

# PILBARA IRON ORE PROJECT – REVISED PROPOSAL

## FLINDERS MINES LTD

# ASSESSMENT ON PROPONENT INFORMATION – ENVIRONMENTAL REVIEW DOCUMENT

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Prepared for Flinders Mines Ltd By Preston Consulting Pty Ltd 20 March 2015 Rev\_0



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# CONTENTS

LIST OF	FIGURESIII
LIST OF	TABLESIII
LIST OF	APPENDICESIV
1	INTRODUCTION1
1.1	Project Background1
1.2	Key Terminology1
1.3	Purpose of this Document
1.4	Level of Assessment Criteria - Category A API4
2	GENERAL DESCRIPTION OF PROPOSAL5
2.1	Summary of PIOP Stage 15
2.2	Proposal Facilities and Activities5
2.3	Location, Tenure and Land Use
2.4	Approval and Development Timeframes
3	PROPONENT AND KEY PROPOSAL CHARACTERISTICS14
3.1	Proponent Details
3.2	Key Proposal Characteristics
4	STAKEHOLDER CONSULTATION16
5	RELEVANT STUDIES
6	ASSESSMENT OF PRELIMINARY KEY ENVIRONMENTAL FACTORS22
6.1	Determination of Preliminary Key Environmental Factors
6.2	Discussion of Each Preliminary Key Environmental Factor
7	OTHER ENVIRONMENTAL FACTORS
8	PRINCIPLES OF THE EP ACT
9	CONCLUSION
9.1	Proponent Conclusions
9.2	Application of the Significance Framework 43
10	GLOSSARY44
11	REFERENCES46
12	APPENDICES

# **LIST OF FIGURES**

Figure 1: Regional location of the Pilbara Iron Ore Project	.2
Figure 2: Revisions to the PIOP Stage 1 Development Envelope approved under MS 924	.8
Figure 3: Final proposed Mine and External Infrastructure Development Envelopes for th	ıe
Revised Proposal	.9
Figure 4: Tenure and land use within the Development Envelopes1	1
Figure 5: Boundaries of Millstream Water Reserve1	2
Figure 6: Study Area boundaries	30
Figure 7: Location of Priority Flora identified during surveys	31
Figure 8: GDEs in proximity to Proposal	32
Figure 9: Fauna habitat and records 3	33
Figure 10: Land systems that intersect with the Study Area	34
Figure 11: Interpreted extent of interconnected aquifers (from WorleyParsons, 2012c) 4	10
Figure 12: Conceptual illustration of the application of the significance framework	13

# LIST OF TABLES

Table 1: Criteria for Category A API level of assessment	4
Table 2: Summary of PIOP Stage 1 Elements	5
Table 3: Summary description of Proposal elements	6
Table 4: Approvals schedule	13
Table 5: Key characteristics of the Proposal (corresponds to Development Envelope bound	aries
provided in Figure 3)	15
Table 6: Relevant stakeholder consultation records	16
Table 7: Summary of relevant environmental surveys	18
Table 8: Assessment Table – Preliminary Key Environmental Factors	24
Table 9: Environmental assessment – other environmental factors	36
Table 10: EP Act Principles	41

## **LIST OF APPENDICES**

- Appendix 1: Flora and Vegetation Survey Reports
- Appendix 2: Fauna Survey Reports
- Appendix 3: Groundwater Abstraction Modelling Reports
- Appendix 4: Tailings Geochemical Studies
- Appendix 5: Summary of Stakeholder Consultation
- Appendix 6: Communication with Decision Making Authorities
- Appendix 7: Flinders Pilbara Iron Ore Project Stage 1 API Environmental Review Document
- Appendix 8: Development Envelope Shapefiles
- Appendix 9: PIOP Stage 1 Significant Fauna Species Management Plan

# **1 INTRODUCTION**

## **1.1 PROJECT BACKGROUND**

Flinders Mines Ltd (FMS) obtained Ministerial approval for the development of Stage 1 of the Pilbara Iron Ore Project (PIOP) on 11 January 2013 (Ministerial Statement (MS) 924). The PIOP is located approximately 70 kilometres (km) north-west of Tom Price in the Pilbara region of Western Australia (WA) (Figure 1). The Stage 1 Proposal approved under MS 924 was for mining only and did not include an export option.

The Balla Balla Joint Venture, whose sponsors are Todd Corporation Ltd and Rutila Resources Ltd (Rutila) have identified that the proposed Balla Balla Infrastructure (BBI) Port (MS 945), located approximately 200 km to the north of the PIOP, has additional capacity and signed an Alliance Agreement with FMS to become the foundation customer for the BBI Port. A 200 km rail and conveyor corridor is proposed to connect the PIOP with the BBI Port (subject of a separate proposal – currently under assessment).

FMS identified that Stage 2 of the PIOP would need to be developed concurrently with Stage 1 to allow the PIOP to meet the initial demand required at the BBI Port. Stage 2 generally refers to the processing of ore on site, and includes additional mining area, processing, transport and support infrastructure, tailings storage and water abstraction additional to that approved in Stage 1. The addition of Stage 2 to the PIOP is a revision to the Proposal approved under MS 924. Stage 2 is therefore the subject of this document and forms the scope of this Proposal.

## **1.2 Key Terminology**

As discussed above, this API Document refers to a revision of the PIOP Stage 1 Proposal that was approved under MS 924. To ensure consistency throughout this document, the following terminology will be used:

- **PIOP Stage 1** The original Proposal approved under MS 924;
- **The Proposal** the proposed revisions to PIOP Stage 1 as detailed in this Assessment on Proponent Information Environmental Review (API) document; and
- **Revised Proposal** All components of the PIOP, including those currently approved under MS 924, as well as the changes proposed in this API Document.



Figure 1: Regional location of the Pilbara Iron Ore Project

### **1.3 PURPOSE OF THIS DOCUMENT**

The purpose of this API Document is to provide a detailed description of the Proposal and to enable assessment of the potential environmental impacts that may result, should the Proposal be implemented. This document also outlines the key elements (characteristics) required for the construction and operation of the Proposal. The assessment will be completed by the Office of the Environmental Protection Authority of WA (OEPA) under the provisions of Part IV of the *Environmental Protection Act 1986* (EP Act).

This API Document has been submitted along with a referral under Section 38(1) of the EP Act, on the assumption that an API level of assessment is appropriate (refer to Section 1.4 below). This assumption is based on ongoing discussions with the OEPA over several months.

The intention is that this API Document contains all the information that the OEPA require to assess the Proposal, and therefore the scoping process can be circumvented.

This API Document has been written in accordance with the Environmental Protection Authority's (EPA's) gazetted *Environmental Impact Assessment (EIA) Part IV divisions 1 and 2 Administrative Procedures* (EPA, 2012a), and has also taken into account the *Environmental Assessment Guideline* (EAG) *8: for Environmental Factors and Objectives* (EPA 2013b). FMS also considered the recently released *EAG for Preparation of an API Category A Environmental Review Document* (EPA, 2015).

This API Document focuses on the environmental factors that are deemed to be 'key' factors; those with the potential to be significantly impacted and could not be appropriately managed under other existing legislation. Potential impacts to these key factors are described in detail and assessed using relevant studies specific to the Proposal. 'Other' environmental factors are discussed briefly, with a focus on demonstrating that they can be appropriately managed using a combination of industry-standard controls and other existing legislation. Therefore, this API Document describes the most relevant impacts and characteristics of the Proposal for assessment and provides all related biological and technical reports and survey results as Appendices (Appendix 1 - 4).

FMS is also in the process of preparing a referral under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) which is to be submitted to the Department of the Environment (DotE) in parallel with this API Document. FMS intends on keeping the approval processes separate and does not request a bilateral assessment for this Proposal.

## **1.4 Level of Assessment Criteria - Category A API**

In submitting this document, the criteria for a Category A level of assessment were reviewed. Table 1 identifies these criteria and describes how the Proposal complies with each criteria.

### Table 1: Criteria for Category A API level of assessment

	Criteria	Comment
(a)	The Proposal raises a limited number of key environmental factors that can readily be managed and for which there is an established condition-setting framework.	The Proponent, in consultation with the OEPA, has considered the key environmental factors. Flora and vegetation, terrestrial fauna and inland water environment quality are considered to be key environmental factors for the Proposal. There is an established condition-setting framework for mining proposals in terrestrial environments in the Pilbara.
(b)	The Proposal is consistent with established policies, guidelines and standards.	The location and purpose of the land upon which the Proposal is based is consistent with established Government policy and land use. Assessment against policies, guidelines and standards is provided in this API Document and the Proposal is consistent with these. Information is provided where relevant in relation to guidelines and standards.
(c)	The Proponent can demonstrate that it has conducted appropriate and effective stakeholder consultation, in particular with decision making authorities.	FMS has completed extensive stakeholder consultation. A summary of the consultation is included in Section 4.
(d)	There is limited or local concern only about the likely effect of the Proposal, implemented, on the environment.	The Proposal is expected to result in low levels of public concern. As a comparison, the approval process for the PIOP Stage 1 did not lead to significant public concerns.

# **2 GENERAL DESCRIPTION OF PROPOSAL**

## 2.1 SUMMARY OF PIOP STAGE 1

The PIOP Stage 1 was approved on 11 January 2013 under MS 924, and the scope of the Proposal was summarised in EPA Report 1456. The key elements of the PIOP Stage 1 are as listed in Table 2 below.

