

Our Ref: CC-EN-0037 ELP 1018



Dr Paul Vogel  
Chairman  
Environmental Protection Authority  
Locked Bag 33, Cloisters Square  
**PERTH WA 6850**

31 October 2013

Dear Dr. Vogel

### **CHRISTMAS CREEK EXPANSION PROJECT – REFERRAL OF REVISED PROPOSAL**

Under Section 38 of the *Environmental Protection Act 1986*, Chichester Metals Ltd, a subsidiary of Fortescue Metals Group Limited (Fortescue) wishes to refer a revised proposal for the Christmas Creek Mine, the Christmas Creek Expansion Project (the Project). Please find enclosed the completed EPA Referral Form for consideration.

The Project is located approximately 100 km north-west of Newman in the Pilbara region of Western Australia, adjacent to Fortescue's Cloudbreak operations. The Project consists of expanding production from the Christmas Creek which will require increasing the disturbance footprint from 10,135.5 ha as approved under Ministerial Statement 707, to approximately 18,335 ha. The Proposal will also include, but is not limited to:

- increasing the export tonnage of iron ore product to 85 Mtpa
- construction and operation of additional tailings facilities
- construction and operation of additional waste dumps
- dewatering up to 110 GLpa to support ongoing mining below the water table and injection of up to 110 GLpa of surplus water
- potable and process water requirement of up to 25 GLpa to be supplied from:
  - water recovered during dewatering; and/or
  - expansion and operation of a desalination plant; and/or
  - excess water supplied from nearby mining operations, including Cloudbreak; and/or
  - water supply borefield.
- surface water management infrastructure.

**The New Force in Iron Ore**  
**[www.fmgil.com.au](http://www.fmgil.com.au)**

Fortescue Metals Group Limited ABN 57 002 594 872 ACN 002 594 872  
ADDRESS Level 2, 87 Adelaide Terrace, East Perth, Western Australia 6004  
POSTAL ADDRESS PO Box 6915, East Perth, Western Australia 6892  
TEL +61 8 6218 8888 FAX +61 8 6218 8880 EMAIL [fmgil@fmgil.com.au](mailto:fmgil@fmgil.com.au)

Fortescue considers that the Project could be assessed by an 'Assessment by Proponent Information' (API), for the following reasons:

- there are a limited number of environmental factors, which are well understood
- Fortescue has established a management framework at Christmas Creek and Cloudbreak, to manage potential environmental impacts arising from its operations
- there is an established condition-setting framework for the environmental factors which are likely to be applicable to the Project (Ministerial Statements 707, 871 and 899)
- Fortescue has established relationships with Government and non-Government stakeholders
- limited public interest has been received from recent projects in the Chichester area.

If you have any queries regarding the enclosed information please do not hesitate to contact Rachael Sharp, Fortescue's Senior Environmental Advisor for the Christmas Creek Project on 08 6218 8805 or [rsharp@fmgl.com.au](mailto:rsharp@fmgl.com.au).

Yours sincerely

**FORTESCUE METALS GROUP**



**ISAK BUITENDAG**

Director, External Relations

**Enc.**

Attachment 1 EPA Referral Form – Proponent



# Environmental Protection Authority

GOVERNMENT OF  
WESTERN AUSTRALIA

## Referral of a Proposal by the Proponent to the Environmental Protection Authority under Section 38(1) of the *Environmental Protection Act 1986*.

EPA REFERRAL  
FORM  
PROPONENT

### PURPOSE OF THIS FORM

Section 38(1) of the *Environmental Protection Act 1986* (EP Act) provides that where a development proposal is likely to have a significant effect on the environment, a proponent may refer the proposal to the Environmental Protection Authority (EPA) for a decision on whether or not it requires assessment under the EP Act. This form sets out the information requirements for the referral of a proposal by a proponent.

Proponents are encouraged to familiarise themselves with the EPA's *General Guide on Referral of Proposals* [see Environmental Impact Assessment/Referral of Proposals and Schemes] before completing this form.

A referral under section 38(1) of the EP Act by a proponent to the EPA must be made on this form. A request to the EPA for a declaration under section 39B (derived proposal) must be made on this form. This form will be treated as a referral provided all information required by Part A has been included and all information requested by Part B has been provided to the extent that it is pertinent to the proposal being referred. Referral documents are to be submitted in two formats – hard copy and electronic copy. The electronic copy of the referral will be provided for public comment for a period of 7 days, prior to the EPA making its decision on whether or not to assess the proposal.

### CHECKLIST

Before you submit this form, please check that you have:

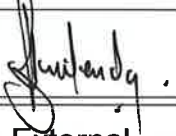
	Yes	No
Completed all the questions in Part A (essential).	✓	
Completed all applicable questions in Part B.	✓	
Included Attachment 1 – location maps.	✓	
Included Attachment 2 – additional document(s) the proponent wishes to provide (if applicable).	✓	
Included Attachment 3 – confidential information (if applicable).		✓
Enclosed an electronic copy of all referral information, including spatial data and contextual mapping but excluding confidential information.	✓	

Following a review of the information presented in this form, please consider the following question (a response is optional).

Do you consider the proposal requires formal environmental impact assessment?		
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not sure
If yes, what level of assessment?		
<input checked="" type="checkbox"/> Assessment on Proponent Information	<input type="checkbox"/> Public Environmental Review	

**PROPONENT DECLARATION** (to be completed by the proponent)

I, Isak Buitendag (full name) declare that I am authorised on behalf of Chichester Metals Pty Ltd (being the person responsible for the proposal) to submit this form and further declare that the information contained in this form is true and not misleading.

Signature 	Name (print): Isak Buitendag
Position: Director, External Relations	Company : Fortescue Metals Group Limited
Date 31/10/2013	

**PART A - PROPONENT AND PROPOSAL INFORMATION**

(All fields of Part A must be completed for this document to be treated as a referral)

**1 PROPONENT AND PROPOSAL INFORMATION**

**1.1 Proponent**

Name	Chichester Metals Pty Ltd, a wholly owned subsidiary of Fortescue Metals Group (Fortescue).
Joint Venture parties (if applicable)	N/A
Australian Company Number (if applicable)	109 264 262
Postal Address  (where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State)	PO Box 6915  East Perth, WA, 6892
Key proponent contact for the proposal:  <ul style="list-style-type: none"> <li>• name</li> <li>• address</li> <li>• phone</li> <li>• email</li> </ul>	Sean McGunnigle Manager, Environmental Approvals  Fortescue Metals Group PO Box 6915 East Perth, WA, 6915  (08) 6218 8415  <a href="mailto:smcgunnigle@fmgl.com.au">smcgunnigle@fmgl.com.au</a>
Consultant for the proposal (if applicable):  <ul style="list-style-type: none"> <li>• name</li> <li>• address</li> <li>• phone</li> <li>• email</li> </ul>	N/A

## 1.2 Proposal

Title	Christmas Creek Expansion Proposal (the Proposal)
Description	<p>The Proposal is located at Christmas Creek in the Pilbara region of Western Australia (Figure 1) and includes the following:</p> <ul style="list-style-type: none"> <li>• increasing the export tonnage of iron ore product to 85 million tonnes per annum (Mtpa)</li> <li>• expanding the disturbance area from 10,135.5 hectares (ha) (as approved under Ministerial Statements 707 and 871) to approximately 18,335 ha within an approximate 33,000 ha Disturbance Envelope</li> <li>• construction and operation of additional tailings facilities</li> <li>• construction and operation of additional waste dumps</li> <li>• dewatering up to 110 gigalitres per annum (GLpa) to support ongoing mining below the water table and injection of up to 110 GLpa of surplus water</li> <li>• potable and process water requirement of up to 25 GLpa to be supplied from:             <ul style="list-style-type: none"> <li>• water recovered during dewatering; and/or</li> <li>• expansion and operation of a desalination plant; and/or</li> <li>• excess water supplied from nearby mining operations, including Cloudbreak; and/or</li> <li>• an external water supply borefield.</li> </ul> </li> <li>• surface water management infrastructure.</li> </ul>
Extent (area) of proposed ground disturbance.	<p>The total approved area of disturbance for the mine is currently 10,135.5 ha; however this existing approved disturbance is not bound by a specific boundary. Since approval of the Project in 2005, Fortescue has expanded the footprint to allow flexibility in the expansion of operations and activities as required. Approximately 8,200 ha of additional disturbance is proposed at Christmas Creek (the Proposal area) within a 33,000 ha Disturbance Envelope (Figure 2).</p>
Timeframe in which the activity or development is proposed to occur (including start and finish dates where applicable).	<p>Mining at Christmas Creek commenced in 2008. The approved Project provides for mining to continue for over 20 years. This Proposal will not extend the Project mine life beyond 2028.</p>

<p>Details of any staging of the proposal.</p>	<p>This Proposal is an expansion of the current Christmas Creek mine. Expansion of the Christmas Creek mine is anticipated to commence in 2015.</p>
<p>Is the proposal a strategic proposal?</p>	<p>No</p>
<p>Is the proponent requesting a declaration that the proposal is a derived proposal?</p> <p>If so, provide the following information on the strategic assessment within which the referred proposal was identified:</p> <ul style="list-style-type: none"> <li>• title of the strategic assessment; and</li> <li>• Ministerial Statement number.</li> </ul>	<p>No</p>
<p>Please indicate whether, and in what way, the proposal is related to other proposals in the region.</p>	<p>The Proposal will be an expansion of the existing mine at Christmas Creek.</p> <p>The existing Christmas Creek mine was proposed as part of the Pilbara Iron Ore and Infrastructure Project, which was referred and approved under Part IV of the <i>Environmental Protection Act 1986</i> (EP Act) in 2005. The Pilbara Iron Ore and Infrastructure Project was approved in two stages:</p> <ul style="list-style-type: none"> <li>• Stage A Project: Port and a north-south railway from Port Hedland to the Chichester Ranges in the Eastern Pilbara to Port Hedland (Ministerial Statement 690)</li> <li>• Stage B Project: Christmas Creek and Mindy Mindy mines and an east-west rail spur (Ministerial Statement 707)</li> </ul> <p>The following approvals have since been obtained for Fortescue projects:</p> <ul style="list-style-type: none"> <li>• Cloud Break Iron Ore Project: The Cloud Break Iron Ore Mine (Ministerial Statement 721)</li> <li>• Port Facility Upgrade: Anderson Point Port Hedland, Dredging and Wharf Construction, Third Berth (Ministerial Statement 771).</li> <li>• Solomon Iron Ore Project (Ministerial Statement 862)</li> <li>• Christmas Creek Water Management Scheme (Ministerial Statement 871)</li> <li>• Cloudbreak Life of Mine (Ministerial Statement 899).</li> </ul>

<p>Does the proponent own the land on which the proposal is to be established? If not, what other arrangements have been established to access the land?</p>	<p>Access to the land is via various mining tenements.</p> <p>The Christmas Creek Mine site falls within tenements granted under the <i>Iron Ore (FMG Chichester Pty Ltd) Agreement Act 2006</i> to Chichester Metals Pty Ltd, a wholly owned subsidiary of Fortescue and includes the following Mining Leases: M46/320, M46/321, M46/322, M46/323, M46/324, M46/325, M46/326, M46/327, M46/328, M46/329, M46/330; M46/331, M46/332, M46/333, M46/334, M46/335, M46/336, M46/337, M46/338, M46/339, M46/340, M46/341, M46/342, M46/343, M46/344, M46/345, M46/346, M46/347, M46/348, M46/349, M46/350, M46/351, M46/352, M46/353, M46/354, M46/355, M46/402, M46/403, M46/405, M46/406, M46/412, M46/413, M46/414, M46/415, M46/416, M46/417, M46/418, M46/419, M46/420, M46/421, M46/422, M46/423, M46/424 and Miscellaneous Licence 46/49, 46/54, 46/55, 46/56, 46/58, 46/66, 46/86, 46/87, 46/99, 46/111, and General Purpose Lease 46/7.</p> <p>The Proposal is located entirely within the Nyiyaparli Native Title boundary (WCO5/6).</p> <p>The Christmas Creek Expansion Proposal is located on Hillside and Roy Hill pastoral leases.</p>
<p>What is the current land use on the property, and the extent (area in hectares) of the property?</p>	<p>The land use of the property is mining and pastoral. A disturbance area of approximately 18,335 ha is proposed for the mine and dewatering infrastructure (Figure 2). This clearing will be undertaken within an approximately 33,000 ha Disturbance Envelope.</p>



### 1.3 Location

Name of the Shire in which the proposal is located.	The Proposal lies within the Shire of East Pilbara.
For urban areas: <ul style="list-style-type: none"> <li>• street address;</li> <li>• lot number;</li> <li>• suburb; and</li> <li>• nearest road intersection.</li> </ul>	N/A
For remote localities: <ul style="list-style-type: none"> <li>• nearest town; and</li> <li>• distance and direction from that town to the proposal site.</li> </ul>	The Christmas Creek mine is located approximately 111 kilometres (km) north-east of Newman in the Pilbara region of Western Australia (Figure 1).
Electronic copy of spatial data - GIS or CAD, geo-referenced and conforming to the following parameters: <ul style="list-style-type: none"> <li>• GIS: polygons representing all activities and named;</li> <li>• CAD: simple closed polygons representing all activities and named;</li> <li>• datum: GDA94;</li> <li>• projection: Geographic (latitude/longitude) or Map Grid of Australia (MGA);</li> <li>• format: Arcview shapefile, Arcinfo coverages, Microstation or AutoCAD.</li> </ul>	Enclosed?: Yes

### 1.4 Confidential Information

Does the proponent wish to request the EPA to allow any part of the referral information to be treated as confidential?	No
If yes, is confidential information attached as a separate document in hard copy?	No

### 1.5 Government Approvals

Is rezoning of any land required before the proposal can be implemented?  If yes, please provide details.	No
Is approval required from any Commonwealth or State Government agency or Local Authority for any part of the proposal?  If yes, please complete the table below.	Yes