Table 2:	Summary	of PIOP	Stage 1	Elements
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Element	Description			
Size of ore body	Approximately 748 Mt indicated and inferred			
Mining rate	Approximately 15 Mt per year			
Project life	15 years			
Pit development	Ajax pit disturbance area - 59 ha Badger pit disturbance area - 37 ha Blackjack pit disturbance area - 118 ha Champion pit disturbance area - 530 ha Delta pit disturbance area - 470 ha Eagle pit disturbance area - 504 ha			
	Total pit disturbance area - 1,718 ha			
	Maximum depth of pits - 100 m			
Road Width of out of pit haul road corridor - 40 m				
infrastructure	Total area of out of pit haul road corridor disturbance area - approximately 209 ha			
Waste rock         Strip ratio - 5:4:1 (average life of mine)				
	Total waste material – approximately 1,308 Mt			
	Disposal – out of pit waste rock landforms (WRLs) and in pit disposal			
	Ajax WRL area – N/A Badger WRL area - 3 ha Blackjack WRL area - 20 ha Champion WRL area - 47 ha Delta WRL area - 49 ha Eagle WRL area - 89 ha			
	Total WRL disturbance area - 208 ha			
Total area of disturbance	Approximately 2,135 ha			
Water supply	Average water demand – approximately 4 GL/yr			
	Source – groundwater from on-tenement bores or off-tenement bores. Potential for both to be confirmed			

### **2.2 PROPOSAL FACILITIES AND ACTIVITIES**

This Proposal is to revise the current PIOP Stage 1 as approved under MS 924 and described in Section 2.1. The sections below detail the revisions required that form the scope of this Proposal.

Table 3 summarises the elements of the Proposal as well as any key characteristics relevant to EIA. The PIOP has been separated into two Development Envelopes:

- 1. The **Mine Development Envelope**, which is a revision of the PIOP Stage 1 Development Envelope approved under MS 924, and is contained entirely within the Blacksmith tenement; and
- 2. The **External Infrastructure Development Envelope**, which contains all infrastructure (roads, camp, airstrip etc.) that lies outside of the Blacksmith tenement.

These Development Envelopes are shown in Figure 2, with the revisions and additions to the original PIOP Stage 1 Development Envelope shown in green and blue respectively. The majority of revisions to the original PIOP Stage 1 Development Envelope relate to infrastructure outside of the Blacksmith tenement, however there have been some additional areas included within the Blacksmith tenement to allow for mining, access roads and communications towers.

Up to 300 ha of ground disturbance within the Mine and External Infrastructure Development Envelopes will be required to implement the Proposal. This consists of 70 ha of disturbance for the development of mine pits and 30 ha for infrastructure within the Mine Development Envelope, and 200 ha of disturbance for the development of external infrastructure such as access roads, camps and airstrip within the External Infrastructure Development Envelope.

Figure 3 shows the boundary of the final Mine and External Infrastructure Development Envelopes for the Revised Proposal, within which all ground disturbance will occur.

The relevant shape files for the revised Development Envelopes are included in Appendix 8.

Proposal Element	Description					
Mining	70 ha of additional mining areas form part of the Proposal. These are limited to two new mine pits at the Paragon deposit.					
	Mining will be undertaken using standard open cut bench mining methods employing drilling, blasting, excavation, and hauling. Overburden and waste material will be initially stored in external waste dumps and will then be subsequently placed in mined-out pits when it becomes operationally feasible to do so.					
	Pit lakes are not anticipated as the base of both mine pits will not extend below groundwater level.					
Waste Rock	Much of the waste rock from the new Paragon pit will be used for construction purposes. <i>A</i> additional WRL will be developed to service the new Paragon mine pits. This WRL will be relatively small in size, covering an area of approximately 15 ha.					
	In-pit waste rock disposal is not expected to occur at the Paragon deposit as the mined out open pits are planned to be used for tailings disposal (see below).					
Water Abstraction	Up to 4 GL/yr of groundwater was approved to be abstracted as part of PIOP Stage 1 (MS 924). The Proposal will require an additional 2 GL/yr, primarily to operate the ore processing facility (OPF). This water is to be taken from the dewatering bores and water supply network approved under MS 924. The exact bores to be targeted will be subject to approval from the Department of Water (DoW).					
	The Paragon deposit lies above the water table and therefore dewatering is not required.					
OPF	An OPF will be developed to process Bedded Iron Deposits, Channel Iron Deposits and Detrital Iron Deposits from all seven deposits.					
	Run-of-mine (ROM) ore will be brought to a ROM Pad where it will be stockpiled for use at the OPF. The ROM ore will then be reclaimed and delivered to the OPF primary crusher where it will be wet-processed to produce 100% sinter fines product. Tailings will be produced as a waste product.					
	The OPF will process approximately 27.5 Mtpa (wet) ROM ore and produce approximately 25 Mtpa of product and 2.5 Mtpa of tailings.					

 Table 3: Summary description of Proposal elements

Proposal Element	Description
Tailings Storage Facilities (TSFs)	The forecasted tailings production from the OPF is approximately 2.5 Mt (1.25 million m <sup>3</sup> ) per annum. Tailings will be pumped to dedicated empty mine pits within the Mine Development Envelope via a tailings pipeline. Initially tailings is proposed to be pumped to the Paragon mine pits as these pits will be mined first, with ore stockpiled until the OPF is ready for operation. A mine pit at the Delta deposit may be used for tailings disposal for the later stages of mining.
	An embankment may be developed at low points in the mine pits to provide additional storage capacity if required.
	<ul> <li>The proposed TSF is to include the following key components:</li> <li>Distribution pipeline and spigots;</li> <li>Pontoon-mounted recovery pump and return water pipeline; and</li> </ul>
	The tailings will be dosed with a flocculent before leaving the OPF and upon arrival at the TSF, the tailings density will be approximately 65% solids.
	There will be a fluctuating and undetermined amount of water reclaimed from the pontoon- mounted pump in the supernatant pond. The reclaimed water will be pumped via a return water pipeline to the OPF for reuse.
Associated Infrastructure and Services	<b>Power Station</b> – A power station will be required to power the OPF and other mine infrastructure. The power station is expected to be diesel-powered (unless natural gas can be economically sourced) and will be sized at approximately 25 MW. If deemed commercially suitable, the power station may also supply power to the BBI conveyor.
	<b>External Access Roads</b> – Additional access roads are required to connect mining areas with the accommodation camp, airport and existing transport corridors. The disturbance width required for these roads will vary depending on their purpose, however will typically be 30 m. The northern access roads may be required due to terrain constraints within the Blacksmith tenement. If suitable access is able to be developed within the Blacksmith tenement then these roads may not need to be developed.
	<b>Airport</b> – An airstrip and administration building will be developed to allow the workforce to travel to site. The PIOP is relatively isolated therefore the development of an airport will greatly reduce travel times. The Airport will be developed within the location shown in <b>Error! Reference source not found.</b> and will comply with all Civil Aviation Safety Authority requirements.
	<b>Accommodation Camps</b> – Construction and permanent accommodation camps will be constructed within the Development Envelopes for construction and operational personnel. These camps will be appropriately sited in proximity to key work areas and potable water supply.
	<b>Other Supporting Infrastructure –</b> Infrastructure such as administration buildings, fuel storage, workshops, laydown areas and communications may be required. These will be sited as required within the Disturbance Envelopes.





Figure 3: Final Proposed Mine and External Infrastructure Development Envelopes for the Revised Proposal

## **2.3 LOCATION, TENURE AND LAND USE**

The Proposal is located in the Pilbara region of WA. All proposed disturbance addressed in this API Document is planned to be constructed entirely within the boundary of the Mine and External Infrastructure Development Envelopes.

The Mine Development Envelope lies within the boundaries of the Blacksmith tenement (Mining Lease M47/1451). The External Infrastructure Development Envelope lies within the following tenure as shown in Figure 4:

- Exploration Lease E47/1560 (held by Flinders Iron Pty Ltd, a subsidiary of FMS). Appropriate miscellaneous licences have been applied for over the areas of the Development Envelope on this tenement, however they have not yet been approved (L47/734, L47/730 and L47/728); and
- A future miscellaneous licence (L47/731) that has been applied for, for access roads to the north and east of M47/1451.

The Proposal is located within the Millstream Water Reserve as shown in Figure 5. The reserve was proclaimed in 1969 for the purpose of public drinking water source protection. By-laws created under the *Country Areas Water Supply Act 1947* enable the DoW to consider potentially contaminating activities and land uses, and to inspect premises (DoW, 2010).

A small portion of both Development Envelopes overlaps with Coolawanyah Station (Figure 4). The nearest conservation estate is Karijini National Park, located 45 km east of the Proposal.





Figure 5: Boundaries of Millstream Water Reserve

## **2.4** Approval and Development Timeframes

Key approval milestone targets for assessment under Section 38 of the EP Act are shown in Table 4. These timeframes are consistent with the EPA's *EAG 6: for Timelines for EIA of Proposals* (EPA, 2013a). The key development milestone timeframes will be determined after a full Bankable Feasibility Study has been completed in Q3 2015.

### Table 4: Approvals schedule

	2015					
Stage	Mar		Apr	Мау	Jun	Jul
Proposal referred and accepted by the OEPA						
Public comment period on referral information (7 days)						
OEPA set level of assessment as API Category A (4 weeks)						
OEPA assess Proposal and take an assessment strategy and referral information to EPA meeting (7 weeks)						
OEPA consults with proponent and Decision-Making Authorities on draft recommended conditions (2 weeks)						
OEPA publish report and submits to the Minister (4 weeks from date of EPA meeting)						
Appeal period to the Minister on the EPA's Assessment Report (2 weeks)						
Minister issues statement if no appeals (approximately 2 weeks)						

# 3 PROPONENT AND KEY PROPOSAL CHARACTERISTICS

### **3.1 PROPONENT DETAILS**

The proponent is FMS, an emerging Australian iron ore company with the main focus of developing the PIOP, situated in the Pilbara region of WA. The PIOP is 100% owned by FMS. The Proponent for the Proposal is therefore detailed below:

Flinders Mines Ltd ABN: 14 149 783 068

The key contact person in relation to this document is:

### **Flinders Mines Limited**

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### **3.2 Key Proposal Characteristics**

FMS has considered *EAG 1: Defining the Key Characteristics of a Proposal* (EPA, 2012b) - which focuses on how to define the key characteristics of proposals for the purposes of assessment and incorporation into a MS. The objective of EAG1 is to assist proponents to identify and provide the key characteristics that capture all key features of the Proposal relevant to Part IV of the EP Act.

It is expected that a replacement Ministerial Statement will be released for the Revised Proposal, and MS 924 will become invalid. For this reason, the key characteristics definitions in the replacement MS will need to encompass both the PIOP Stage 1 and this Proposal. The proposed key characteristics for the Revised Proposal are described in Table 5.

Figure 3 shows the boundary of the Development Envelopes for the Revised Proposal, within which all ground disturbance will occur.

Table 5: Key characteristics of the Proposal (corresponds to Development Envelope boundaries provided inFigure 3)

Summary of the Proposal						
Proposal Title	Pilbara Iron	Ore Project – Revised Proposal				
Proponent Name	Flinders Min	es Limited				
Short Description	Short       The proposal is to develop and operate an iron ore mine on the Blacksmith tenement         Description       (M47/1451) located approximately 70 km north-west of Tom Price in the Pilbara region of         Western Australia.       The proposal also includes additional infrastructure such as access         roads, airport, accommodation camps, power station, ore processing facility, tailings         storage facilities and other supporting infrastructure.					
		Physical Elements				
Element	Location	Extent Authorised under MS 924	Revised Proposal			
Backfilling of mine pits	Figure 3	Mine pits are to be backfilled so that the final surface levels are at a higher elevation than the predicted post development groundwater levels to prevent the formation of pit lakes.	No change.			
Mine pits and associated infrastructure	Figure 3	Mine pits - Clearing no more than 1,718 ha within the 7,262 ha Development Envelope. Associated Infrastructure - Clearing no more than 417 ha within the 7,262 ha Development Envelope.	<ul> <li>Mine pits - Clearing no more than 1,788 ha within the 7,531 ha Mine Development Envelope.</li> <li>Associated Infrastructure - Clearing no more than 447 ha within the 7,531 ha Mine Development Envelope.</li> </ul>			
External infrastructure (including airport, camp, access roads)	Figure 3	-	Clearing no more than 200 ha within the 1,316 ha External Infrastructure Development Envelope.			
Operational Elements						
Element	nt Extent Authorised Revised Proposal					
Ore Processing (waste)	-		Disposal of tailings to in-pit storage areas.			
Water abstraction	Net abstraction of no more than 4 gigalitres per annum.		Net abstraction of no more than <b>6</b> gigalitres per annum.			

## **4 STAKEHOLDER CONSULTATION**

FMS completed significant stakeholder consultation for PIOP Stage 1 (Appendix 5) and much of the content of this consultation also applies to this Proposal. In the time since the approval of PIOP Stage 1 FMS has also consulted with key stakeholders about the key items of interest for this Proposal.

A date record summary of consultation is maintained by FMS and will be used to support the government approvals process by demonstrating that key stakeholders have been identified, issues have been raised and responses and outcomes recorded. The key stakeholder list will be added as / if new stakeholders are identified. As much of the stakeholder consultation content completed for PIOP Stage 1 is also relevant to this Proposal, a summary of stakeholder consultation completed for PIOP Stage 1 is provided in Appendix 5.

Table 6 details the key stakeholders and consultation since the release of MS 924 that are relevant to this Proposal.

Stakeholder	Date	Topics / issues raised	Proponent response / outcome
OEPA	Ongoing monthly and planning meetings	<ul> <li>Presentation of outcomes of surveys and studies;</li> <li>Key factors;</li> <li>Assessment requirements;</li> <li>Submission, format and content of this API Document; and</li> <li>Project updates.</li> </ul>	FMS will continue to inform OEPA of design changes and the status of surveys and approval submissions.
Department of Mines and Petroleum (DMP)	23 Jan 2015	Tailings characterisation information sent to DMP for comment. DMP stated that FMS had adopted an appropriate approach to the issue of material characterisation.	FMS to consult further with DMP at the Mining Proposal stage.
Department of Environment Regulation (DER)	21 Nov 2014	<ul> <li>Presentation of the Proposal;</li> <li>Licensing of various infrastructure that form part of the Proposal under Part V of the EP Act, including:         <ul> <li>OPF and associated TSFs;</li> <li>Camp wastewater treatment plant;</li> <li>Mine dewatering and recharge.</li> </ul> </li> </ul>	FMS will obtain works approvals and licences under Part V of the EP Act prior to construction and operation respectively.
	30 Jan 2015	Tailings characterisation information sent to DER for comment. DER stated that the TSFs were likely to require a works approval and licence	FMS will consult further with DER at the Works Approval stage.
DoW	14 Oct 2014	Presentation of the Proposal and initial discussion about expected dewatering volumes and recharge options available	FMS will consult with DoW and obtain appropriate approvals for dewatering and recharge activities.
10 Feb 2015		<ul> <li>Tailings characterisation and TSF monitoring;</li> <li>Water supply requirements;</li> <li>Dewatering and recharge options; and</li> <li>Commitments proposed for the API Document.</li> </ul>	FMS have considered DoW's comments and have included relevant commitments in this API Document.

 Table 6: Relevant stakeholder consultation records

Stakeholder	Date	Topics / issues raised	Proponent response / outcome
DotE	24 Sep 2014	<ul> <li>Presentation of the Proposal;</li> <li>Presentation of outcomes of biological surveys;</li> <li>Presentation of potential impacts to Matters of National Environmental Significance (MNES);</li> <li>Expected submission dates for EPBC Act referral; and</li> <li>Cost-recovery.</li> </ul>	FMS will consider DotE's advice when preparing the EPBC Referral.
Department of State Development	Ongoing	Discussions and acceptance of the Proposal.	Proposal understood as a component that supports the BBI Project.
Wintawari Guruma Aboriginal Corporation – Eastern Guruma	Ongoing	<ul> <li>Native Title negotiations for M47/1451</li> <li>Heritage Protocols</li> <li>Heritage site surveys and potential disturbance</li> </ul>	Native Title Agreement reached in March 2012. Discussions continue regarding heritage site surveys.
Coolawanyah Pastoral Station	2012	Land Access Agreement	A Land Access Agreement was executed in March 2012
Rutila	Ongoing	<ul> <li>PIOP export requirements;</li> <li>Timeframe targets;</li> <li>Infrastructure connections;</li> <li>Use of Flinders camp for biological surveys; and</li> <li>Sharing of environmental information and resources.</li> </ul>	FMS will continue to liaise with Rutila throughout the life of the Proposal.

# **5 RELEVANT STUDIES**

FMS commissioned surveys and studies in order to inform the EIA for PIOP Stage 1. Several of these surveys and studies remain relevant to this Proposal and have been used in this API Document.

FMS have also planned and implemented a series of additional studies to complement the PIOP Stage 1 studies and allow the assessment of any new potential impacts associated with this Proposal. All relevant studies are listed and described in Table 7, and provided in Appendix 1-4 for reference.

Consultant, survey / investigations name	Study Area, type and timing	Study standard / guidance and limitations	Appendix
Flora and Vegetation			
Ecoscape Australia Pty Ltd (Ecoscape) (2011a), PIOP – Blacksmith Flora and Vegetation Survey. August 2011.	<ul> <li>Approximately 10,781 ha Study Area; and</li> <li>Level 2 flora and vegetation assessment, field surveys conducted in May / Jun and Aug 2010, and Mar 2011.</li> </ul>	<ul> <li>EPA Guidance Statement No. 51;</li> <li>Position Statement No. 3; and</li> <li>Consultation with Department of Parks and Wildlife (DPaW).</li> <li>Limitations: The resource and access areas were adequately surveyed, with 50 floristic quadrats assessed (approximately 0.46 quadrats per km<sup>2</sup> across the tenement, but 2.33 quadrats per km<sup>2</sup> in the unburnt area). Approximately 80% of the tenement was burnt in early 2010 and provided significant constraints on vegetation mapping, however there were sufficient unburnt areas to characterise the flora and vegetation, except the major drainage line (riparian area) through the 'Ajax' resource area that was the only representative of this landform/vegetation type, and the wide valley floor of 'Eagle' that is anticipated to have had different shrubland vegetation types.</li> </ul>	1
Ecoscape (2015), Desktop Flora, Vegetation and Fauna Survey (currently underway –document title not yet verified)	<ul> <li>Desktop survey of areas of Development Envelopes not previously surveyed; and</li> <li>Commenced March 2015.</li> </ul>	• Consultation with the OEPA regarding content.	Currently underway – to be provided when complete
GHD (2014), Flinders Mines: Blacksmith Prospect Infrastructure Investigation. Vegetation, Flora and Fauna Assessment. October 2014.	<ul> <li>Approximately 1,251 ha Study Area;</li> <li>Survey of proposed disturbance areas south of Blacksmith tenement; and</li> <li>Desktop assessment and Level 1 flora and vegetation field assessment conducted in Jul/Aug 2014.</li> </ul>	<ul> <li>EPA Guidance Statement No. 51;</li> <li>Position Statement No. 3; and</li> <li>Consultation with DPaW.</li> </ul> Limitations: No significant limitations noted. Minor limitations include: <ul> <li>Level 1 survey conducted only, over a single season;</li> <li>Timing at the end of the dry season is not optimal, however the number of taxa found is comparable with those undertaken in the area during preferable times of the year:</li></ul>	1