Agency/Authority	Approval required	Application lodged Yes / No	Agency/Local Authority contact(s) for proposal
Department of the Environment (DOE) (formerly the Department of Sustainability, Environment, Water, Population and Communities)	Approval under <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	Application to be lodged in parallel with Section 38 referral.	Veronica Richie c/o Referral Business Entry Point, Environmental Assessment Branch  GPO Box 787 Canberra ACT 2601
Department of State Development	Approval under the <i>Government Agreements Act 1979</i>	No	Minister for State Development Department of State Development Level 6, 1 Adelaide Terrace East Perth WA 6004
Department of Water (DoW)	Licence to construct wells for abstraction of groundwater (26D)	No	Kevin Hopkinson Program Manager – Licensing, Pilbara Region
	Licence for abstraction of groundwater or taking of surface water and associated infrastructure (5C)	No	Department of Water PO Box 836 Karratha WA 6714
Department of Environment Regulation (DER)	Works Approval for construction of prescribed premises.	No	Alana Kidd Regional Leader  Pilbara Industry Regulation
	Licences and Registrations for prescribed premises.	No	Department of Environment Regulation PO Box 835 Karratha WA 6714
Department of Mines and Petroleum (DMP)	Dangerous Goods Licence.	No	TBD

<b>Agency/Authority</b>	<b>Approval required</b>	<b>Application lodged Yes / No</b>	<b>Agency/Local Authority contact(s) for proposal</b>
Department of Health (DoH)	Application for construction and installation of a sewage treatment system	No	TBD
	Approvals for potable water systems	No	TBD
Shire of East Pilbara	Application for construction and installation of a sewage treatment system	No	TBD
	Planning applications	No	TBD
	Building licences	No	TBD

## PART B - ENVIRONMENTAL IMPACTS AND PROPOSED MANAGEMENT

### 2 ENVIRONMENTAL IMPACTS

Describe the impacts of the proposal on the following elements of the environment, by answering the questions contained in Sections 2.1-2.11:

- 2.1 flora and vegetation;
- 2.2 fauna;
- 2.3 rivers, creeks, wetlands and estuaries;
- 2.4 significant areas and/ or land features;
- 2.5 coastal zone areas;
- 2.6 marine areas and biota;
- 2.7 water supply and drainage catchments;
- 2.8 pollution;
- 2.9 greenhouse gas emissions;
- 2.10 contamination; and
- 2.11 social surroundings.

These features should be shown on the site plan, where appropriate.

For all information, please indicate:

- (a) the source of the information; and
- (b) the currency of the information.

#### 2.1 Flora and Vegetation

2.1.1 Do you propose to clear any native flora and vegetation as a part of this proposal?

[A proposal to clear native vegetation may require a clearing permit under Part V of the EP Act (Environmental Protection (Clearing of Native Vegetation) Regulations 2004)]. Please contact the Department of Environment and Conservation (DEC) [*now the Department of Environment Regulation - DER*] for more information.

- (please tick)  Yes **If yes**, complete the rest of this section.  
 No **If no**, go to the next section

2.1.2 How much vegetation are you proposing to clear (in hectares)?

The Proposal includes clearing of up to 8,200 ha at the mine site, in addition to the current approval for 10,135 ha.

2.1.3 Have you submitted an application to clear native vegetation to the DER (unless you are exempt from such a requirement)?

Yes

No

**If yes**, on what date and to which office was the application submitted of the DER?

It is anticipated that the Proposal will be formally assessed; therefore, there will be no requirement for a Native Vegetation Clearing Permit under Part V of the EP Act.

2.1.4 Are you aware of any recent flora surveys carried out over the area to be disturbed by this proposal?

Yes

No

**If yes**, please attach a copy of any related survey reports and provide the date and name of persons / companies involved in the survey(s).

**If no**, please do not arrange to have any biological surveys conducted prior to consulting with the DER.

Recent flora and vegetation investigations relevant to the Proposal include the following:

- Astron 2010, *Christmas Creek Groundwater Dependant Vegetation Study: Literature Review and Risk Assessment Focusing on the Fortescue Marsh.*
- Biota Environmental Sciences (Biota) 2004a, *Fortescue Metals Group Ltd Stage B Rail Corridor, Christmas Creek, Mt Lewin, Mt Nicholas and Mindy Mindy Mine Areas, Flora and Vegetation Survey.*
- Biota 2004b, *Fortescue Metals Group Ltd Stage B Rail Corridor, Christmas Creek, Mt Lewin, Mt Nicholas and Mindy Mindy Mine Areas, Flora and Vegetation Survey.*
- Biota 2004c, *Potential Impacts on Groundwater Dependant Vegetation*, Letter to Fortescue Metals Group Ltd.
- ENV Australia Pty Ltd 2010, *Christmas Creek and Cloudbreak Vegetation Assessment.*
- ENV Australia Pty Ltd 2013a, *Christmas Creek Life of Mine Flora and Vegetation Assessment Update (Attachment 2A).*
- Mattiske Consulting Pty Ltd (Mattiske) 2005, *Flora and Vegetation on the Cloudbreak and White Knight Leases.*
- Mattiske 2007, *Flora and Vegetation near Fortescue Marshes.*
- Muller 2005, *Water Flow in Mulga Areas Adjoining Fortescue Marsh.*

2.1.5 Has a search of DEC [now the Department of Parks and Wildlife DPAW] records for known occurrences of rare or priority flora or threatened ecological communities been conducted for the site?

Yes

No

If you are proposing to clear native vegetation for any part of your proposal, a search of DPAW records of known occurrences of rare or priority flora and threatened ecological communities will be required. Please contact DPAW for more information.

A desktop assessment (Department of Parks and Wildlife (DPAW) database searches and previous surveys) identified known records for 46 Priority listed flora and Declared Rare Flora (DRF) within 50 km of the study area (including Christmas Creek and surrounding areas). A table outlining these species and their likelihood of occurrence at Christmas Creek is presented below in Table 1.

**Table 1 Conservation significant flora occurring within 50 km of the study area**

Species	Conservation status	Suitable habitat present	Closest record	Likelihood of occurrence in the study area <sup>1</sup>
<i>Acacia aphanoclada</i>	P1	Yes	Within 25 km	Possible
<i>Acacia cyperophylla</i> var. <i>omearana</i>	P1	Yes	Within 25 km	Possible
<i>Acacia effuse</i>	P3	No	N/A	Unlikely
<i>Acacia fecunda</i>	P3	Yes	Within 25 km	Possible
<i>Acacia</i> sp. Nullagine (B.R. Maslin 4955)	P1	Yes	Within 25 km	Possible
<i>Acacia subtiliformis</i>	P3	No	Within 25 km	Unlikely
<i>Amaranthus centralis</i>	P3	Yes	Within 25 km	Possible
<i>Aristida jerichoensis</i> var. <i>Subspinulifera</i>	P1	Yes	Within 25 km	Possible
<i>Atriplex spinulosa</i>	P1	Yes	Within 25 km	Possible
<i>Atriplex flabelliformis</i>	P3	Yes	In study area	Recorded
<i>Brachyscome</i> sp. Wanna Munna Flats (S. van Leeuwen 4662)	P1	Yes	Within 25 km	Possible
<i>Brunonia</i> sp. Long Hairs (D.E Symon 2440)	P1	Yes	Within 25 km	Possible
<i>Bulbostylis burbridgeae</i>	P4	No	Within 50 km	Unlikely
<i>Calotis squamigera</i>	P1	Yes	In study area	Recorded
<i>Eremophila magnifica</i> subsp. <i>velutina</i>	P3	No	Within 25 km	Unlikely

<sup>1</sup> Likely – suitable habitat, close (<10 km) records and/or field survey completed in sub-optimal season, suggest species is likely to occur;

Possible – suitable habitat, records (<50 km) and/or field survey completed in sub-optimal season, suggests species possibly occurs; and

Unlikely – lack of suitable habitat, no records (<50 km) and/or field survey completed in optimal season, suggest species is unlikely to occur.

Species	Conservation status	Suitable habitat present	Closest record	Likelihood of occurrence in the study area <sup>1</sup>
<i>Eremophila pilosa</i>	P1	Yes	Within 38 km	Possible
<i>Eremophila spongiocarpa</i>	P1	Yes	In study area	Recorded
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	Yes	In study area	Recorded
<i>Glycine falcata</i>	P3	No	Within 25 km	Unlikely
<i>Goodenia lyrata</i>	P3	No	Within 25 km	Unlikely
<i>Goodenia nuda</i>	P4	Yes	In study area	Recorded
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	P3	No	Within 25 km	Unlikely
<i>Helichrysum oligochaetum</i>	P1	Yes	Within 42 km	Possible
<i>Indigofera ixocarpa</i>	P2	No	Within 25 km	Unlikely
<i>Lotasperma sessilifolium</i>	P3	Yes	Within 50 km	Possible
<i>Lepidium catapycnon</i>	DRF	No	39 km	Unlikely
<i>Myriocephalus scalpellus</i>	P1	Yes	Within 25 km	Possible
<i>Nicotiana heterantha</i>	P1	Yes	In study area	Recorded
<i>Nicotiana umbratica</i>	P3	No	Within 25 km	Unlikely
<i>Peplidium</i> sp. Fortescue Marsh (S. van Leeuwen 4865)	P1	No	21 km	Unlikely
<i>Ptilotus mollis</i>	P4	Yes	Within 29 km	Possible
<i>Phyllanthus aridus</i>	P3	Yes	In study area	Recorded
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	P3	Yes	In study area	Recorded
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	P3	Yes	In study area	Recorded
<i>Rhynchosia bungarensis</i>	P4	No	Within 53 km	Unlikely
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	P3	No	Within 53 km	Unlikely
<i>Stemodia</i> sp. Battle Hill (A.L. Payne 1006)	P1	Yes	Within 37 km	Possible
<i>Stylidium weeliwollii</i>	P2	Yes	Within 32 km	Possible
<i>Tecticornia globulifera</i> (formerly <i>T. sp.</i> Fortescue Marsh)	P1	Yes	In study area	Recorded
<i>Tecticornia medusa</i> (formerly <i>T. sp.</i> Roy Hill)	P3	Yes	In study area	Recorded
<i>Tecticornia</i> sp. Christmas Creek	P1	Yes	In study area	Recorded

Species	Conservation status	Suitable habitat present	Closest record	Likelihood of occurrence in the study area <sup>1</sup>
(K.A. Shepherd & T. Colmer et al. KS 1063)				
<i>Teucrium pilbaranum</i>	P1	Yes	N/A <sup>2</sup>	Possible
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3	Yes	In study area	Recorded
<i>Tribulus minutus</i>	P1	No	Within 25 km	Unlikely
<i>Triodia triticoides</i>	P1	No	Kimberley record	Unlikely
<i>Vigna</i> sp. Central (M.E. Trudgen 1626)	P2	Yes	In study area	Recorded

2.1.6 Are there any known occurrences of rare or priority flora or threatened ecological communities on the site?

Yes

No

**If yes**, please indicate which species or communities are involved and provide copies of any correspondence with DPAW regarding these matters.

The Proposal is located adjacent to the Fortescue Marsh, which contains the Fortescue Marsh Priority 1 Priority Ecological Community (PEC). This community is described by the DPAW as containing “endemic *Eremophila* species and several near endemic and new to science Samphires” (DEC 2009). The Proposal is also within 25 km of the PEC buffer for the Fortescue Valley Sand Dunes community (Priority 3).

The most recent surveys conducted by ENV (2013a) recorded 13 species of Priority flora at low densities (<1% to 2%):

- *Calotis squamigera* (Priority 1)
- *Eremophila spongioarpa* (Priority 1)
- *Nicotiana heterantha* (Priority 1)
- *Tecticornia* sp. Christmas Creek (K.A. Shepherd and T. Colmer et al. KS 1063) (Priority 1)
- *Tecticornia globulifera* (formerly *T.* sp. Fortescue Marsh) (K.A. Shepherd et al. KS 1055) (Priority 1)
- *Vigna* sp. Central (M.E. Trudgen 1626) (Priority 2)
- *Atriplex flabelliformis* (Priority 3)
- *Eleocharis papillosa* (Priority 3)
- *Rhagodia* sp. Hamersley (M. Trudgen 17794) (Priority 3)
- *Rostellularia adscendens* var. *Latifolia* (Priority 3)

<sup>2</sup> N/A: coordinates not available



- *Tecticornia medusa* (formerly *T. sp. Roy Hill*) (H. Pringle 62) (Priority 3)
- *Eremophila youngii* subsp. *Lepidota* (Priority 4)
- *Goodenia nuda* (Priority 4).

Two additional Priority listed Flora were identified within the Proposal area during the earlier flora surveys conducted at Christmas Creek (Biota 2004, ENV 2010, Mattiske 2005; 2007):

- *Phyllanthus aridus* (Priority 3)
- *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (Priority 3).

In addition to species listed from the Proposal area, a number of Priority flora species have been recorded in close proximity to the Proposal area during previous surveys (Biota 2004, ENV 2010, Mattiske 2005, 2007):

- *Eremophila pilosa* (Priority 1)
- *Helichrysum oligochaetum* (Priority 1)
- *Myriocephalus scalpellus* (Priority 1)
- *Peplidium* sp. Fortescue Marsh (Priority 1)
- *Stylidium weeliwolli* (Priority 2).

2.1.7 If located within the Perth Metropolitan Region, is the proposed development within or adjacent to a listed Bush Forever Site? (You will need to contact the Bush Forever Office, at the Department for Planning and Infrastructure)

Yes

No

**If yes**, please indicate which Bush Forever Site is affected (site number and name of site where appropriate).

2.1.8 What is the condition of the vegetation at the site?

The recent survey undertaken by ENV (2013a) rated vegetation condition between Excellent and Completely Degraded, with the majority being in Very Good condition, in accordance with Trudgen's vegetation scale (1991) (ENV 2013a). Areas associated with current mining were generally rated as Completely Degraded. Areas in the north and north-west were considered in Excellent to Very Good condition with little disturbance from cattle and only occasional invasive introduced flora (ENV 2013a). The flats, plains, drainage lines and creeks were rated from Excellent to Good, however disturbance has occurred in these areas due to cattle, tracks and introduced flora (ENV 2013a).

Mulga communities ranged from Excellent to Poor condition, depending on the density and types of weeds present and the extent of soil erosion resulting from cattle grazing (ENV 2013a).

Vegetation communities across the Proposal area are presented in Figure 3.

## 2.2 Fauna

2.2.1 Do you expect that any fauna or fauna habitat will be impacted by the proposal?

(please tick)  Yes **If yes**, complete the rest of this section.

No **If no**, go to the next section.

2.2.2 Describe the nature and extent of the expected impact.

There are five broad fauna habitats present within the Proposal and surrounding areas (Ecologia 2010) (Figure 4). For consistency across the Proposal area, habitat mapping in the ENV (2012a) investigation is based on the broad fauna habitats identified by Ecologia. Table 2 summarises the broad habitat types identified by Ecologia 2010 and the equivalent habitat type as determined by ENV (2012a).

**Table 2 Broad habitat types within the Proposal area and surrounds**

Ecologia habitat type	ENV habitat type	Habitat value
Spinifex covered hills and ranges	Low hill	Low
Creek lines with acacia shrublands and eucalypt open woodlands	Drainage line and alluvial plain	Moderate
Low mulga shrubland	Stony plain	Low
Low halophytic shrubland (samphire)	Marsh	Moderate
Water and floodplain (ephemeral)	Marsh	High

Source: Ecologia (2010) and ENV (2012a).

For the purpose of this referral, the Ecologia (2010) fauna habitats will be referenced as these are consistent with those used in the previous *Christmas Creek Water Management Scheme Environmental Review* (FMG 2010) and Cloudbreak reporting.

The low halophytic shrubland occurs within the boundary of the Fortescue Marsh, moving into low mulga woodland on alluvial flats, followed by Spinifex-covered hills and ranges in the uplands (Figure 4). Running north-south into the Fortescue Marsh are creeklines supporting either acacia shrubland or eucalypt woodland (Ecologia 2010).

The Fortescue Marsh is located to the south of the Proposal area (Figure 4) and consists of an area of extensive, episodically inundated samphire marsh, which corresponds to the ephemeral water and floodplain habitat type. The Fortescue Marsh represents the terminus for the upper Fortescue River. Following episodic heavy rainfall, the Marsh supports immense waterbird breeding (CALM 2002).

The Proposal will involve clearing of up to 8,200 ha of vegetation within the Disturbance Envelope adjacent to the existing 10,135.5 ha approved for clearing under Ministerial Statement 707 (Indicative Approved Footprint, Figure 2).

Very little low halophytic shrubland habitat occurs within the Disturbance Envelope. The low halophytic shrubland is not expected to be significantly directly impacted by the proposed development. Indirect impacts from dewatering and

injection of surplus water has the potential to affect fauna habitat, including the nearby Fortescue Marsh, by changing the local groundwater regime. Modelling of changes to groundwater levels likely to occur as a result of the Proposal is being undertaken to establish an abstraction/injection regime that will minimise impacts on vegetation and fauna habitat. It is anticipated that some habitats will be impacted by drawdown and mounding during the life of the mine.

The low mulga shrubland, spinifex-covered hills and ranges and creekline habitats are widespread throughout the Pilbara (ENV 2012a). The creekline habitat was the most species rich for birds after the floodplains; however, there were few species of conservation significance (ENV 2012a). Reptiles were species rich in most habitat types, with the exception of the low mulga woodland (ENV 2012a). The creekline habitat is generally rich in species, hosting large populations of amphibians (ENV 2012a).

Despite the presence of good condition vegetation from the Proposal area, it is considered that habitat of the Proposal area has been degraded and altered over time through cattle grazing and altered fire regimes (ENV 2012a).

From a subterranean fauna perspective, habitat of the Proposal area represents an extensive area of repetitive geological and hydrogeological heterogeneity, both laterally and vertically (Bennelongia 2012). The same geological and hydrogeological units extend from the BHP Billiton Iron Ore rail line in the west to the vicinity of the Nullagine-Newman Road in the east (Bennelongia 2012). In the south, the units are bounded by the Fortescue Marsh and to the north by the margin of the exposed Marra Mamba of the Chichester Range (Bennelongia 2012).

It is considered likely that this area represents connected habitat for both troglofauna and stygofauna; therefore, troglofauna and stygofauna are unlikely to be restricted to the Proposal area (Bennelongia 2012).

2.2.3 Are you aware of any recent fauna surveys carried out over the area to be disturbed by this proposal?

Yes

No

**If yes**, please attach a copy of any related survey reports and provide the date and name of persons / companies involved in the survey(s).

**If no**, please do not arrange to have any biological surveys conducted prior to consulting with the DPAW.

Fauna surveys previously undertaken over the Christmas Creek mining leases and surrounds are listed below:

#### **Terrestrial fauna**

- Biota 2005, *Fauna habitats and fauna assemblages of proposed the FMG Stage B rail corridor and Mindy Mindy, Christmas Creek, Mt Lewin and Mt Nicholas mine areas.*
- Bamford Consulting Ecologists (Bamford) 2005b, *Survey for the Night Parrot *Pezoporus occidentalis* in the Cloud Break Project Area*, May 2005.
- Bamford Consulting Ecologists (Bamford) 2006, *Survey for the Night Parrot *Pezoporus occidentalis* in the Cloud Break Project Area*, March 2006.

- Bamford Consulting Ecologists (Bamford) 2007a, *Night Parrot survey November-December 2006 at FMG's Cloudbreak site.*
- Bamford Consulting Ecologists (Bamford) 2007b, *Survey of the Night Parrot Pezoporus occidentalis in the Cloud Break Project Area*, November 2007.
- Bamford Consulting Ecologists (Bamford) 2009, *Report on September 2008 search for the Night Parrot.*
- Bamford Consulting Ecologists (Bamford) 2010, *Report on September 2009 search for the Night Parrot.*
- Bamford Consulting Ecologists (Bamford) 2011, *Report on the 2010 search for the Night Parrot.*
- Ecologia 2010, Christmas Creek, *Terrestrial Fauna Desktop Fauna Assessment.*
- ENV Australia (ENV) 2012a, *Christmas Creek Life of Mine Vertebrate Fauna and Fauna Habitat Assessment (Attachment 2C).*
- ENV 2012b, *Assessment of Potential Fauna Diggings, Christmas Creek*
- Subterranean Ecology 2012, *Christmas Creek Life of Mine Project Terrestrial SRE Invertebrate Survey.*

#### **Subterranean fauna**

- Bennelongia Environmental Consultants 2008, *Assessment of stygofauna values at the Christmas Creek Project.*
- Bennelongia Environmental Consultants 2012, *Christmas Creek Life of Mine Assessment, Subterranean Fauna Assessment.*
- Ecologia Environment 2006, *Pilbara Iron Ore and Infrastructure Project: Stage B and Cloudbreak, Christmas Creek and Mindy Mindy Mine sites, revised Stygofauna sampling plan.*
- Ecowise Environmental 2007, *Stygofauna survey plan – Cloudbreak, Christmas Creek and Mindy Mindy Mine sites.*
- Knott, B & Goater S 2004, *Report for Fortescue Metals Group Ltd – Pilbara Iron Ore Mine Sites.*

2.2.4 Has a search of DPAW records for known occurrences of Specially Protected (threatened) fauna been conducted for the site?

Yes       No      (please tick)

2.2.5 Are there any known occurrences of Specially Protected (threatened) fauna on the site?

Yes       No      **If yes**, please indicate which species or communities are involved and provide copies of any correspondence with DPAW regarding these matters.

## Terrestrial fauna

Desktop analysis as part of the recent fauna survey (ENV 2012a) determined 25 conservation significant species have been recorded or are known to occur within the vicinity of the Proposal area. Of these, four were recorded during the current survey (ENV 2012a) including the following:

- Pilbara Olive Python (*Liasis olivaceus barroni*) Vulnerable (EPBC Act); Schedule 1 (*Wildlife Conservation Act 1950* (WC Act))
- Australian Bustard (*Ardeotis australis*) Priority 4 (WC Act)
- Star Finch (*Neochmia ruficauda clarescens*) Priority 4 (WC Act)
- Rainbow Bee-eater (*Merops ornatus*) Migratory (EPBC Act).

The following conservation significant species have been recorded within the Christmas Creek area during previous surveys:

- Bush Stonecurlew (*Burhinus grallarius*) Priority 4 species
- Short-tailed Mouse (*Leggadina lakedownensis*) Priority 4 species
- Grey Falcon (*Falco hypoleucos*) Priority 4 species (Ecologia 2011)
- White-bellied Sea-eagle (*Haliaeetus leucogaster*) Migratory (EPBC Act).

In addition, ENV undertook a targeted survey of the Proposal area to verify the presence or absence of the Northern Quoll, Pilbara Olive Python and the Western Pebble-mound Mouse (ENV 2012a). The survey found no Northern Quoll or Pilbara Olive Python; however, the Western Pebble-mound Mouse was recorded.

Species identified in the desktop analysis including previous surveys in the vicinity (less than 50 km radius) and database searches together with results of additional targeted surveys are presented in Table 3 with the likelihood of occurrence for each species.

A Short Range Endemic (SRE) invertebrate fauna survey of the Disturbance Envelope was undertaken by Subterranean Ecology (2011). The survey found 26 target SRE taxa from six invertebrate orders of which no specimens are considered 'confirmed SRE' species (Subterranean Ecology 2011). Four taxa are considered 'potential SRE', pending further resolution of their identification and SRE status.

[This page has been left blank intentionally]



Species	Conservation status <sup>3</sup>	Habitat relevance	Likelihood <sup>4</sup>
Princess Parrot ( <i>Polytelis alexandrae</i> )	Vulnerable	Identified by a search of the Department of the Environment (DOE) <i>Protected Matters Search Tool</i> (2011) but has not recorded in the Proposal area. The Princess Parrot inhabits sand dunes and sand flats in the arid zone of western and central Australia (DOE 2012). This type of habitat does not occur in the vicinity of the Proposal area.	Unlikely
Fork-tailed Swift ( <i>Apus pacificus</i> )	Migratory	As this species forages high in the airspace it is reasonably independent of the habitats within the Proposal area. The species will only be found in the Proposal area on an infrequent basis. There are no previous records of the species in the vicinity of the Proposal area.	Possible
Cattle Egret ( <i>Ardea ibis</i> )	Migratory	Despite the limited records in the vicinity of the Proposal area, this species is well known from the Pilbara region. The creeklines and floodplains, with thick grass provides suitable habitat for this species, especially where surface water is present.	Likely
Eastern Great Egret ( <i>Ardea modesta</i> )	Migratory	The creekline habitat type and ephemeral wet areas (when wet) provides suitable foraging and breeding habitat for this species but only when surface water is present. One individual was recorded close to the current Proposal area during a previous survey (Biota 2005).	Likely
White-bellied Sea-eagle ( <i>Haliaeetus leucogaster</i> )	Migratory	The creeklines and floodplains habitats of the Proposal area contain surface water that may provide foraging habitat for this species. However, this species is know from more marine or coastal habitats in Western Australia and only infrequently will venture inland. One specimen was recorded in the Marsh habitat of the Proposal area (Bamford 2010).	Recorded
Grey Falcon ( <i>Falco hypoleucos</i> )	P4	Possible nesting habitat occurs for this species in the large trees found in the creekline habitat of the Proposal area. This species has been recorded within the Proposal area (Bamford 2005, 2010) and within 40 km of the Proposal area (DEC 2011c).	Recorded
Peregrine Falcon ( <i>Falco peregrinus</i> )	S4	The creekline habitat of the Proposal area provides suitable habitat for this species. Prey items are abundant and this species may forage across all parts of the Proposal area as part of a wider home range. The spinifex hills habitat present in the Proposal area lack the high cliffs preferred by this species for its nesting positions. This species has been recorded in close proximity to the Proposal area (DEC 2011c, Biota 2005, Bamford 2005, 2010).	Likely
Australian Bustard ( <i>Ardeotis australis</i> )	P4	The low mulga shrublands of the Proposal area are ideal habitats for the Australian Bustard. Nine individuals were recorded in this habitat type during the ENV (2012a) survey.	Recorded
Bush Stone-curlew	P4	The creeklines and low mulga shrublands, specifically those adjacent to the creekline	Recorded



<b>Species</b>	<b>Conservation status<sup>3</sup></b>	<b>Habitat relevance</b>	<b>Likelihood<sup>4</sup></b>
<i>(Burhinus grallarius)</i>		habitats, are the preferred habitat for this species. This species has been recorded within 40 km from the Proposal area (Ecologia 2011).	
Oriental Plover <i>(Charadrius veredus)</i>	Migratory	The spinifex hills of the Proposal area contain large areas of Spinifex that provide suitable foraging habitat for this species. However, previous records of this species in the vicinity of the Proposal area are lacking.	Possible
Wood Sandpiper <i>(Tringa glareola)</i>	Migratory	The floodplains and creekline habitats of the Proposal area contain ephemeral freshwater wetlands, which are a suitable habitat for this species when in flood. This species has been recorded in the Fortescue Marsh in the vicinity of the Proposal area (Bamford 2010).	Likely
Common Greenshank <i>(Tringa nebularia)</i>	Migratory	The floodplains and creekline habitats of the Proposal area contains freshwater wetlands which are a suitable habitat for this species. This species has been recorded in the Fortescue Marsh in the vicinity of the Proposal area (Bamford 2010).	Likely
Rainbow Bee-eater <i>(Merops ornatus)</i>	Migratory	All of the habitat types provide suitable foraging habitat for this species. The creekline habitat type has soft substrates, which are suitable as nesting sites, particularly in exposed river banks. This species has been recorded in the low mulga shrubland, low halophytic shrubland and creekline habitat types.	Recorded
Star Finch <i>(Neochmia ruficauda clarescens)</i>	P4	The low halophytic shrublands, low mulga shrubland and creeklines of the Proposal area provide suitable habitat for this species. This species was opportunistically recorded in the Creekline habitat during the ENV (2012a) survey. Star finches been recorded in the vicinity of the Proposal area (Bamford 2005).	Recorded
<b>Mammals</b>			
Northern Quoll <i>(Dasyurus hallucatus)</i>	Endangered, S1	Suitable rocky escarpment habitat is not present in the Proposal area. The only previous records of this species in the area are from more than thirty years ago (DEC 2011c).	Possible
Pilbara Leaf-nosed Bat <i>(Rhinonicteris aurantia)</i>	Vulnerable, P4	Recorded from Cloudbreak, 40 km west of the study area (Ecologia 2010). No suitable roosting habitat occurs in the area.	Possible