 Table 7: Summary of relevant environmental surveys

Consultant, survey / investigations name	Study Area, type and timing	Study standard / guidance and limitations	Appendix
		<ul> <li>Rainfall for the year to date was lower than average, however suitable rainfall was experienced in the three months prior to the survey. Conditions were deemed suitable for a Level 1 survey;</li> <li>Six flora specimens were unable to be identified due to a lack of flowering or fruiting material, however the majority of flora species were able to be identified;</li> <li>Some areas of the study area had been burnt less than five years ago, however the vegetation had recovered well and this was not expected to affect the survey results; and</li> <li>Access was allowed for all but a small area to the north-east. Information for this area was extrapolated from nearby accessible areas.</li> </ul>	
Terrestrial Fauna			
Phoenix Environmental Pty Ltd (Phoenix) (2014), Memo: PIOP Level 1 Vertebrate Fauna Survey of Proposed Road Alignment.	<ul> <li>Approximately 6 km long by 200 m wide Study Area; and</li> <li>Desktop and Level 1 fauna and habitat assessment conducted in 20 Oct 2014.</li> </ul>	<ul> <li>EPA Guidance Statement No. 56; and</li> <li>Consultation with DPaW.</li> <li>Limitations:</li> <li>No limitations noted</li> </ul>	2
Ecoscape (2011b), PIOP – Blacksmith Vertebrate Fauna and Short Range Endemic (SRE) Survey.	<ul> <li>The Study Area is the Blacksmith tenement (E47/882);</li> <li>Targeted search for conservation significant fauna species including a desktop assessment and a Level 2 fauna survey;</li> <li>Preliminary surveys 31 May - 5 June 2010;</li> <li>Northern Quoll survey 13 - 18 July 2010; and</li> <li>Targeted trapping 7-16 Oct 2010.</li> </ul>	<ul> <li>EPA Guidance Statement No. 56;</li> <li>EPA Position Statement No. 3;</li> <li>EPA Guidance Statement No. 20; and</li> <li>Consultation with DPaW.</li> </ul> Limitations: No significant limitations noted. Minor limitations include: <ul> <li>Much of the area has suffered from wildfire event in Feb 2010, and low level grazing for many years, which will have had a long-term effect on the fauna assemblage. More recently, exploration activity has degraded some habitat; and <ul> <li>The DPaW Pilbara regional survey data were not available for comparative purposes. The trapping effort and period of other surveys was limited.</li> </ul></li></ul>	2
GHD (2014), Flinders Mines: Blacksmith Prospect Infrastructure Investigation. Vegetation, Flora and Fauna Assessment.	<ul> <li>Approximately 1,251 ha Study Area;</li> <li>Survey of proposed disturbance areas south of M47/1451; and</li> <li>Desktop assessment and Level 1 fauna field assessment conducted in Jul/Aug 2014.</li> </ul>	<ul> <li>EPA Guidance Statement No. 51;</li> <li>Position Statement No. 3; and</li> <li>Consultation with DPaW.</li> <li>Limitations: <ul> <li>No significant limitations noted. Minor limitations include:</li> <li>Level 1 survey conducted only, over a single season;</li> <li>The timing of the survey meant that some species (particularly reptiles) may have been less active; and</li> <li>Access was allowed for all but a small area to the north-east. Information for this area was extrapolated from nearby accessible areas.</li> </ul> </li> </ul>	1

Consultant, survey / investigations name	Study Area, type and timing	Study standard / guidance and limitations	Appendix
Subterranean Fauna			
Bennelongia Pty Ltd (2011), PIOP: Blacksmith Subterranean Fauna Surveys.	<ul> <li>Subterranean fauna surveys occurred within the Blacksmith tenement (E47/882) at Ajax, Blackjack, Champion, Delta and Eagle ore deposits; and</li> <li>Jun 2010 - Sep 2011.</li> </ul>	<ul> <li>EPA Guidance Statement No. 54a; and</li> <li>Consultation with DPaW.</li> <li>Limitations: No significant limitations noted.</li> </ul>	2
Bennelongia Pty Ltd (2012), Addendum: PIOP, Blacksmith Subterranean Fauna Surveys.	<ul> <li>Habitat characterisation, taxanomic and biogeographic review of subterranean fauna collected in the Blacksmith tenement and surrounding areas and additional troglofauna sampling; and</li> <li>7 - 8 Feb 2012.</li> </ul>	<ul> <li>EPA Guidance Statement No. 54a</li> <li>Consultation with DPaW</li> <li>Limitations: No significant limitations noted.</li> </ul>	2
Hydrological Processe	s		
WorleyParsons (2012c), PIOP – Groundwater Impact Assessment Report.	Groundwater modelling for the PIOP to assess the dewatering requirements at the Champion, Delta and Eagle deposits, and the associated potential off- tenement drawdown impacts on Groundwater Dependant Ecosystems (GDEs).	Consultation with DoW Limitations: No significant limitations noted.	3
WorleyParsons (2013), PIOP – Dewatering Modelling Report. Addendum to the Groundwater Impact Assessment Report.	Revision of WorleyParsons (2012c) modelling to assess the updated dewatering requirements at the Champion, Delta and Eagle deposits, and the associated potential off-tenement drawdown impacts on GDEs.	<ul> <li>Consultation with DoW;</li> <li>Australian Groundwater Modelling Guidelines. Waterlines Report Series No 82, June 2012, National Water Commission, Australian Government;</li> <li>DHI-WASY GmbH 2012. FEFLOW 6.1 Finite Element Subsurface Flow &amp; Transport Simulation System User Manual. Berlin Germany.</li> <li>Limitations: No significant limitations noted</li> </ul>	3
Inland Water Quality		No significant initiations noted.	
WorleyParsons (2012a), Geochemical Characterisation of Mine Waste and Tailings – Implications for Mine Waste Management.	Geochemical characterisation of waste (Delta, Eagle and Champion deposits). Testwork occurred in 2012.	<ul> <li>The testwork methods used were proven approaches to 'static-testing' and 'kinetic-testing' within the Australian, and international mining industries:</li> <li>Price, W.A. (2009). Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. MEND Report 1.20.1;</li> <li>AMIRA (2002). Acid Rock Drainage Test Handbook: Project 387A Prediction and Kinetic Control of Acid Mine Drainage;</li> <li>Stewart WA, Miller SD and Smart R. (2006). Advances in Acid Rock Drainage Characterisation of Mine Wastes; and</li> <li>Morin KA and Hutt NM, 1997, Environmental Geochemistry of Minesite Drainage: Practical Theory and Case Studies.</li> </ul>	4
		No significant limitations noted.	

Consultant, survey / investigations name	Study Area, type and timing	Study standard / guidance and limitations	Appendix
Graeme Campbell & Associates (GCA) (2011), Flinders PIOP: Geochemical Characterisation of Process – Tailings – Solids Sample and Management Implications.	A testwork programme exclusively focussed on the detrital iron deposit (DID) (DID 2, DID 3 and DID 4 composites) and Brockman bedded iron deposit (BID) (BIDg and BIDh composites) ores of the Delta deposit from the Blacksmith tenements. Testwork occurred in 2011.	As above. <b>Limitations:</b> No limitations noted	4
RGS Environmental Pty Ltd (RGS) (2014), Independent Third Party Review of Mine Waste Characterisation PIOP: Process Waste Tailings.	An independent third party review of the GCA (2011) report. RGS reviewed the GCA (2011) report in November 2014.	<ul> <li>AMIRA (2002). Acid Rock Drainage Test Handbook: Project 387A Prediction and Kinetic Control of Acid Mine Drainage;</li> <li>DITR (2007). Leading Practice Sustainable Development Program for the Mining Industry. Managing Acid and Metalliferous Drainage;</li> <li>INAP (2009). Global Acid Rock Drainage Guide; and</li> <li>Price, W.A. (2009). Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials.</li> </ul>	4
		Limitations: RGS stated that it was not clear from the GCA (2011) report whether the composite samples of ore materials used to generate the single tailings solids sample provide a reasonable representation of the tailings solids likely to be generated by the Proposal.	
Graeme McDonald (2015), PIOP Deposit Homogeneity.	An assessment by FMS Geologist about predicted homogeneity between deposits at the PIOP. Report was in response to the limitations identified by RGS (2014) (see above).	Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (2012). Limitations: None identified.	4

FMS will also be conducting detailed assessments prior to construction such as:

- Desktop flora, vegetation and fauna survey of areas potentially disturbed as a result of this Proposal (currently underway);
- Pre-disturbance surveys for the presence of conservation significant flora, vegetation and fauna within proposed disturbance areas;
- Dewatering / water abstraction water balance modelling updating current modelling using revised mine planning and water balance information to determine accurate dewatering volumes required;
- Supplementary tailings leachate testing;
- Baseline monitoring of groundwater quality upstream and downstream of the TSFs;
- Nutrient loading assessments for wastewater disposal (i.e. from sewage treatment plants); and
- Flow rate and volume assessments at watercourse crossings to inform culvert or bridge design.

# 6 ASSESSMENT OF PRELIMINARY KEY ENVIRONMENTAL FACTORS

## 6.1 DETERMINATION OF PRELIMINARY KEY ENVIRONMENTAL FACTORS

This API Document has taken into account the recently released *EAG for Preparation of an API – Category A Environmental Review Document* (EPA, 2015). This section will focus on the environmental factors that are deemed to be 'key' factors; those with the potential to be significantly impacted and could not be appropriately managed under other existing legislation. Potential impacts to these key factors are described in detail and assessed using the information provided from relevant studies specific to the Proposal. 'Other' environmental factors are discussed briefly in Section 7, with a focus on demonstrating that they can be appropriately managed using a combination of industry-standard controls and other existing legislation. In summary, this section will describe the most relevant impacts and characteristics of the Proposal for assessment and provides all related biological and technical reports and survey results as Appendices (Appendix 1 - 4).

FMS and Preston Consulting Pty Ltd conducted an assessment of the potential environmental impacts of the Proposal and determined that flora and vegetation, terrestrial fauna and inland waters environmental quality were the three 'key' environmental factors that required detailed assessment in this API Document. Offsets and Rehabilitation and Closure are Integrating Factors that were deemed to be relevant to this Proposal and are also discussed in this section.