Species	Conservation status <sup>3</sup>	Habitat relevance	Likelihood <sup>4</sup>
Greater Bilby ( <i>Macrotis lagotis</i> )	Vulnerable, S1	The sandy substrates preferred by this species are only present in the low halophytic shrublands and creeklines habitat type. Previous indications of diggings at Christmas Creek are considered by ENV (2012b) to have been made by Sand Goanna <i>Varanus gouldii</i> and Yellow-spotted Monitor <i>V. panoptes</i> . The ENV (2012b) survey found no evidence of the presence of Greater Bilbies.	Unlikely
Ghost Bat ( <i>Macroderma gigas</i> )	Near threatened, P4	There are no suitable roost sites for this species within the Proposal area. If suitable roosting sites are located near the Proposal area, this species can be expected to forage over all habitat types. This species has been recorded within 40 km of the Proposal area.	Possible
Brush-tailed Mulgara ( <i>Dasyercus blythi</i> )	P4	The Proposal area lacks the sandy substrate preferred by this species to burrow in. However, this species has been recorded within 40 km of the Proposal area (DEC 2011c).	Possible
Northern Short-tailed Mouse ( <i>Leggadina lakedownensis</i> )	P4	The low mulga shrubland of the Proposal area provide suitable habitat for this species, however the clay pans and sandy clay depressions favoured by this species are absent. This species has been recorded in the Proposal area (Biota 2005) and within 40 km of the Proposal area (DEC 2011c).	Recorded
Western Pebble-mound Mouse ( <i>Pseudomys chapmani</i> )	P4	The Spinifex Hill habitat type provides suitable habitat for this species. Pebble-mound mouse is considered likely to occur in the area (Ecologia 2010). This species has been recorded within 40 km of the Proposal area (DEC 2011c, Bamford 2005, Biota 2005).	Recorded
Northern Marsupial Mole ( <i>Notoryctes caurinus</i> )	Endangered	The Proposal area lacks the sandy substrate preferred by this species to burrow in.	Unlikely

Source: adapted from ENV (2012a)

### Subterranean fauna

A survey of stygofauna was undertaken in 2008 by Bennelongia (2008). The survey recorded a possible 32 species of Stygofauna from 10 orders. All but one of the species (*Bathynella* sp) are known from outside of the Disturbance Envelope, providing little evidence to suggest this Stygofauna community is characterized by restricted species (Bennelongia 2008). *Bathynella* sp. was found from two locations within existing or proposed pit locations.

Additional investigations of the Disturbance Envelope were undertaken by Bennelongia, incorporating an assessment of stygofauna and troglifauna (2012 in progress). Three species of troglifauna were collected as singletons known only from within the Disturbance Envelope, however it is unlikely that these species are restricted to the Disturbance Envelope given the occurrence of surrounding connected habitat (Bennelongia 2012).

Six species of stygofauna may be impacted by the Proposal; however, habitat assessment indicates the presence of repetitive geological and hydrogeological heterogeneity on a scale of ten to hundreds of metres, both laterally and vertically (Bennelongia 2012). It is likely that both stygofauna and troglifauna utilise this connectivity.

## 2.3 Rivers, Creeks, Wetlands and Estuaries

### 2.3.1 Will the development occur within 200 metres of a river, creek, wetland or estuary?

- (please tick)       Yes      **If yes**, complete the rest of this section.  
                          No      **If no**, go to the next section.

No mining infrastructure will be placed within 200 m of the Fortescue Marsh; however, water management infrastructure may be required to be located in this area as part of the Proposal. The Proposal will require diversion of creeks around mine pits and waste dumps. These creeks discharge into the Fortescue Marsh. Fortescue is undertaking surface water assessments to ascertain the impacts of these diversions on water flows within these creeklines.

Locations of creeklines and watercourses across the Proposal area and surrounding area are provided in Figure 5. Required creek diversions are being determined through the Proposal planning phase and will be dependent on final mine and infrastructure design.

The Proposal will require dewatering of below the watertable mine areas to allow safe access to the ore. To facilitate ore extraction, dewatering of the semi-confined Marra Mamba orebody aquifer is planned.

Some abstracted groundwater will be used for operational purposes and transfer to other sites, including Cloudbreak, as required. Surplus water will be disposed of using a Managed Aquifer Recharge (MAR) strategy for the life of mine. Abstracted groundwater that is fresh or brackish will be injected back into the orebody aquifer. Abstracted groundwater that is saline will be injected into the Oakover aquifer, a saline groundwater system overlain by approximately 50 m of Tertiary sediments located to the south of the Christmas Creek mining area. Abstraction and injection activities in the deeper groundwater systems could potentially affect groundwater levels in surficial aquifers. This has the potential to affect vegetation condition in

the vicinity of the Fortescue Marsh in situations where groundwater contributes to vegetation water use requirements. On-ground investigations and modelling are being undertaken to investigate the potential impacts of dewatering and reinjection on the hydrogeology of the site and the ecology of the Fortescue Marsh.

Preliminary results of the hydrogeological model indicate that the maximum drawdown at the existing marsh monitoring bores is expected to be approximately 1.7 m, and the maximum drawdown in sensitivity analysis is approximately 2.3 m.

Preliminary results of the unsaturated zone Hydrus model, together with plant physiology studies undertaken by the University of Western Australia, suggest that the Samphire vegetation which fringes the Fortescue marsh is unlikely to be significantly impacted by groundwater drawdown of up to 3 m.

Given the proximity of the Proposal to the Fortescue Marsh and the planned dewatering activities as part of the Proposal, an adaptive water management strategy and management plan that considers potential impacts upon the Fortescue Marsh will be adopted.

2.3.2 Will the development result in the clearing of vegetation within the 200 metre zone?

Yes       No      **If yes**, please describe the extent of the expected impact.

Clearing of creeklines for establishment of the saline injection borefield may be required. This may occur within 200 m of smaller tributaries that discharge southwards through the Proposal area to the Fortescue Marsh. The clearing required will occur within the Disturbance Envelope. Pipelines and roads will be designed such that minimal disturbance will occur to the creeks – burying/raising where necessary to avoid restricting flow.

2.3.3 Will the development result in the filling or excavation of a river, creek, wetland or estuary?

Yes       No      **If yes**, please describe the extent of the expected impact.

Some filling or excavation of creeklines may occur as a result of the Proposal due to the location of mine pits and other infrastructure.

2.3.4 Will the development result in the impoundment of a river, creek, wetland or estuary?

Yes       No      **If yes**, please describe the extent of the expected impact.

The location of infrastructure, including mine pits and waste dumps, may require the realignment of creeklines, and thus alter the local drainage regime.

2.3.5 Will the development result in draining to a river, creek, wetland or estuary?

Yes       No      **If yes**, please describe the extent of the expected impact.

Dewatering and injection activities are considered unlikely to cause significant impacts on vegetation and associated ecosystems in the vicinity of the Proposal area. It is possible that dewatering could affect the Fortescue Marsh if the drawdown compromises the ecological water requirements of the marsh. However, an adaptive water management strategy approach will be adopted and the Fortescue Marsh Management Plan will be further developed to minimise potential impacts to the marshes.

2.3.6 Are you aware if the proposal will impact on a river, creek, wetland or estuary (or its buffer) within one of the following categories? (please tick)

Conservation Category Wetland	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unsure
Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unsure
Perth's Bush Forever site	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unsure
Environmental Protection (Swan & Canning Rivers) Policy 1998	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unsure
The management area as defined in s4(1) of the Swan River Trust Act 1988	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Unsure
Which is subject to an international agreement, because of the importance of the wetland for waterbirds and waterbird habitats (e.g. Ramsar, JAMBA, CAMBA)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unsure

See information above regarding potential impact on the Fortescue Marsh, which contains habitat for waterbirds listed under the JAMBA and CAMBA treaties.

## 2.4 Significant Areas and/ or Land Features

2.4.1 Is the proposed development located within or adjacent to an existing or proposed National Park or Nature Reserve?

Yes       No      **If yes**, please provide details.

A Proposed Conservation Reserve (PCR) occurs over pastoral leases adjacent to the Proposal area, encompassing the Fortescue Marsh area (Figure 6). DPAW is proposing that portions of the Mulga Downs, Hillside, Marillana and Roy Hill stations be excluded from the renewal of pastoral leases in 2015 and added to the conservation estate. The indicative approved footprint has little overlap with the proposed conservation reserve however the Disturbance Envelope overlaps a portion of the PCR as presented in Figure 6.

2.4.2 Are you aware of any Environmentally Sensitive Areas (as declared by the Minister under section 51B of the EP Act) that will be impacted by the proposed development?

Yes       No      **If yes**, please provide details.

The Fortescue Marsh has been identified as a 'Nationally Important Wetland' and an Environmentally Sensitive Area, pursuant to the Environmental Protection (Environmentally Sensitive Areas) Notice 2005 and is listed as an 'indicative place' on the Register of National Estate due to its importance as a habitat for migratory birds. Increases in drawdown or mounding of the water table may affect

environmental values of the Fortescue Marsh (refer Sections 2.2 and 2.3 or other areas within the Pastoral Lease Exclusion Zone).

2.4.3 Are you aware of any significant natural land features (e.g. caves, ranges etc) that will be impacted by the proposed development?

Yes       No      **If yes**, please provide details.

## 2.5 Coastal Zone Areas (Coastal Dunes and Beaches)

2.5.1 Will the development occur within 300metres of a coastal area?

(please tick)       Yes      **If yes**, complete the rest of this section.  
 No      **If no**, go to the next section.

2.5.2 What is the expected setback of the development from the high tide level and from the primary dune?

2.5.3 Will the development impact on coastal areas with significant landforms including beach ridge plain, cusped headland, coastal dunes or karst?

Yes       No      **If yes**, please describe the extent of the expected impact.

2.5.4 Is the development likely to impact on mangroves?

Yes       No      **If yes**, please describe the extent of the expected impact.

## 2.6 Marine Areas and Biota

2.6.1 Is the development likely to impact on an area of sensitive benthic communities, such as seagrasses, coral reefs or mangroves?

Yes       No      **If yes**, please describe the extent of the expected impact.

2.6.2 Is the development likely to impact on marine conservation reserves or areas recommended for reservation (as described in *A Representative Marine Reserve System for Western Australia*, CALM, 1994)?

Yes       No      **If yes**, please describe the extent of the expected impact.

2.6.3 Is the development likely to impact on marine areas used extensively for recreation or for commercial fishing activities?

Yes

No

**If yes**, please describe the extent of the expected impact, and provide any written advice from relevant agencies (e.g. Fisheries WA).

## 2.7 Water Supply and Drainage Catchments

2.7.1 Are you in a proclaimed or proposed groundwater or surface water protection area?

(You may need to contact the Department of Water (DoW) for more information on the requirements for your location, including the requirement for licences for water abstraction. Also, refer to the DoW website)

Yes

No

**If yes**, please describe what category of area.

The Proposal lies within the Pilbara Groundwater Area proclaimed under the *Rights in Water and Irrigation Act 1914*.

2.7.2 Are you in an existing or proposed Underground Water Supply and Pollution Control area?

(You may need to contact the DoW for more information on the requirements for your location, including the requirement for licences for water abstraction. Also, refer to the DoW website)

Yes

No

**If yes**, please describe what category of area.

2.7.3 Are you in a Public Drinking Water Supply Area (PDWSA)?

(You may need to contact the DoW for more information or refer to the DoW website. A proposal to clear vegetation within a PDWSA requires approval from DoW.)

Yes

No

**If yes**, please describe what category of area.

2.7.4 Is there sufficient water available for the proposal?

(Please consult with the DoW as to whether approvals are required to source water as you propose. Where necessary, please provide a letter of intent from the DoW)

Yes

No

(please tick)

To enable extraction of ore, groundwater will be abstracted through dewatering activities. Significant quantities of groundwater are available; therefore, groundwater sourced through dewatering will be used to supply water for all

mining operations, excess water will be reinjected into the local groundwater system to offset drawdown impacts on groundwater dependent ecosystems.

Consideration is being given to the use of an off-site borefield at a location to be determined, depending on the salinity of water from mine dewatering and associated costs of desalination infrastructure.

2.7.5 Will the proposal require drainage of the land?

Yes

No

**If yes**, how is the site to be drained and will the drainage be connected to an existing Local Authority or Water Corporation drainage system? Please provide details.

2.7.6 Is there a water requirement for the construction and/ or operation of this proposal?

(please tick)

Yes

**If yes**, complete the rest of this section.

No

**If no**, go to the next section.

2.7.7 What is the water requirement for the construction and operation of this proposal, in kilolitres per year?

The Proposal will require dewatering at a rate of up to 110,000,000 kL/yr, above the current approved amount of 50,000,000 kL/yr for the Christmas Creek mine (Statement 871). Of this, up to 25,000,000 kL/yr will be used for dust suppression and ore processing when mining is at its full capacity (2014 – 2025). Surplus water (up to 110,000,000 kL/yr) will be injected back into the local groundwater systems to offset drawdown effects or transferred for use at Cloudbreak and other sites, as required.