The subterranean fauna environmental factor was originally considered to potentially be a 'key' environmental factor due to the potential for impacts from groundwater abstraction and additional mining. A review of the survey reports identified that there are high levels of habitat connectivity between valleys, ridges and deposits, and the proposed mining described in this Proposal all occurs above the water table. Groundwater abstraction for this Proposal is only to provide water supply (i.e. not dewatering), and the abstraction was deemed unlikely to have a significant impact on stygofauna habitat in comparison to the original PIOP Stage 1. It was therefore deemed to be unlikely that the Proposal would significantly impact subterranean fauna populations in the area. This factor was therefore classed as an 'other' environmental factor and is discussed further in Section 7.

The hydrological processes environmental factor was also deemed to be an 'other' environmental factor as MS 924 already contains applicable conditions to address this factor and DoW is able to manage groundwater abstraction under the RIWI Act.

## 6.2 DISCUSSION OF EACH PRELIMINARY KEY ENVIRONMENTAL FACTOR

Table 8 provides a tabled summary of key assessment information relevant to the Proposal. It provides a concise overview of the **significant** environmental impacts that are likely to require mitigation and regulation. The potential impacts that FMS deemed to be minor and easily

managed using industry best-practice methods were not included, as per the guidance listed in EPA (2015).

FMS proposes to implement appropriate management measures to mitigate the potential impacts on each factor. The management measures have been divided into two types of controls; industry best-practice controls and additional Proposal-specific controls in Table 8.

### Table 8: Assessment Table - Preliminary Key Environmental Factors

Inherent Impact (without mitigation)	Environmental Aspect	Mitigation Actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	
Flora and Vegetation – To maintain representation, diversity, viability and ecolog	ical function at the	species, population and community level.		
<ul> <li>Context: <i>Policy</i> <ul> <li>MS 924 contained specific conditions relating to vegetation, specifically Groundwater Dependant Ecosystems (GDEs). MS 924 required that FMS develop a Groundwater Dependant Vegetation Monitoring and Management Plan (GDVMMP) to verify that impacts to GDEs were kept within the limits set in MS 924; and</li> <li>MS 924 also required the contribution of funds for the clearing of good to excellent condition native vegetation.</li> </ul> </li> <li><i>Belevant Baseline Information</i> The following information summarises the major findings of the flora and vegetation surveys undertaken by Ecoscape (Level 2 survey, 2011a) and GHD (Level 1 survey, 2014) and included in Appendix 1. The Ecoscape Study Area refers to a separate study area outside of M47/1451, and the GHD Study Area refers to a separate study area outside of M47/1451. These boundaries. It should be noted that 80% of the Ecoscape Study Area was burnt at the time of their survey, however sufficient unburnt vegetation remained to allow the characterisation of the area (Ecoscape, 2011a). There are portions of the Development Envelopes that lie outside the ecological survey areas (Figure 6) or were subject to Level 1 survey only GHD Study Area). These areas were not able to be surveyed to a Level 2 standard due to time constraints and the unsuitable time of year (planning commenced in Q3 2014). It was instead preferable to survey proposed disturbance areas at a suitable time of year, prior to construction, and therefore this has been committed to in this document (this section).</li> <li>Areas potentially impacted by the Proposal are currently the scope of a desktop flora, vegetation and fauna survey being conducted by Ecoscape. This survey is focused on the potential for conservation significant species habitat, and the results will be made available to the OEPA prior to the completion of their assessment. <i>Eloru</i> No hy plant taxon recorded was listed as Threatened under EPBC Act or <i>Wildlife Conservation </i></li></ul>	<ul> <li>Ground disturbance – clearing of native vegetation; and</li> <li>Earthmoving and construction activities.</li> </ul>	<ul> <li>Implement the following industry best-practice controls:</li> <li>Implement Project Construction and Operational Environmental Management Plans (EMPs). These EMPs will contain detailed management actions, monitoring, reporting, corrective actions and responsibilities for flora and vegetation. Key management actions to be included in the EMPs are;</li> <li>Manage vegetation clearing through internal ground disturbance procedures;</li> <li>Identify the boundaries of areas to be cleared or disturbed by GPS coordinates and provide maps of boundaries to dozer operators;</li> <li>Develop the disturbance footprint to the minimum required to ensure safe and adequate construction and operation;</li> <li>Manage any indirect impacts to riparian vegetation resulting from erosion or watercourse crossings as per the mitigation actions listed in the Hydrological Processes section in this table;</li> <li>Implement weed hygiene and management measures/procedures to prevent spread of weeds and the introduction of new weed species as a result of construction and operation.</li> <li>Implement the following additional Proposal-specific controls:</li> <li>Conduct targeted conservation significant flora and vegetation surveys of expected disturbance areas within the External Infrastructure Development Envelope, prior to construction. FMS will ensure that each area is surveyed to an appropriate standard and at a suitable time of year;</li> <li>Develop Infrastructure Plan and submit to OEPA for approval prior to the commencement of construction. This Proposal is being submitted prior to the development of detailed infrastructure design, therefore flexibility is critical at this early stage. The Infrastructure Plan will be completed following detailed design and will finalise the required disturbance to key environmental features, and will provide the required information from the surveys discused above;</li> <li>Provide an offset payment for the clearing of up to 300 ha of Good to Excellent condition vegetation;</li> <li>Inclu</li></ul>	<ul> <li>The replacement MS is expected to regulate impacts to flora and vegetation, either via limits in the key characteristics table or via conditions, including:         <ul> <li>Limit of ground disturbance;</li> <li>Activities to occur within defined Development Envelopes;</li> <li>Annual reporting of impacts; and</li> <li>Requirement for offsets for the disturbance of Good to Excellent condition vegetation. The condition is expected to set a rate per hectare in line with current rates for the Hamersley IBRA sub-region.</li> </ul> </li> <li>EPBC Act will regulate potential impacts to MNES flora or vegetation (however none have been found so far). FMS is referring the Proposal to DotE for impacts to MNES fauna in parallel to this API submission;</li> <li>WC Act can address impacts to protected flora if found;</li> <li>Weed management will be as per the requirements of the <i>Agriculture and Related Resources</i> <i>Protection Act 1976</i>; and</li> <li>A Mining Proposal under the <i>Mining Act</i> <i>1978</i> (Mining Act) will be required which will ensure the Proposal complies</li> </ul>	<ul> <li>Predicted Outcomes:</li> <li>The Proposal will resvegetation. &gt;98% of Excellent condition. Yexpected offset conditional Surveys to date have will not be impacted a recorded during substeme precorded during substeme precorded during substeme precorded. With the impresent of the significant species, due to the follor PF located during vegetation surver where practicab of <i>Goodenia nuda</i> in associated with a substraction applied in the proposed disturbed as it lies out of the extent of vegetation and the extent of vegetation as the survey of a structure Pf.</li> <li>The potential unidered disturbed as it lies out the extent of vegetation as the extent of vegetation abstraction is propose exposure to GDEs. The to be dependent on p the Channel Iron Dep supply. This conclusis in those areas (&gt;50 m (WorleyParsons, 201 among other commit verify these assumpties exceed those approver be required; and</li> <li>Indirect impacts are a best-practice industry areas for the projects across the significant. The key to a survey areas (Figure Survey ar</li></ul>

### **Predicted Outcomes**

sult in the disturbance of up to 300 ha of native the vegetation within the Study Areas is in Good to This disturbance will be offset in accordance with itions;

shown that PECs, TECs or Threatened Flora species by the Proposal. In the unlikely event that these are sequent surveys they will be avoided;

ed within the External Infrastructure Development and it possible that there are other PF plants or ne Development Envelopes that have not yet been plementation of mitigation actions, the Proposal is not ntly impact or affect the conservation status of any PF

llowing reasons: ig the targeted conservation significant flora and ey will be included in planning databases and avoided le;

nay become more abundant as this species is often disturbance;

cies that have the potential to occur prefer gorges or bitat, which will be avoided as much as practicable, and epresented outside of the Development Envelopes; and curbance requirements, and details of avoidance ed, will be confirmed with the submission of the lan prior to construction;

tified or range extension *Josephinia* species will not be itside of the Development Envelopes;

bance is not expected to result in a significant decline in ion within the Hamersley sub-region of the Pilbara ub-region is almost completely intact (i.e. >98% of preaining);

of groundwater abstraction will be required to ter supply for ore processing (Section 3.1). This water rced from mine pit dewatering, and is in addition to the n approved under MS 924.

action is not expected to impact GDEs as no additional sed from the Ajax deposit (which has the greatest he GDEs downstream of the Eagle deposit are expected perched aquifers rather than the groundwater stored in

posit (CID) aquifer that will be targeted for water ion was based on the significant depth to groundwater n), and the GDEs are only found along creek lines 2b). The GDVMMP already required by MS 924 will, ments, propose additional investigation works to ions. Impacts to GDEs are therefore not expected to ed under MS 924, and as such no new conditions would

not expected to be significant as the implementation of y controls has suitably managed these impacts in ss the Pilbara.

iated with the predicted outcomes are not expected to uncertainties are:

ment Envelopes that lie outside the ecological field 6) or were subject to Level 1 surveys only (GHD Study

Inherent Impact (without mitigation)	Environmental Aspect	Mitigation Actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	
<ul> <li>Proposal is located within the Hamersley Interim Biogeographical Regionalisation for Australia (IBRA) sub-region of the Pilbara biogeographic region (DotE, 2011); and</li> </ul>			with relevant standards.	Area). These areas and fauna survey be the potential for cor
<ul> <li>GDEs occur within and adjacent to the Study Areas (Figure 8).</li> <li>Relevant Design Considerations:</li> <li>Both Development Envelopes exclude the location where the <i>Josephinia</i> species was found.</li> </ul>	Alteration or blockage of surface water flows.	The EMPs (discussed above) will also incorporate surface water management and erosion protection into project planning and design to minimise disruption to watercourses and riparian vegetation.	The replacement MS will regulate any impacts that occur outside of the limits authorised under Part IV of the EP Act.	be made available to Areas in the Externa in the Infrastructure conservation signifi This, in combination
<ul> <li>Inherent Significant Impacts:</li> <li>Direct loss of primarily Very Good to Excellent condition native vegetation within the Development Envelope;</li> <li>Risk of direct loss of PF individuals or populations;</li> <li>Risk of direct loss of locally significant vegetation;</li> <li>Risk of direct loss of GDE vegetation or a reduction in GDE health;</li> <li>Indirect impacts to vegetation health through a range of mechanisms such as dust, flooding or erosion; and</li> <li>Transfer of existing weeds or the introduction of new weed species during construction and/or operation.</li> </ul>	Groundwater abstraction.	<ul> <li>Obtain all required approvals under the RIWI Act prior to groundwater drilling and abstraction;</li> <li>Comply with Condition 6-1 of MS 924 to ensure that groundwater abstraction does not cause the loss of groundwater dependant vegetation beyond the boundary of the 200 m wide GDE vegetation impact zone shown in Figure 4 of MS 924; and</li> <li>Develop and implement a GDVMMP. The GDVMMP will include all the requirements currently listed in MS 924.</li> </ul>	<ul> <li>The replacement MS is expected to include the same conditions as MS 924:         <ul> <li>Condition requiring the submission and approval of a GDVMMP prior to groundwater abstraction; and</li> <li>Conditions placing limits on GDE disturbance.</li> </ul> </li> <li>26D and 5C Licences under the <i>Rights in Water and Irrigation</i> <i>Act 1914</i> (RIWI Act) can ensure impacts to GDEs are minimised.</li> </ul>	<ul> <li>information would 1</li> <li>The survey intensity sufficient information to allow an assessime to the identification wide-ranging habitation information would a</li> <li>Groundwater source insufficient data to a degree of connective (WorleyParsons, 20 details included in tiuncertainty will not</li> <li>Alignment with EPA of The disturbance of up be unavoidably disturf vegetation the Proposa Taking into consideratt Factor (Offsets)" in thii implemented to meet to</li> </ul>
Terrestrial Fauna - To maintain representation, diversity, viability and ecological	function at the spec	cies, population and assemblage level.	-	
Context:PolicyMS 924 did not contain specific conditions relating to terrestrial fauna. The EPA stated in EPA Report 1456 that 'the proposal (Stage 1 PIOP) is unlikely to have a significant impact on conservation significant fauna as the areas within the Blacksmith tenement that will be developed are not essential for their ongoing maintenance given their wide distribution in the region and the presence of similar suitable habitats in surrounding areas'.Relevant Baseline InformationThe following information summarises the major findings of the terrestrial fauna surveys undertaken by Ecoscape (Level 2 survey, 2011b), GHD (Level 1 survey,	Ground disturbance – clearing of potential fauna habitat.	The Proposal design has, and will continue to, avoid and minimise clearing of higher value fauna habitat where practicable. The proposed locations of infrastructure were developed to optimise operational costs while being sensitive to the need to avoid or limit the impact to potential significant fauna values due to clearing and disturbance of habitat. Implement the following industry best-practice controls: The proposed industry best-practice controls for ground disturbance (i.e. such as minimising disturbance, developing a GDP system, managing weeds etc.) listed in 'Flora and Vegetation' above will also apply to general fauna habitat disturbance and therefore	<ul> <li>The replacement MS is expected to regulate impacts to fauna, either via limits in the key characteristic table or via conditions, including the following:         <ul> <li>Limit of ground disturbance;</li> <li>Activities to</li> </ul> </li> </ul>	<ul> <li>Predicted Outcomes:</li> <li>The proposed mine pladeveloped to optimise the impact to potential measures are also constant of the proposal is expected to terrestrial fauna:</li> <li>The Proposal will reterrestrial fauna hal remains almost comparison of the proposal comparison of the proposal will reterrestrial fauna hal remains almost comparison of the proposal comparison of the proposal will reterrestrial fauna hal remains almost comparison of the proposal comparison of the proposal will reterrestrial fauna hal remains almost comparison of the proposal comparison of the proposal will reterrestrial fauna hal remains almost comparison of the proposal co</li></ul>
<ul> <li>2014) and Phoenix (Level 1 survey, 2014) (Appendix 2):</li> <li>Three fauna habitat types were mapped within the Ecoscape Study Area - valley floor, hill slopes and gorges. Gorges habitat was the most restricted and of the highest value, however none were found in proximity to proposed works within the Mine Development Envelope (Figure 9);</li> <li>Four fauna habitat types were identified within the GHD Study Area as shown in Figure 9Error! Reference source not found., of which breakaway / rocky ridgelines and drainage line habitats were deemed to have the highest significance;</li> <li>Open and closed shrubland was the only habitat type recorded within the Phoenix Study Area (Figure 9; Phoenix, 2014), and was not deemed to be significant;</li> <li>Ecoscape (2012) also developed a regional habitat map based on information gathered during their field surveys and an analysis of aerial photographs. Ecoscape also highlighted key features such as rock breakaways and significant drainage lines as being potential significant Northern Quoll and Pilbara Olive Python habitat (Figure 9; Appendix 2);</li> </ul>		<ul> <li>nave not been repeated. Additional industry best-plattice</li> <li>management measures specific to fauna will be included in EMPs and will include a commitment to design watercourse crossings with culverts which will allow fauna to traverse under access roads.</li> <li>Implement the following additional Proposal-specific controls:</li> <li>Conduct additional targeted conservation significant fauna surveys of areas within the External Infrastructure Development Envelope that are expected to be disturbed during construction;</li> <li>Develop Infrastructure Plan and submit to OEPA for approval prior to the commencement of construction. The Infrastructure Plan is to finalise the required disturbance to conservation significant fauna habitat, and will include the results of the surveys discussed above;</li> <li>Consider drainage line habitat identified by GHD (2014) as a key constraint – mine planning and infrastructure design will be</li> </ul>	<ul> <li>within defined Development Envelopes;</li> <li>Annual reporting of impacts; and</li> <li>Condition requiring the submission and approval of an Infrastructure Plan and revised Significant Fauna Species Management Plan prior to construction.</li> <li>EPBC Act will regulate any potential impacts to MNES</li> </ul>	<ul> <li>to have a significant at a local or regiona of the 2,135 ha of di considered that 'dev not essential for the fauna species'. No c additional proposed</li> <li>Breakaways / rocky be disturbed (Figure Disturbance within Quoll or Pilbara Oliv 2012) is not expecte proposed disturban</li> <li>Drainage line habita (covers 29% of the of Infrastructure Deve infrastructure will g lines is minimised.</li> </ul>

### **Predicted Outcomes**

are currently the scope of a desktop flora, vegetation ing conducted by Ecoscape. This survey is focussed on servation significant species habitat, and the results will o the OEPA prior to the completion of their assessment. al Development Envelope to be disturbed as determined e Plan will be subjected to a targeted Level 2 icant flora and vegetation survey prior to construction. n with the mitigation actions proposed mean that this be unlikely to affect the predicted outcome; y and presence of burnt areas. FMS considers that on was gathered during the Ecoscape and GHD surveys ent of impacts to this factor. Further surveys may lead of additional PF species or locations however given t of the majority of PF, it is unlikely that this alter the predicted outcome; and e for GDEs downstream of Eagle deposit - there is confirm the extent of the perched groundwater and the ity between shallow and deeper CID/BID aquifers 12b). This will be verified prior to dewatering, with the GDVMMP required by MS 924, therefore this

alter the predicted outcome.

### **Objective:**

to 300 ha of Good to Excellent condition vegetation will bed to implement the Proposal. Give the condition of the al was predicted to have a residual impact for this factor. tion the application of offsets (refer to "Integrating is table below), FMS expects that the Proposal can be the EPA objective for this factor.

ans and locations of associated infrastructure were operational costs and balance the need to avoid or limit l significant fauna values. Other active management sistent with best practice and stewardship principles. e described management and mitigation measures, the o result in the following outcomes in relation to

esult in the disturbance of approximately 300 ha of bitat. Terrestrial fauna habitat in the surrounding area npletely intact and therefore the Proposal is not expected t effect on the representation of terrestrial fauna habitat al level. This is in line with the EPA's original assessment isturbance proposed for PIOP Stage 1, where it was velopment areas within the Blacksmith tenement were e on-going maintenance of any conservation significant change to the above assessment is anticipated from the d development areas outside the Blacksmith tenement; y ridgelines habitat as identified by GHD (2014) will not e 9);

gorges habitat or any potential significant Northern ve Python habitat as defined by Ecoscape (2011b and ed as these habitats were not identified in proximity to ace areas (Figure 9);

at as defined by GHD (2014) is relatively widespread GHD Study Area) and extends outside of the External elopment Envelope boundaries. Nevertheless, generally be located such that disturbance to drainage This will occur primarily for engineering reasons, as