Construction of infrastructure will require minor quantities of water, which will come from the current on-site water use allocation.

2.7.8 What is the proposed source of water for the proposal? (e.g. dam, bore, surface water etc.)

Water for construction and operation will be sourced from:

- water recovered during dewatering; and/or
- expansion and operation of a desalination plant; and/or
- excess water supplied from nearby mining operations, including Cloudbreak; and/or
- an external water supply borefield.



## 2.8 Pollution

2.8.1 Is there likely to be any discharge of pollutants from this development, such as noise, vibration, gaseous emissions, dust, liquid effluent, solid waste or other pollutants?

(please tick)  Yes **If yes**, complete the rest of this section.

No **If no**, go to the next section.

The discharges associated with the Proposal include noise and vibration, dust, solid and liquid waste and other minor emissions. These were included and assessed in the original Proposal however the revised Proposal may increase the amount of noise, vibration, dust and operating waste associated with extension of haul lengths beyond that assessed in the original Proposal. An increase in workforce numbers will also increase waste, both effluent and putrescibles.

The Proposal may also increase the gaseous emissions as a power station is proposed to be constructed on the site. Investigations to assess potential emissions are being undertaken for inclusion in the environmental impact assessment.

2.8.2 Is the proposal a prescribed premise, under the Environmental Protection Regulations 1987?

(Refer to the EPA's General Guide for Referral of Proposals to the EPA under section 38(1) of the EP Act 1986 for more information)

Yes  No **If yes**, please describe what category of prescribed premise.

The increase in dewatering requirements for the Proposal will require an amendment/new application of a Category 6 (Mine Dewatering) licence.

The additional tailings facilities will require an expansion to the existing prescribed premise licence under Category 5.

The power station is a prescribed premises, and the expansion of the power station will require alterations to the current Category 67 and Category 87 licences. There may also be a need to expand fuel storage on site as a result of the new power station (Category 52), which may require an amendment or a new application for a Category 73 licence for bulk chemical storage.

Additional wastewater treatment plants will require additional approvals under Category 54 or 85.

2.8.3 Will the proposal result in gaseous emissions to air?

Yes  No **If yes**, please briefly describe.

It is anticipated that the power station will result in additional gaseous emissions.

- 2.8.4 Have you done any modelling or analysis to demonstrate that air quality standards will be met, including consideration of cumulative impacts from other emission sources?

Yes  No **If yes**, please briefly describe.

The volumes of gaseous emissions, and distances from sensitive receptors are such that modelling of emission impacts is not considered warranted.

- 2.8.5 Will the proposal result in liquid effluent discharge?

Yes  No **If yes**, please briefly describe the nature, concentrations and receiving environment.

The Proposal includes increasing the amount of mine dewatering and subsequent injection of both brackish and saline surplus dewatering product.

Water will be transported to two separate areas for injection, based on the salinity of the water to be disposed. The northern area will be injected with fresh-brackish water (allowing for later use for mining purposes). The southern area, adjacent to the Fortescue Marsh, will be injected with higher salinity water, under a strategy intended to buffer potential drawdown in the groundwater associated with the Marsh.

- 2.8.6 If there is likely to be discharges to a watercourse or marine environment, has any analysis been done to demonstrate that the State Water Quality Management Strategy or other appropriate standards will be able to be met?

Yes  No **If yes**, please describe.

No discharges to a watercourse or marine environment are proposed under normal operating conditions. Short-term emergency discharge may be required in the event of cyclonic flooding. Surplus water will be injected back into the groundwater system upstream of the Fortescue Marsh. To assess potential impacts to the hydrological regime from the proposed water management scheme on the nearby Fortescue Marsh, modelling will be undertaken.

Groundwater quality is not anticipated to be significantly impacted by dewatering as water will be managed in separate streams according to water quality to enable injection into chemically-similar local aquifers. Excess brackish water will generally be injected into the along-strike mineralised Marra Mamba Formation aquifer to store brackish water for future use. Excess saline water will be injected into the naturally-saline Oakover Formation aquifer to the south of mining areas to reduce the dewatering drawdown footprint.

- 2.8.7 Will the proposal produce or result in solid wastes?

Yes  No **If yes**, please briefly describe the nature, concentrations and disposal location/ method.

Solid waste will be generated during the construction and operational phases from clearing of native vegetation, disposal of chemical storage containers, plastic, paper, wood, scrap metal, tyres, rubber, batteries and domestic solid (including putrescibles) wastes. Waste will be predominately disposed of in the existing landfill on-site.

Waste rock from mining will be managed through in-pit disposal where feasible. Excess waste rock will be managed through construction of waste landforms.

2.8.8 Will the proposal result in significant off-site noise emissions?

Yes       No      **If yes**, please briefly describe.

Investigations into noise emissions will be undertaken as part of the environmental impact assessment and results of investigations included accordingly.

2.8.9 Will the development be subject to the Environmental Protection (Noise) Regulations 1997?

Yes       No      **If yes**, has any analysis been carried out to demonstrate that the proposal will comply with the Regulations?

Please attach the analysis.

Construction and operation will produce noise. Noise emissions are not expected to be significant enough to warrant further investigation and are not expected to exceed regulatory thresholds.

2.8.10 Does the proposal have the potential to generate off-site, air quality impacts, dust, odour or another pollutant that may affect the amenity of residents and other "sensitive premises" such as schools and hospitals (proposals in this category may include intensive agriculture, aquaculture, marinas, mines and quarries etc.)?

Yes       No      **If yes**, please describe and provide the distance to residences and other "sensitive premises".

2.8.11 If the proposal has a residential component or involves "sensitive premises", is it located near a land use that may discharge a pollutant?

Yes       No       Not Applicable

**If yes**, please describe and provide the distance to the potential pollution source

## 2.9 Greenhouse Gas Emissions

2.9.1 Is this proposal likely to result in substantial greenhouse gas emissions (greater than 100 000 tonnes per annum of carbon dioxide equivalent emissions)?

Yes       No      **If yes**, please provide an estimate of the annual gross emissions in absolute and in carbon dioxide equivalent figures.

Greenhouse emission estimation is being undertaken and findings will be presented in the environmental impact assessment.

- 2.9.2 Further, if yes, please describe proposed measures to minimise emissions, and any sink enhancement actions proposed to offset emissions.

Greenhouse gas management measures will be outlined in the environmental impact assessment and undertaken in line with the Fortescue Greenhouse Gas Emissions and Energy Reporting Management Plan (100-PR-GH-0001).

## 2.10 Contamination

- 2.10.1 Has the property on which the proposal is to be located been used in the past for activities which may have caused soil or groundwater contamination?

Yes       No       Unsure      **If yes, please describe.**

A portion of the Proposal area was previously utilised as a landfill site to dispose of materials produced during construction of existing facilities. DER has been advised of the potential contamination at the site.

- 2.10.2 Has any assessment been done for soil or groundwater contamination on the site?

Yes       No      **If yes, please describe.**

- 2.10.3 Has the site been registered as a contaminated site under the *Contaminated Sites Act 2003*? (on finalisation of the CS Regulations and proclamation of the CS Act)

Yes       No      **If yes, please describe.**

## 2.11 Social Surroundings

- 2.11.1 Is the proposal on a property which contains or is near a site of Aboriginal ethnographic or archaeological significance that may be disturbed?

Yes       No       Unsure      **If yes, please describe.**

The Chichester Range, the Fortescue Plain and the Hamersley Plateau are known to contain a rich diversity of Aboriginal sites. The Proposal area is located on the Nyiyaparli Native Title Claim which is currently registered under the *Native Title Act 1993*.

Fortescue signed a Land Access Agreement (LAA) in October 2005 with the Nyiyaparli People who are recognised as the Traditional Owners of the area of the Proposal. The LAA provides the legal framework for all Aboriginal heritage survey work and heritage approvals, as well as a higher level of protection for Aboriginal heritage sites than is afforded by legislation.

Aboriginal Heritage surveys of the area commenced in late 2003 and are ongoing. A range of ethnographic and archaeological sites have been identified as occurring within the vicinity of the Proposal.

Any potential Aboriginal culture and heritage impacts, including items discovered during construction, will be managed in accordance with the Fortescue Cultural Heritage Management Plan (45-PL-HE-0002).

Where Fortescue is unable to avoid a heritage site that may come to light during further surveying, an application is made to the Minister of Indigenous Affairs under s 18 of the *Aboriginal Heritage Act 1972* (WA). This application is made only after consultation with the Nyiyaparli People and in accordance with the LAA.

2.11.2 Is the proposal on a property which contains or is near a site of high public interest (e.g. a major recreation area or natural scenic feature)?

Yes       No      **If yes**, please describe.

2.11.3 Will the proposal result in or require substantial transport of goods, which may affect the amenity of the local area?

Yes       No      **If yes**, please describe.

The transport of ore has been considered as part of the original environmental approvals for the Proposal.

### 3 PROPOSED MANAGEMENT

#### 3.1 Principles of Environmental Protection

3.1.1 Have you considered how your project gives attention to the following Principles, as set out in section 4A of the EP Act? (For information on the Principles of Environmental Protection, please see EPA Position Statement No. 7, available on the EPA website)

- |  |   |                             |
|--|---|-----------------------------|
| 1. The precautionary principle.  | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2. The principle of intergenerational equity.  | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3. The principle of the conservation of biological diversity and ecological integrity. | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4. Principles relating to improved valuation, pricing and incentive mechanisms.        | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| 5. The principle of waste minimisation.  | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |

3.1.2 Is the proposal consistent with the EPA's Environmental Protection Bulletins/Position Statements and Environmental Assessment Guidelines/Guidance Statements (available on the EPA website)?

Yes       No

Position statements and guidance statements relevant to the Proposal are summarised below:

##### **Position statements**

- EPA 2000, Environmental Protection of Native Vegetation in Western Australia, Position Statement No. 2.
- EPA 2002, Terrestrial Biological Surveys as an Element of Biodiversity Protection, Position Statement No. 3.
- EPA 2004a, Environmental Protection of Wetlands, Position Statement No. 4.
- EPA 2004b, Principles of Environmental Protection, Position Statement No. 7.
- EPA 2005, Environmental Protection in Natural Resource Management, Position Statement No. 8.

##### **Guidance statements**

- EPA 2007, Draft Guidance Statement No. 8, Environmental Noise.
- EPA 2006, Guidance Statement No. 6, Rehabilitation of Terrestrial Ecosystems.
- EPA 2002, Guidance Statement No. 12, Guidance Statement for Minimising Greenhouse Gas Emissions.
- EPA 2008, Guidance Statement No. 19, Environmental Offsets – Biodiversity.
- EPA 2009, Guidance Statement No. 20, Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia.

- EPA 2004a, Guidance Statement No. 41, Assessment of Aboriginal Heritage.
- EPA 2004b, Guidance Statement No. 51, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia.
- EPA 2004c, Guidance Statement No. 56, Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia.

### 3.2 Consultation

3.2.1 Has public consultation taken place (such as with other government agencies, community groups or neighbours), or is it intended that consultation shall take place?

- Yes       No      **If yes**, please list those consulted and attach comments or summarise response on a separate sheet.

Fortescue has undertaken consultation with numerous government bodies in relation to the Proposal, including the OEPA, DOE (previously DSEWPC), DER/DPAW, DoW and DSD. Consultation has included:

- site visit from OEPA
- regular meetings with the OEPA for all Fortescue development projects including the Christmas Creek Expansion Proposal
- regular meetings with DOE for all Fortescue development projects including the Christmas Creek Expansion Proposal
- presentation to DOE in Canberra on all Fortescue projects
- DOE visit of Fortescue project sites, including Christmas Creek
- discussions with DER/DPAW regarding survey methodology for various baseline environmental studies
- presentation of the project to DoW.

Ongoing consultation will continue throughout the development of the Proposal.

Fortescue has also undertaken consultation with a number of stakeholders as part of previous projects. Extensive consultation was undertaken in 2003 and 2004 for the development of the Stage B Project, which includes the Christmas Creek Mine. Consultation for the Christmas Creek Water Management Scheme was undertaken over 2009 – 2010, with the following stakeholders:

- OEPA
- Department of State Development
- Department of Indigenous Affairs
- Department of Mines and Petroleum
- Department of Transport
- Department of Regional Development and Lands
- Department of Water
- Department of Environment and Conservation (now DER and DPAW)

- Main Roads Western Australia
- Port Hedland Port Authority
- Conservation Commission
- Shire of East Pilbara
- Conservation Council
- World Wildlife Fund
- Wildflower Society of Western Australia
- Roy Hill and Hillside Stations
- Nyiyiparli Working Group.

Consultation for the Cloudbreak Life of Mine Project was undertaken in 2010-2011 with the following stakeholders:

- Department of Environment and Conservation (now DER and DPAW)
- Department of State Development
- Department of Mines and Petroleum
- Department of Water
- Conservation Commission
- Conservation Council
- Shires of East Pilbara and Ashburton
- World Wildlife Fund.

A public environmental review was undertaken for the Cloudbreak Life of Mine Project, which incorporated a six-week public review period.

As a result of the extensive consultation undertaken by Fortescue, it is not anticipated that any new stakeholders would be identified if the assessment of this Proposal was to incorporate a public review process.

In addition, the Christmas Creek Water Management Scheme and Cloudbreak Life of Mine Project identified and assessed a range of key environmental factors that are relevant to the Proposal, including:

- groundwater
- surface water
- vegetation and flora
- fauna
- proposed conservation areas
- matters of NES.

As the environmental factors which have been assessed as part of these projects are consistent with those to be assessed for the Proposal, it is considered unlikely that a public review would raise any additional significant environmental issues.



## **CONCLUSION**

The Proposal will be undertaken as an expansion of the existing Christmas Creek Mine Site and Water Management Scheme. Fortescue has been operating the Christmas Creek Mine since May 2009 under Ministerial Statement 707 and the Water Management Scheme since April 2012 under Ministerial Statement 871.