Inherent Impact (without mitigation)	Environmental Aspect	Mitigation Actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	
<ul> <li>These habitats are generally well connected both locally and regionally (GHD, 2014; Phoenix, 2014);</li> <li>105 and 74 vertebrate fauna species were recorded during the Ecoscape and GHD surveys respectively;</li> <li>Nine species of conservation significance were recorded during the surveys from direct sightings, secondary evidence, echolocation recordings and camera traps. Based on habitats present in the Study Areas, known distributions and nearby records, a further five conservation significant species may potentially occur in the Study Area; and</li> <li>No short-range endemic (SRE) species were identified as occurring within or near the Ecoscape Study Area. SRE species were not surveyed by GHD or Phoenix.</li> <li>There are portions of the External Infrastructure Development Envelope that lie within Ecoscape's desktop fauna habitat mapping (Ecoscape, 2012; Appendix 2) but outside the ecological field survey areas (Figure 6) or were subject to Level 1 surveys only (GHD Study Area). These areas were not able to be surveyed to a Level 2 standard due to time constraints. It was instead preferable to survey proposed disturbance areas at a suitable time of year, prior to construction, and therefore this has been committed to in this API Document (this section).</li> <li>Areas potentially impacted by the Proposal are currently the scope of a desktop flora, vegetation and fauna survey being conducted by Ecoscape. This survey is focussed on the potential for conservation significant species habitat, and the results will be made available to the OEPA prior to the completion of their assessment.</li> <li><b>Relevant Design Considerations:</b></li> <li>FMS investigated several airport and accommodation camp options, and the final two options were surveyed by GHD. One of the options (the north option) was found to have numerous active Western Pebble-mound Mouse mounds (Appendix 2). This option was not pursued, and the southern option was chosen, where no conservation significant fau</li></ul>		<ul> <li>assessed to avoid these areas of habitat where practicable, or minimise disturbance in areas that cannot be avoided;</li> <li>Apply appropriate buffers if necessary around any key conservation significant fauna habitat (such as Northern Quoll and Pilbara Olive Python denning /shelter habitat) identified during the targeted conservation significant fauna surveys, based on the construction or operational activities to be undertaken (i.e. to minimise indirect impacts from dust, noise etc.);</li> <li>Review and implement the FMS Significant Fauna Species Management Plan (Ecoscape 2011c; Appendix 9) prior to construction. This plan will be updated with information from the Infrastructure Plan about final habitat disturbance requirements as well as specific design and management controls for conservation significant fauna such as: <ul> <li>Pre-clearing surveys to determine the location of dens / burrows;</li> <li>Translocation plans;</li> <li>Clearing campaigns and significant developments within critical conservation significant fauna</li> </ul> </li> <li>Rehabilitation of habitat; and</li> <li>Conduct a program to monitor the effects of the Revised Proposal on conservation significant fauna.</li> <li>In the event that monitoring suggests significant adverse effects on local conservation significant fauna populations as a result of the Proposal, a framework will be developed in consultation with DPaW for further investigations, management and contingency actions.</li> </ul>	<ul> <li>fauna. FMS is referring the Proposal to DotE in parallel to this API submission;</li> <li>WC Act manages unauthorised impacts to species listed under that Act; and</li> <li>Several approvals relate to the design of the Proposal, and will ensure it complies with relevant standards. These include a Mining Proposal and Mine Closure Plan (MCP) to be submitted under the Mining Act for all proposed works, and works approvals and licences under Part V of the EP Act for prescribed activities.</li> </ul>	surface water manag located within these The land systems cor the surrounding area occurs within the Stu significant fauna hab a large amount of pot (2014) along the rock External Infrastructu Based on the above, t status of any conserv Impacts to SRE speci- within or nearby the Indirect impacts to te will be managed usin <b>Degree of Uncertainty</b> The uncertainties assoc be significant. The key the The Proposal include Envelope that lie out: not subject to a Level were mapped using of currently the scope of being conducted by E conservation signific available to the OEPA Areas to be disturbed Envelope will be surv significant fauna prio provided by the Infra characteristics limits uncertainty does not of uncertainty for the <b>Alignment with EPA O</b> Given that minimal imp expected during the imp impact is unlikely for th implemented to meet the
Inland Waters Environmental Quality - To maintain the quality of groundwater a	and surface water, s	ediment and biota so that the environmental values, both ecological ar	nd social, are protected.	
<ul> <li>Context: <u>Policy</u> The PIOP is situated within the Millstream Water Reserve, in a Priority 2 PDSWA. By-laws created under the <i>Country Areas Water Supply Act 1947</i> enable DoW to consider potentially contaminating activities and land uses, and to inspect premises (DoW, 2010). Relevant guidelines include: <ul> <li>National Water Quality Management Strategy - Australian Drinking Water Guidelines 6 (National Health and Medical Research Council &amp; Natural Resource Management Ministerial Council (NHMRC &amp; NRMMC), 2011);</li> <li>Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC Guidelines) (Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand (ANZECC &amp; ARMCANZ), 2000); and </li> </ul></li></ul>	<ul> <li>Power Station and bulk fuel storage; and</li> <li>Leachate from the proposed TSFs.</li> </ul>	<ul> <li>Implement the following industry best-practice controls:</li> <li>The EMPs will contain detailed management actions, monitoring, reporting, corrective actions and responsibilities for inland waters environmental quality, including:</li> <li>Store and manage diesel in accordance with AS 1940-2004 and Water Quality Protection Notes, and seek further advice from DoW regarding hydrocarbon management and storage area design;</li> <li>Manage hydrocarbon spills occurring during field operations, e.g. burst hydraulic hose, according to management procedures covering the reporting and clean-up of spills; and</li> <li>Install sediment ponds at various locations to collect runoff and allow sediment to settle out.</li> </ul>	<ul> <li>The replacement MS will restrict tailings storage within the Mine Development Envelope;</li> <li>DER will require a works approval and licence under Part V of the EP Act for the TSFs, Power Station and Bulk Fuel Storage Area. DER are expected to primarily focus on the quality of tailings leachate, the containment of fuel</li> </ul>	<ul> <li>Predicted Outcomes:</li> <li>Appropriate manager understood on mine s EMPs. DMP will gene hydrocarbons and ha Mining Act and DG Ac the Proposal within t</li> <li>Sediment and erosion and regulated by DM contain commitments</li> <li>No permanent pit lak pits above the water</li> <li>The TSF pit void optif fill / embankment de significant impacts on</li> </ul>

### **Predicted Outcomes**

ement controls will be required for any infrastructure drainage lines or their floodplains;

ntaining suitable habitat are also well represented in (less than 1% of each land system's regional extent dy Areas) (Figure 10). It is likely that conservation itat occurs more broadly in these areas. As an example, tential Northern Quoll habitat was identified by GHD ky ridgelines and mesas immediately outside of the re Development Envelope;

the Proposal is not expected to affect the conservation vation significant species;

es are not expected as no SRE species were found Ecoscape Study Area; and

errestrial fauna are not expected to be significant and g Construction and Operations EMPs.

iated with the predicted outcomes are not expected to uncertainties are:

es areas of the External Infrastructure Development side the field Study Areas (the northern roads), or were 2 survey (GHD and Phoenix Study Areas). These areas lesktop information by Ecoscape (2012) and are f a further desktop flora, vegetation and fauna survey Ecoscape. This survey is focussed on the potential for ant species habitat, and the results will be made A prior to the completion of their assessment. l within the External Infrastructure Development veyed for the likelihood and presence of conservation or to construction, with proposed clearing areas astructure Plan. The proposed mitigation actions, key and conditions are expected to ensure that any result in changes to the predicted impacts. The degree e predicted outcomes is therefore low.

### bjective:

acts to conservation significant fauna habitats are plementation of the Proposal, a significant residual is factor. FMS expects that the Proposal can be ne EPA objective for this factor.

ment of hydrocarbons and hazardous materials is well sites and requirements will be included in the Proposal erally regulate storage and management of

zardous materials as part of their powers under the ct. DoW comment will be sought given the location of he Millstream Water Reserve;

n controls will also be included in the Proposal EMPs P. The Mining Proposal to be submitted to DMP will s regarding sediment and erosion controls; tes will remain at mine closure, as all proposed mine

table; on minimises the risks associated with a typical valley sign, where an embankment failure could have n downstream surface water bodies;

Inherent Impact (without mitigation)	Environmental Aspect	Mitigation Actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	
<ul> <li>Millstream Water Reserve - Drinking Water Source Protection Plan West Pilbara Water Supply (DoW, 2010).</li> <li>Relevant Baseline Information</li> <li>WorleyParsons (2012) undertook a Groundwater Impact Assessment on samples that were taken from the production bores at Delta, Champion and Eagle deposits. The groundwater test results are summarised below and indicate that the groundwater on test is of potable and fresh quality (WorleyParsons, 2012c); and</li> <li>Static and kinetic testing were undertaken to determine the potential for acid and/or metalliferous mine drainage. The static testing established that all waste rock samples were neutral to alkaline (i.e. pH of 7 to 8), contained negligible sulphides, and were classified as non-acid-forming. The results from the kinetic testing indicate that concentrations of minor elements in leachates were either below, or close to, the respective detection limits, and that metalliferous drainage is unlikely to be an issue requiring management.</li> <li>Relevant Design Considerations:</li> <li>Up to three separate TSFs are included as part of the Proposal. The TSFs will initially be located within mined-out pits at the Paragon deposit, and a minedout pit at the Delta deposit may be used if additional capacity is required;</li> <li>GCA (2011) completed a geochemical characterisation and assessment program for a single process tailings solid sample from the PIOP. The purpose of the CGA program was to predict potential environmental risks posed by the tailings materials during mining and post-closure. Based on the testwork it was concluded that the process tailings solid weathering 'under the episodic, pulsed rainfall-regime of the PIDara' (RGS, 2014);</li> <li>RGS (2014) undertook an independent third party review of the GCA (2011) report whether the composite samples for ematerials used to generale is angle that these sament of the anacterisation and assessment of the process tailings solid weathering 'under the episodic, pulse</li></ul>		<ul> <li>Implement the following additional Proposal-specific controls:</li> <li>Design, construct and operate the TSFs in accordance with the Guidelines for Safe Design and Operating Standards for Tailings Storage (DMP, 1999), TSFs in WA – Code of Practice (DMP, 2013) and ANCOLD (2012) requirements;</li> <li>Develop and implement a groundwater monitoring program. Baseline groundwater monitoring will be conducted for a minimum of 12 months prior to tailings disposal at each TSF (two years will be the target). A series of groundwater monitoring bores will also be developed in consultation with DoW and DMP to enable routine monitoring of groundwater upstream and downstream of the TSFs. Monitoring results will be assessed to identify if the TSF has led to elevated contaminant levels;</li> <li>Conduct additional leachate testing of tailings samples prior to tailings deposition. FMS is currently in consultation with DoW regarding the number of samples they would like to be tested;</li> <li>Test samples of tailings return water on a regular basis to ensure tailings with elevated contaminated levels are not being placed within the TSFs; and</li> <li>Equip tailings pipelines with pressure sensors (or an equivalent system) to detect changes in pressure that could indicate pipeline leakage or rupture.</li> </ul>	<ul> <li>and any associated impacts;</li> <li>A Mining Proposal and MCP will be required to be approved by DMP under the Mining Act prior to construction. The Mining Proposal will assess the design of TSFs, watercourse crossings and surface water settlement structures. This assessment will ensure that surface water structures do not result in excess turbidity or increases in flow rates (which may lead to scouring). The MCP will detail measures to reinstate groundwater and surface water processes at closure, and will be revised and re-assessed by DMP at least every three years. DMP may refer these documents to DoW for comment if required; and</li> <li>A Licence under the <i>Dangerous Goods</i> <i>Safety Act 2004</i> (DG Act) will be required for the storage of any large volumes of fuel or other hazardous materials.</li> </ul>	<ul> <li>Characterisation of tain detail in Appendix did not pose a contario of the leachate showed concentrations above NRMMC, 2011) or AN 2011). FMS has comit these results. FMS has upstream and downss baseline monitoring) resulting in elevated DER have all been coprovided the followin         <ul> <li>DoW - concerne additional comm</li> <li>DWP - agree tha issue of material</li> <li>DER - stated tha of the EP Act, an would need to b Works Approval</li> </ul> </li> <li>While unexpected, if contaminated as a reavailable. These could a Reconfiguring of the WRLs.</li> <li>Based on the above, if impacts to this factor</li> <li>Degree of Uncertainty</li> <li>RGS (2014) completed a and stated that it was no materials used to generic reasonable representatither proposal. To alleviate the prepared a report (McD is a high degree of homogasessment has been acconstant of the theory of the that there is lot Alignment with EPA O Given that minimal implexpected during the implet of have a significant rest proposal can be implement with theory of the that minimal implexpected during the implet of the theory of theory of the theory of theory of the theory of the theory of the</li></ul>
• Containination of Surface Waters.	l		l	