The key environmental factors relevant to the Proposal are anticipated to include:

- hydrological processes
- flora and vegetation
- terrestrial fauna
- rehabilitation and closure
- matters of NES.

This is a limited number of key factors, which are already managed by Fortescue at both the Christmas Creek and Cloudbreak Mines. Ministerial Statements 707, 871 and 899 provide an established condition-setting framework for these factors.

Fortescue intends to manage the potential environmental impacts associated with the Proposal within the established management framework that has been developed at Christmas Creek. As such, it is anticipated that the Proposal will have a limited effect on the environment.

The two most recent formal assessments at Fortescue's Chichester operations were The Cloudbreak Life of Mine Proposal (Ministerial Statement 899, Public Environmental Review) and the Christmas Creek Water Management Scheme (Ministerial Statement 871, Assessment on Proponent Information). Limited interest from the public and other stakeholders was received for these assessments.

The Cloudbreak Life of Mine Project received 12 submissions following the public review phase. Five of these submissions were from Government departments, two were from non-Government organisations and five were from members of the public. No appeals were received following the release of the EPA Report.

The assessment of the Christmas Creek Water Management Scheme did not involve a formal public review and no appeals were received following the release of the EPA Report.

Due to the limited number of key environmental factors, extensive stakeholder consultation, limited public interest and the established management framework, it is considered that the Proposal could be assessed at the 'Assessment by Proponent Information (API) – Category A' level of assessment. A detailed impact assessment would be undertaken and presented in an API document to allow formal assessment by the EPA in the event that the API level of assessment is determined to be applicable to this Proposal.

[This page has been left blank intentionally]

## REFERENCES

Astron Environmental Services (Astron) 2010, *Christmas Creek Groundwater Dependant Vegetation Study: Literature Review and Risk Assessment Focusing on the Fortescue Marsh*, report prepared for Fortescue Metals Group Ltd, Perth.

Bamford Consulting Ecologists (Bamford) 2005, *Survey for the Night Parrot Pezoporus occidentalis in the Cloud Break Project Area*, report prepared for Fortescue Metals Group Ltd, Perth.

Bamford Consulting Ecologists (Bamford) 2006, *Survey for the Night Parrot Pezoporus occidentalis in the Cloud Break Project Area*, report prepared for Fortescue Metals Group Ltd, Perth.

Bamford Consulting Ecologists (Bamford) 2007a, *Night Parrot survey November-December 2006 at FMG's Cloud Break site*, report prepared for Fortescue Metals Group Ltd, Perth.

Bamford Consulting Ecologists (Bamford) 2007b, *Survey of the Night Parrot Pezoporus occidentalis in the Cloud Break Project Area*, report prepared for Fortescue Metals Group Ltd, Perth.

Bamford Consulting Ecologists (Bamford) 2009, *Report on September 2008 search for the Night Parrot, in the Christmas Creek Area*, report for Fortescue Metals Group Ltd, Perth.

Bamford Consulting Ecologists (Bamford) 2010, *Report on September 2009 search for the Night Parrot, in the Christmas Creek Area*, report for Fortescue Metals Group Ltd, Perth.

Bamford Consulting Ecologists (Bamford) 2011, *Report on the 2010 search for the Night Parrot, in the Christmas Creek Area*, report for Fortescue Metals Group Ltd, Perth.

Bennelongia Environmental Consultants (Bennelongia) 2008, *Assessment of stygofauna values at the Christmas Creek Project*, report prepared for Fortescue Metals Group Ltd, Perth.

Bennelongia Environmental Consultants (Bennelongia) 2012, *Christmas Creek Life of Mine Assessment, Subterranean Fauna Assessment*, unpublished report for Fortescue Metals Group Ltd, April 2012.

Biota Environmental Sciences (Biota) 2004a, *Fortescue Metals Group Stage B Rail Corridor, Christmas Creek, Mt Lewin, Mt Nicholas and Mindy Mindy Mine Areas, Flora and Vegetation Survey*, report prepared for Fortescue Metals Group Ltd, Perth.

Biota Environmental Sciences (Biota) 2004b, *Fortescue Metals Group Stage B Rail Corridor, Christmas Creek, Mt Lewin, Mt Nicholas and Mindy Mindy Mine Areas, Flora and Vegetation Survey*, report prepared for Fortescue Metals Group Ltd, Perth.

Biota Environmental Sciences (Biota) 2004c, *Potential Impacts on Groundwater Dependant Vegetation*, Letter to Fortescue Metals Group Pty Ltd.

Biota Environmental Sciences (Biota) 2005, *Fauna habitats and fauna assemblages of proposed the FMG Stage B rail corridor and Mindy Mindy*,

*Christmas Creek, Mt Lewin and Mt Nicholas mine areas*, report prepared for Fortescue Metals Group Ltd, Perth.

Department of Conservation and Land Management (CALM) 2002, *A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002*, Pilbara 2- PIL2 Fortescue Plains Subregion [Online], Available from: [www.dec.wa.gov.au/pdf/science/bio\\_audit/pilbara02\\_p559-567.pdf](http://www.dec.wa.gov.au/pdf/science/bio_audit/pilbara02_p559-567.pdf), [22 June 2010].

Department of the Environment (DOE) 2011, *Protected Matters Search Tool* [Online], Available from: <http://www.environment.gov.au/epbc/pmst/index.html>, [24 November 2011].

Department of the Environment (DOE) 2012, *Polytelis alexandrae — Princess Parrot, Alexandra's Parrot* [Online], Available from: <http://www.environment.gov.au/epbc/pmst/index.html>, [15 May 2012].

Ecologia Environment (Ecologia) 2006, *Pilbara Iron Ore and Infrastructure Project: Stage B and Cloudbreak, Christmas Creek and Mindy Mindy Mine sites, revised Stygofauna sampling plan*, report prepared for Fortescue Metals Group Ltd, Perth.

Ecologia Environment (Ecologia) 2010, *Christmas Creek Terrestrial Fauna Desktop Assessment*, report prepared for Fortescue Metals Group Ltd, Perth.

Ecowise Environmental (Ecowise) 2007, *Stygofauna survey plan – Cloudbreak, Christmas Creek and Mindy Mindy Mine sites*, report prepared for Fortescue Metals Group Ltd, Perth.

ENV Australia Pty Ltd (ENV) 2010, *Christmas Creek and Cloudbreak Vegetation Assessment*, report prepared for Fortescue Metals Group Ltd, Perth.

ENV Australia Pty Ltd (ENV) 2012a, *Christmas Creek Life of Mine Vertebrate Fauna and Fauna Habitat Assessment*, report prepared for Fortescue Metals Group Ltd, Perth.

ENV Australia Pty Ltd (ENV) 2012b, *Assessment of Potential Fauna Diggings, Christmas Creek*, report prepared for Fortescue Metals Group Ltd, Perth, Western Australia, Perth.

ENV Australia Pty Ltd (ENV) 2013a, *Christmas Creek Life of Mine Flora and Vegetation Assessment*, report prepared for Fortescue Metals Group Ltd, Perth.

ENV Australia Pty Ltd (ENV) 2013b, *Vegetation of the Fortescue Marsh – Portion South of Christmas Creek*, report prepared for Fortescue Metals Group Ltd, Perth, Western Australia, Perth.

Fortescue Metals Group (FMG) 2010, *Christmas Creek Water Management Scheme Environmental Review*, report to the Environmental Protection Authority, Perth.

Knott B & Goater S 2004, *Report for Fortescue Metals Group, Subterranean Fauna – Pilbara Iron Ore Mine Sites*, report prepared for Fortescue Metals Group Ltd, Perth.

Mattiske Consulting Pty Ltd (Mattiske) 2005, *Flora and Vegetation on the Cloudbreak and White Knight Leases*, report prepared for Fortescue Metals Group Ltd, Perth.

Mattiske Consulting Pty Ltd (Mattiske) 2007, *Flora and Vegetation near Fortescue Marshes*, report prepared for Fortescue Metals Group Ltd, Perth.

C Muller Consulting (Muller) 2005, *Water Flow in Mulga areas adjoining Fortescue Marsh Area: Report of field observations from field trials undertaken for Fortescue Metals Group*, report prepared for Fortescue Metals Group Ltd, Perth.

Subterranean Ecology 2012, *Christmas Creek Life of Mine Project Terrestrial SRE Invertebrate Survey*, report prepared for Fortescue Metals Group Ltd, Perth.

Trudgen ME 1991, Vegetation Condition Scale, In: National Trust (WA) 1993 *Urban Bushland Policy*, National Trust of Australia (WA), Wildflower Society of Western Australia (Inc) and the Tree Society (Inc) Perth.

[This page has been left blank intentionally]

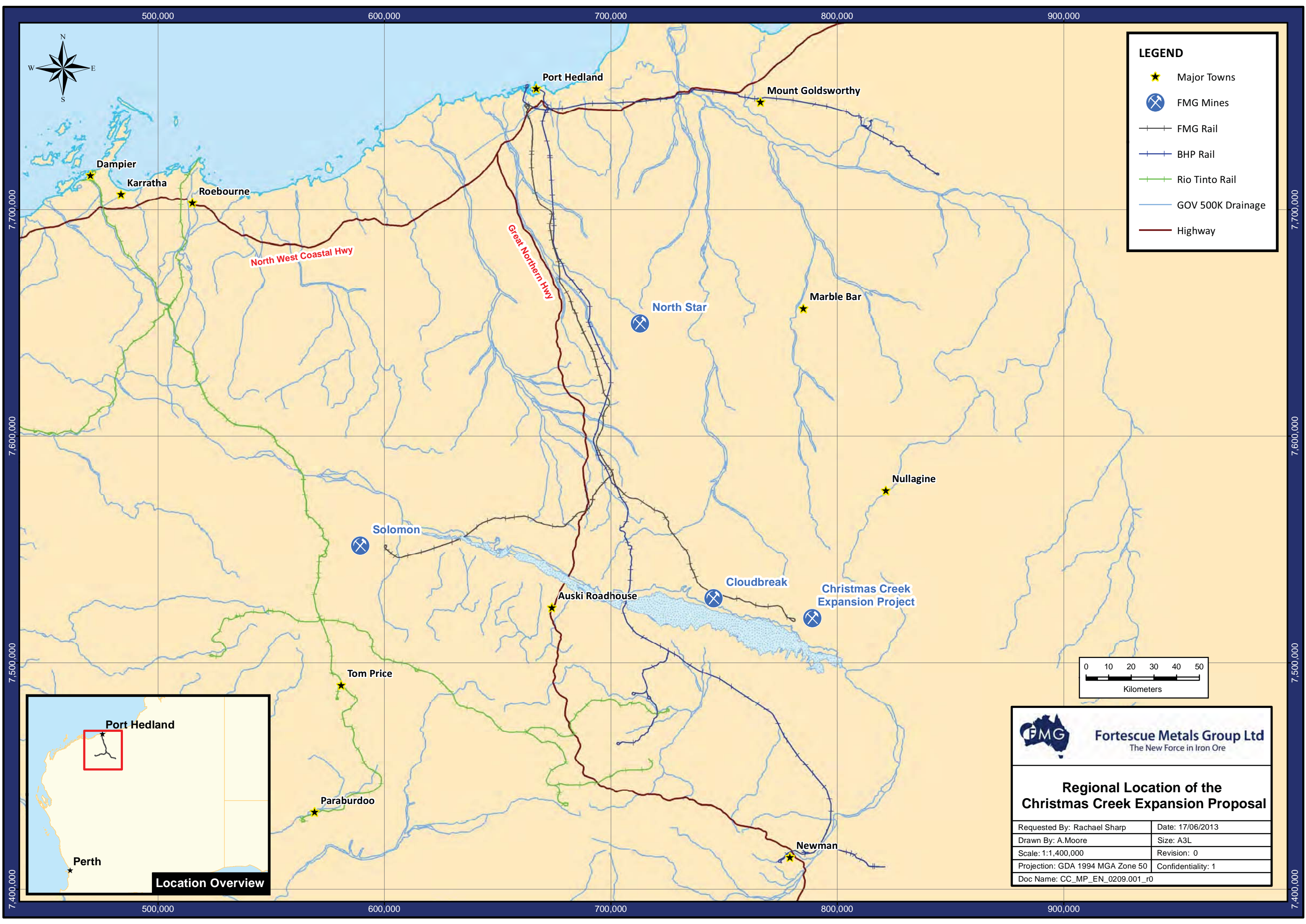
**ATTACHMENT 1: LOCATION MAPS**

[This page has been left blank intentionally]



**Figure 1: Regional Location of the Christmas Creek Expansion Proposal**

[This page has been left blank intentionally]



**LEGEND**

- ★ Major Towns
- ⊗ FMG Mines
- +— FMG Rail
- +— BHP Rail
- +— Rio Tinto Rail
- GOV 500K Drainage
- Highway



**Fortescue Metals Group Ltd**  
The New Force in Iron Ore

---

**Regional Location of the Christmas Creek Expansion Proposal**

Requested By: Rachael Sharp	Date: 17/06/2013
Drawn By: A.Moore	Size: A3L
Scale: 1:1,400,000	Revision: 0
Projection: GDA 1994 MGA Zone 50	Confidentiality: 1
Doc Name: CC_MP_EN_0209.001_r0	

500,000 600,000 700,000 800,000 900,000

7,700,000

7,600,000

7,500,000

7,400,000

500,000 600,000 700,000 800,000 900,000

7,400,000



**Figure 2: Proposed Disturbance Envelope**

[This page has been left blank intentionally]

770,000

780,000

790,000

800,000

7,520,000

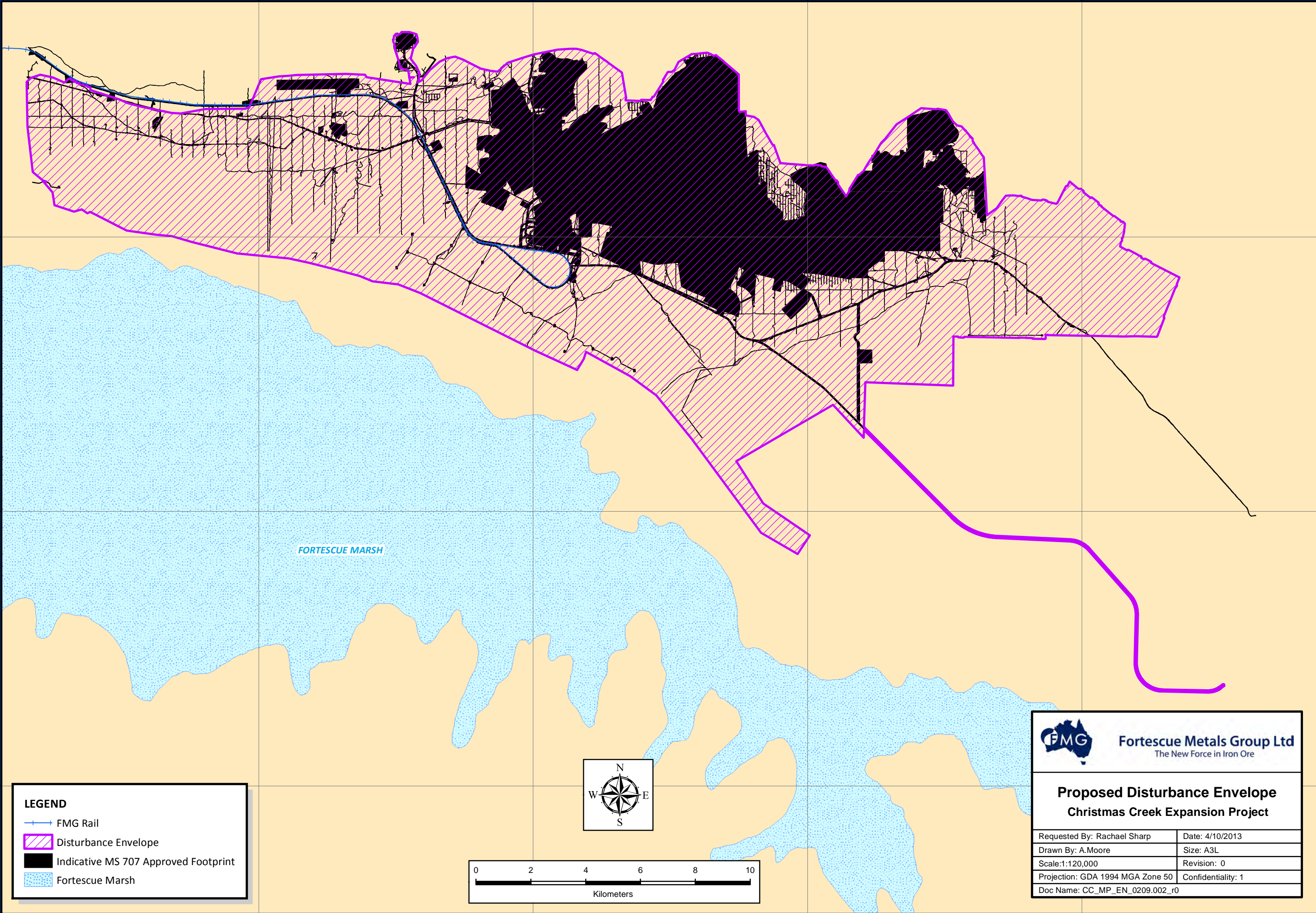
7,510,000

7,500,000

7,520,000





7,510,000

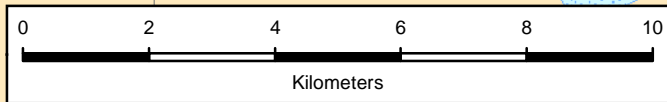
7,500,000




FORTESCUE MARSH

**LEGEND**

-  FMG Rail
-  Disturbance Envelope
-  Indicative MS 707 Approved Footprint
-  Fortescue Marsh





**Fortescue Metals Group Ltd**  
The New Force in Iron Ore

---

**Proposed Disturbance Envelope**  
**Christmas Creek Expansion Project**

Requested By: Rachael Sharp	Date: 4/10/2013
Drawn By: A.Moore	Size: A3L
Scale: 1:120,000	Revision: 0
Projection: GDA 1994 MGA Zone 50	Confidentiality: 1
Doc Name: CC_MP_EN_0209.002_r0	

770,000

780,000

790,000

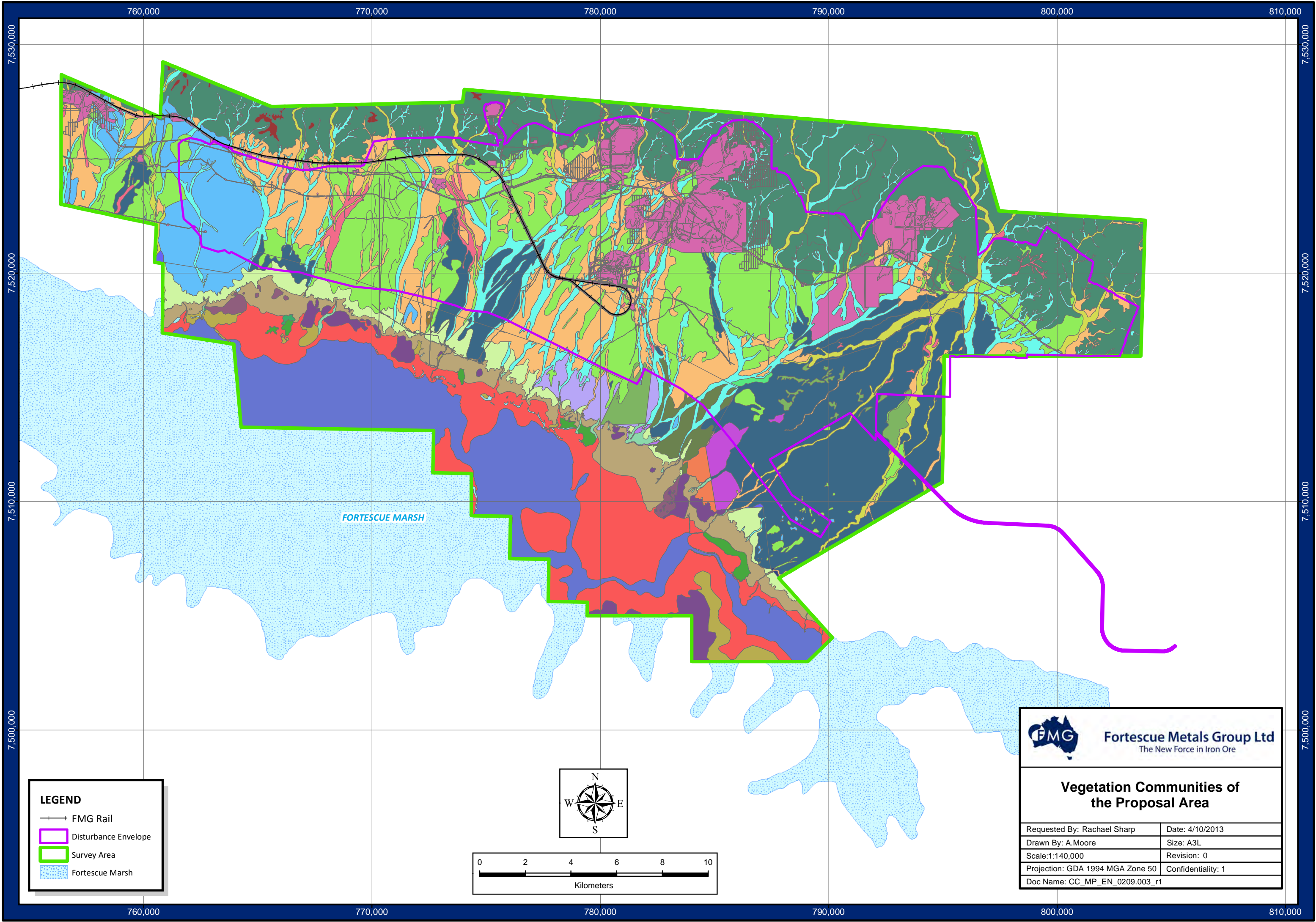
800,000









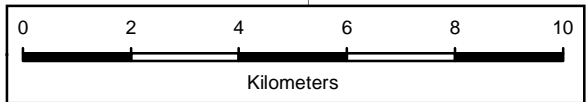
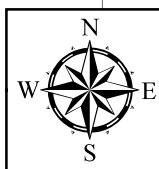
**Figure 3: Vegetation Communities of the Proposal Area**

[This page has been left blank intentionally]



**LEGEND**

-  FMG Rail
-  Disturbance Envelope
-  Survey Area
-  Fortescue Marsh





**Fortescue Metals Group Ltd**  
The New Force in Iron Ore



































---

**Vegetation Communities of the Proposal Area**

Requested By: Rachael Sharp	Date: 4/10/2013
Drawn By: A.Moore	Size: A3L
Scale: 1:140,000	Revision: 0
Projection: GDA 1994 MGA Zone 50	Confidentiality: 1
Doc Name: CC_MP_EN_0209.003_r1	



## Vegetation\_Types

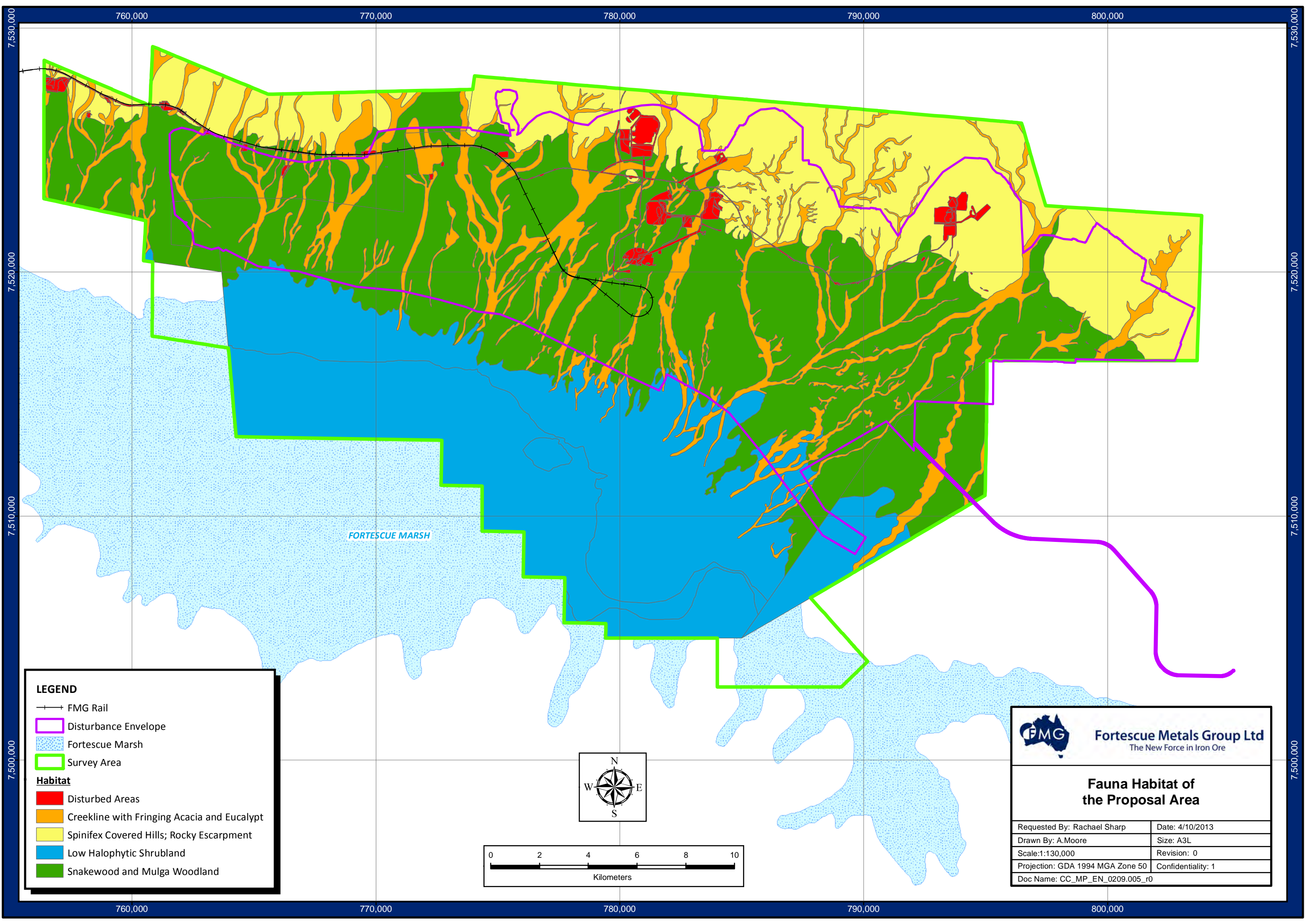
-  LOM 0: Infrastructure
-  LOM 1:Open Woodland of Eucalyptus victrix, E. camaldulensis with pockets of Acacia coriacea subsp. pendens over Grevillea wickhamii subsp. aprica, Petalostylis labicheoides and A. tumida over Triodia longiceps, Chrysopogon fallax, Themeda triandra and Aristida\*
-  LOM 2:Low Woodland to Low Open Forest of Acacia aneura var. aneura, A. citrinoviridis, A. pruinocarpa over A. tetragonophylla and Psydrax latifolia over Chrysopogon fallax, Stemodia viscosa, Blumea tenella, Themeda triandra and Triodia and Aristida species
-  LOM 3:Low Woodland to Low Open Forest of Acacia aneura var. aneura, A. pruinocarpa, A. tetragonophylla, A. tenuissima, Grevillea wickhamii subsp. aprica, Psydrax latifolia over Dodonaea petiolaris and Triodia and Aristida species
-  LOM 4:Low Open Woodland of Acacia aneura var. aneura, Acacia pruinocarpa, Acacia xiphophylla, Acacia victoriae over A. tetragonophylla, Psydrax latifolia and Psydrax suaveolens over Ptilotus obovatus and mixed Maireana and Sclerolaena species
-  LOM 8:Closed Scrub to Tall Shrubland of Acacia pruinocarpa, A. tumida, A. ancistrocarpa, A. maitlandii, A. kempeana, A. tetragonophylla with occasional E. gamophylla and Corymbia spp. over Triodia epactia, Themeda triandra and Aristida species
-  LOM 9:Closed Scrub to Shrubland of Acacia ancistrocarpa, A. maitlandii, A. kempeana, A. monticola, occasional E. gamophylla and Corymbia deserticola over Senna species, Triodia basedowii and Aristida species.
-  LOM 10:Low Open Woodland of Acacia xiphophylla, Acacia victoriae, Acacia aneura var. aneura over Acacia tetragonophylla, Ptilotus obovatus and mixed Senna, Maireana and Sclerolaena species
-  LOM 10.2:Low Open Woodland of Acacia xiphophylla, Acacia aneura, Eremophila platycalyx subsp. pardalota over Low Open Shrubland of E. cuneifolia, Maireana pyramidata, Senna artemisioides subsp. oligophylla over sparse tussock grassland of mixed species
-  LOM 10b:Low Open Woodland of Acacia xiphophylla, Acacia aneura, Eremophila platycalyx subsp. pardalota over Low Open Shrubland of E. cuneifolia, Maireana pyramidata, Senna artemisioides subsp. oligophylla over sparse tussock grassland of mixed species
-  LOM 13:Low Halophytic Shrubland of Tecticornia auriculata, T. indica subsp. leiostachya, T. halocnemoides subsp. tenuis with patches of Frankenia species
-  LOM 16:Hummock Grassland of Triodia basedowii with pockets of Triodia epactia and Triodia lanigera with emergent patches of Eucalyptus leucophloia, Corymbia deserticola over Acacia ancistrocarpa, Acacia hilliana, Acacia acradenia, Acacia pyrifolia, Hakea lorea\*
-  LOM 17:Hummock Grassland of Triodia basedowii with pockets of Triodia epactia and Triodia lanigera with emergent patches of Eucalyptus leucophloia, Corymbia deserticola over Acacia ancistrocarpa, A. pyrifolia, Hakea lorea subsp. lorea over Goodenia stobbsiana \*
-  LOM 22:Low Shrubland of Tecticornia indica subsp. bidens and Nicotiana occidentalis over grasses with occasional stands of Sesbania cannabina and Cullen cinereum
-  LOM 30:High open Shrubland of Acacia synchronicia with Senna glaucifolia (Sclerolaena spp. and other halophytes) over Aristida species.
-  LOM 30+4:Mosaic of LOM30 and LOM4, patches of vegetation were too small to map separately
-  LOM 30+10:Mosaic of LOM30 and LOM10, patches of vegetation were too small to map separately
-  LOM 3004:Mosaic of VT30 and VT4, patches of vegetation were too small to map separately
-  LOM 3010:Mosaic of VT 30 and VT10, patches of vegetation were too small to map separately
-  LOM 3013:Mosaic of VT30 and VT13, patches of vegetation were too small to map separately
-  LOM Infrastructure:Areas cleared for mining, infrastructure and associated activities.
-  Marsh 1:Tecticornia sp. Christmas Creek, T. auriculata, Muehlenbeckia florulenta low closed heath over Eragrostis pergracilis, E. tenellula scattered tussock grasses and Cullen cinereum, Nicotiana heterantha, Pterocaulon sphaeranthoides open herbland
-  Marsh 2:Muehlenbeckia florulenta shrubland to open heath over Tecticornia indica subsp. bidens low scattered shrubs to low open shrubland over Eleocharis papillosa, Schoenoplectus dissachanthus (very) open sedgeland with Nicotiana heterantha, Marsilea hirsuta \*
-  Marsh 3:\*Vachellia farnesiana, Acacia ampliceps open scrub over Tecticornia sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063), \*Aerva javanica and Cullen cinereum low open shrubland over \*Cenchrus setiger, Dactyloctenium radulans and \*C. ciliaris t\*
-  Marsh 4:Melaleuca glomerata open scrub over \*Aerva javanica, Tecticornia spp. low open shrubland over Cleome viscosa, Nicotiana heterantha, Swainsona kingii herbland
-  Marsh 5:Acacia synchronicia, Melaleuca glomerata, Eremophila youngii subsp. lepidota scattered tall shrubs over Tecticornia indica subsp. bidens, Eremophila spongiocarpa low open shrubland over Sporobolus virginicus, \*Cenchrus ciliaris, Dactyloctenium radulans \*
-  Marsh 6:Tecticornia sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), T. indica subsp. bidens, Muehlenbeckia florulenta low open heath over Eragrostis pergracilis (very) open tussock grassland and Cyperus bulbosus scattered sedges with Nicotiana heteran\*
-  Marsh 7:Tecticornia indica subsp. bidens, T. sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), Eremophila spongiocarpa low open heath to low closed heath over Eragrostis spp., Enneapogon spp., \*Cenchrus spp. scattered tussock with Nicotiana heterantha, \*
-  Marsh 8:Tecticornia auriculata ( and T. sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) open heath over Eragrostis pergracilis, Chloris pectinata tussock grassland and Cyperus bulbosus scattered sedges with Swainsona kingii, Nicotiana heterantha scatte\*
-  Marsh 9:Acacia synchronicia scattered tall shrubs over Tecticornia indica subsp. bidens, Eremophila spongiocarpa low open shrubland over Eragrostis pergracilis, \*Cenchrus ciliaris tussock grassland with Lawrencea densiflora, Euphorbia australis, Goodenia forre\*
-  Marsh 10:Acacia synchronicia, A. xiphophylla high shrubland over Eremophila spp., Enchylaena tomentosa var. tomentosa, Maireana pyramidata scattered low shrubs over \*Cenchrus ciliaris, Eragrostis pergracilis, Triraphis mollis very open tussock grassland and Good\*
-  Marsh 11:Lake bed likely to support annual herbs and grasses episodically
-  Marsh 12:Acacia synchronicia scattered shrubs over Eremophila spongiocarpa, Atriplex bunburyana and Sclerolaena cuneata low shrubland to low open shrubland, over Dactyloctenium radulans, Eragrostis pergracilis and Panicum decompositum scattered tussock grasses o\*
-  Marsh 13:Acacia synchronicia scattered tall shrubs over Senna artemisioides subsp. oligophylla (thinly sericeous), Atriplex bunburyana and Sclerolaena cuneata low open shrubland over Dactyloctenium radulans scattered tussock grasses on red-brown clay on alluvial\*

[This page has been left black intentionally]










**Figure 4: Fauna Habitat of the Proposal Area**

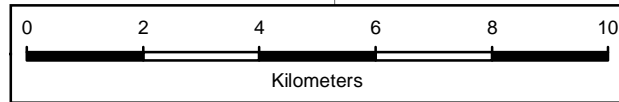
[This page has been left blank intentionally]





**LEGEND**

-  FMG Rail
-  Disturbance Envelope
-  Fortescue Marsh
-  Survey Area
- Habitat**
-  Disturbed Areas
-  Creekline with Fringing Acacia and Eucalypt
-  Spinifex Covered Hills; Rocky Escarpment
-  Low Halophytic Shrubland
-  Snakewood and Mulga Woodland




**Fortescue Metals Group Ltd**  
The New Force in Iron Ore

**Fauna Habitat of the Proposal Area**

Requested By: Rachael Sharp	Date: 4/10/2013
Drawn By: A.Moore	Size: A3L
Scale: 1:130,000	Revision: 0
Projection: GDA 1994 MGA Zone 50	Confidentiality: 1
Doc Name: CC_MP_EN_0209.005_r0	







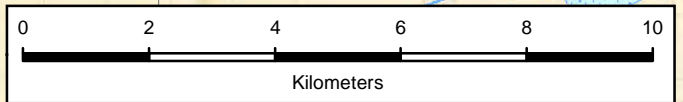
**Figure 5: Surface Hydrology of the Proposal Area**


[This page has been left blank intentionally]



**LEGEND**

-  FMG Rail
-  Disturbance Envelope
-  Watercourses
-  Fortescue Marsh





**Fortescue Metals Group Ltd**  
The New Force in Iron Ore

---

**Surface Hydrology of the Proposal Area**

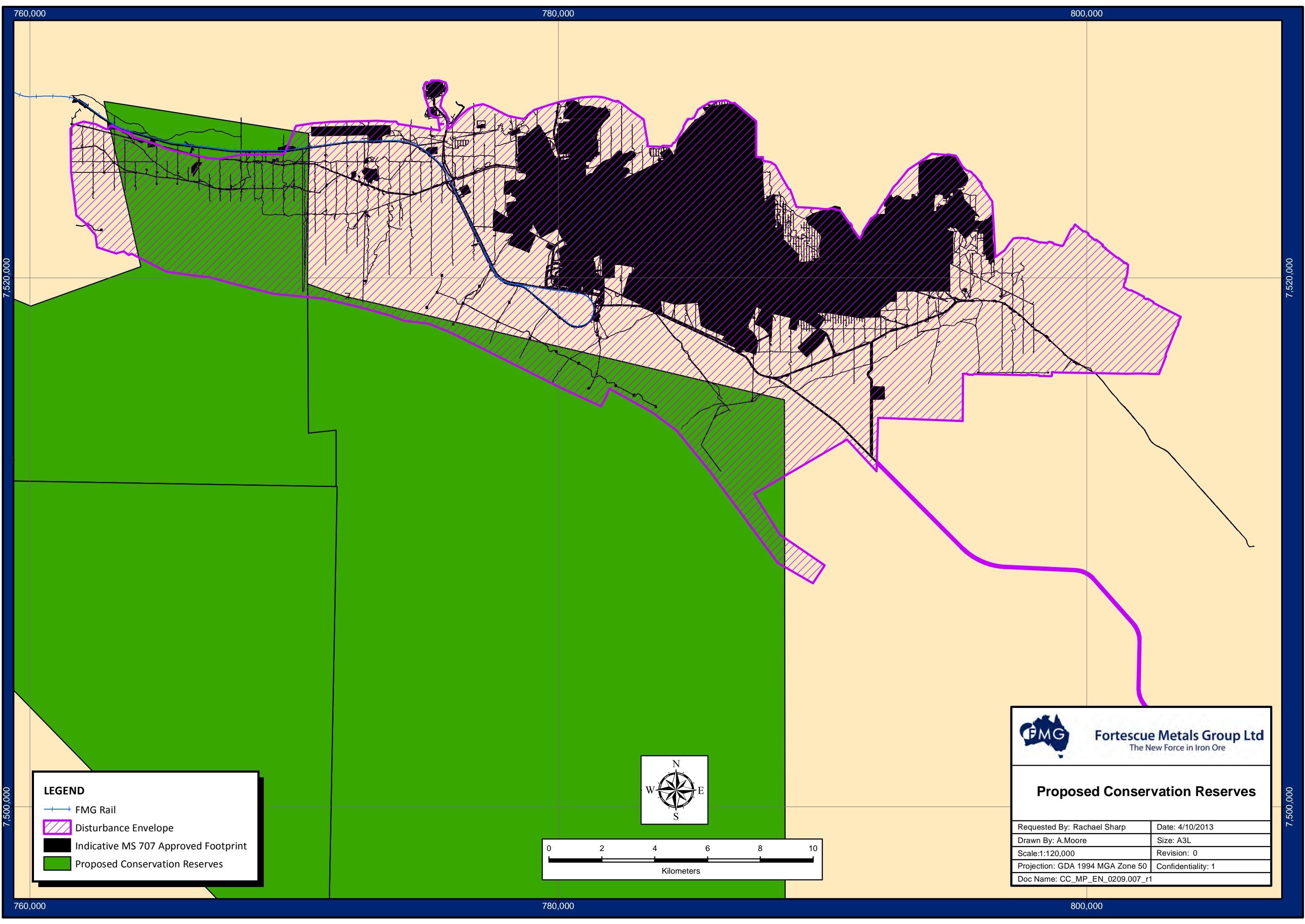
Requested By: Rachael Sharp	Date: 4/10/2013
Drawn By: A.Moore	Size: A3L
Scale: 1:120,000	Revision: 0
Projection: GDA 1994 MGA Zone 50	Confidentiality: 1
Doc Name: CC_MP_EN_0209.006_r1	







**Figure 6: Proposed Conservation Reserve**

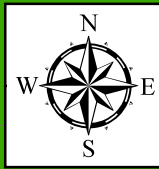
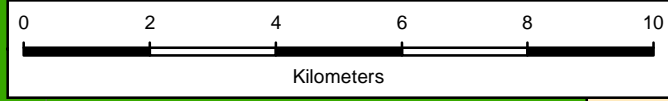
[This page has been left blank intentionally]





**LEGEND**

-  FMG Rail
-  Disturbance Envelope
-  Indicative MS 707 Approved Footprint
-  Proposed Conservation Reserves

Kilometers



**Fortescue Metals Group Ltd**  
The New Force in Iron Ore

**Proposed Conservation Reserves**

Requested By: Rachael Sharp	Date: 4/10/2013
Drawn By: A.Moore	Size: A3L
Scale: 1:120,000	Revision: 0
Projection: GDA 1994 MGA Zone 50	Confidentiality: 1
Doc Name: CC_MP_EN_0209.007_r1	



**ATTACHMENT 2: ADDITIONAL DOCUMENTS**

[This page has been left blank intentionally]

**Attachment 2A: Christmas Creek Life of Mine Flora and Vegetation Assessment (ENV 2013a)**

[This page has been left blank intentionally]

**Attachment 2B: Christmas Creek Life of Mine Vertebrate Fauna Assessment  
(ENV 2012a)**

[This page has been left blank intentionally]