### **Predicted Outcomes**

ailings and waste rock has been conducted (described 4) which concluded that the tailings and waste rock ninant risk to groundwater or surface waters. Testing ed that it did not contain contaminants at

e the Australian Drinking Water Guidelines (NHMRC & VZECC Guidelines (ANZECC & ARMCANZ, 2000) (GCA, mitted to additional leachate testing to further verify as also committed to monitoring groundwater quality stream of the TSFs (including a minimum 12 months of which will allow FMS to determine if the tailings is contaminants downstream of the TSFs. DoW, DMP and nsulted regarding the proposed TSFs and have ng comments (provided in Appendix 6):

ed with the single sample, have requested several nitments in this API Document (included in this table); t FMS have adopted an appropriate approach to the l characterisation; and

at the TSFs are likely to require approval under Part V d the tailings waste characterisation information e considered alongside other waste streams at the l stage.

monitoring shows that groundwater is being sult of the TSFs, several contingency options are ld include:

of the ore processing methods to a dry process; or ailings to create a material that can be stacked into

t is expected that the TSFs will not result in significant

a third-party review of the GCA tailings report (2011) ot clear whether the composite samples of ore ate the single tailings solids sample provide a ion of the tailings solids likely to be generated by the hese concerns, Graeme McDonald (FMS Geologist) onald, 2015; Appendix 4) that demonstrates that there ogeneity between the deposits at the PIOP. This ccepted by DMP, DoW and DER (although DoW have mple be tested to confirm further), therefore it is ow uncertainty associated with this issue.

### bjective:

acts to inland waters environmental quality are plementation of the Proposal, the Proposal is unlikely idual impact for this factor. FMS expects that the nented to meet the EPA objective for this factor.

Inherent Impact (without mitigation)	Environmental Aspect	Mitigation Actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	
Integrating Factor (Offsets) - To counterbalance any significant residual environm	nental impacts or u	incertainty through the application of offsets.		
<ul> <li>Context: <u>Policy</u></li> <li>WA Environmental Offsets Guidelines (Government of WA, 2014);</li> <li>Environmental Protection Bulletin No. 1 – Environmental Offsets – Biodiversity (EPA, 2014); and</li> <li>WA Environmental Offsets Policy (Government of WA, 2011) <u>Relevant Baseline Information</u></li> <li>More than 98% of the vegetation mapped within in the Study Area was found to be in Good to Excellent condition (burnt areas were excluded from this calculation). Areas that were mapped in lesser condition had been impacted by cattle grazing, primarily within drainage lines (GHD, 2014);</li> <li>The Proposal is located completely within the Hamersley sub-region of the Pilbara biogeographic region as defined in the IBRA (DotE, 2011);</li> <li>No PECs, TECs or TF recorded within or close to the Disturbance Envelope;</li> <li>Three P3 and two P4 PF species found; and</li> <li>Nine fauna species of conservation significance were recorded during the surveys.</li> <li>Relevant Design Considerations:</li> <li>Up to 300 ha of disturbance will be required; and</li> <li>A conservative estimate is that all disturbance will occur within areas of Good to Excellent quality vegetation.</li> <li>Inherent Significant Impacts:</li> <li>Direct loss of mostly Good to Excellent condition vegetation;</li> <li>Direct loss of PF species; and</li> <li>Potential indirect impacts as a result of noise, dust, weeds, fire, alterations of groundwater levels and surface water flow characteristics.</li> </ul>	Ground disturbance, predominantly during the construction phase.	<ul> <li>The Proposal design has, and will continue to, avoid and minimise clearing of higher value environmental features where practicable;</li> <li>Develop the proposed mine pits and locations of associated infrastructure to optimise operational costs while being sensitive to the need to avoid or limit the impact to potential significant environmental values due to direct and indirect impacts;</li> <li>Develop an Infrastructure Plan and submit to OEPA for approval prior to the commencement of construction. The Infrastructure Plan will finalise the required disturbance to key environmental features, and will include the results of pre-clearing surveys;</li> <li>Offset the clearing of conservation significant fauna habitat and up to 300 ha of Good to Excellent condition vegetation, based on the results of the Infrastructure Plan;</li> <li>An Impact Reconciliation Procedure is required by Condition 7-3 of MS 924 and a similar condition is expected to be included in the replacement MS. The Impact Reconciliation Procedure will: <ul> <li>Include details of a methodology to identify clearing;</li> <li>Include a methodology for calculating the amount of clearing undertaken during each biennial time period; and</li> <li>State that the biennial time period commences on the first day of March prior to commencing ground disturbance and that the due date for submitting the results of the Procedure for approval of the CEO as 31 March two years after commencement of the biennial time period.</li> </ul></li></ul>	<ul> <li>The replacement MS is expected to require that offset payments be paid, based on the actual clearing within the Hamersley subregion of the Pilbara IBRA; and</li> <li>The DotE may also require offsets under the EPBC Act however these are expected to align with those applied by the EPA.</li> </ul>	Predicted Outcomes: Offsets are proposed t impacts or uncertainty disturbance of 300 ha Alignment with EPA Given that an offset is EPA Objective.
Integrating Factor (Rehabilitation and Closure) - To ensure that premises are cl	osed, decommissio	ned and rehabilitated in an ecologically sustainable manner, consisten	t with agreed outcomes and	land uses, and without
<ul> <li>Context: <i>Policy</i> <ul> <li>Guidelines for Preparing MCPs (DMP and EPA, 2011);</li> <li>Guidance for the Assessment of Environmental Factors No. 6 – Rehabilitation of Terrestrial Ecosystems (EPA, 2006);</li> <li>Strategic Framework for Mine Closure (Australian and New Zealand Minerals and Energy Council and the Minerals Council of Australia, 2000);</li> <li>Mine Closure Guidelines for Mineral Operations in WA (Chamber of Minerals and Energy WA Inc. 1999); and</li> <li>Pilbara Water in Mining Guideline (DoW, 2009).</li> </ul> </li> <li><i>Relevant Baseline Information</i> <ul> <li>More than 98% of the vegetation mapped within in the Study Area was found to be Good to Excellent condition (burnt areas were excluded from this calculation);</li> <li>Areas that were mapped in lesser condition had been impacted by cattle grazing, primarily within drainage lines (GHD, 2014); and</li> <li>The Proposal is located completely within the Hamersley sub-region of the Pilbara biogeographic region as defined in the IBRA (DotE, 2011).</li> </ul> <b>Relevant Design Considerations:</b> <ul> <li>Up to 300 ha of disturbance will be required during construction. A conservative estimate is that the proposed disturbance will occur within areas of Good to Excellent quality vegetation;</li> <li>70 ha of mining at the Paragon deposit is proposed, all of which will occur above the water table;</li> </ul></li></ul>	The areas of the Proposal that are of most relevance to rehabilitation and closure are mine pits, cleared areas, the WRL, hydrocarbon storage areas and the TSFs.	<ul> <li>Comply with the requirements of the <i>Contaminated Sites Act</i> 2003 (CS Act) if contamination occurs;</li> <li>Develop the WRL such that the outer slopes are shallow enough to allow successful rehabilitation;</li> <li>Dismantle all infrastructure and remove from site, or bury it on site (if no contamination risk exists);</li> <li>Strip topsoil and store it onsite for rehabilitation. Topsoil is to be stored for the shortest time period possible to maintain viability of the seed bank and soil fertility;</li> <li>Develop and implement management procedures for the recovery, storage and utilisation of topsoil;</li> <li>Inspect soil stockpiles regularly for evidence of erosion and weeds and remediate accordingly;</li> <li>Undertake progressive rehabilitation throughout the life of the Proposal;</li> <li>Cap the final surface of the TSFs with waste rock and allow to settle prior to rehabilitation;</li> <li>Develop a MCP which will comply with the Guidelines for Preparing MCPs (DMP &amp; EPA, 2010) and submit to DMP prior to construction of the Proposal. The MCP will be updated as new information becomes available, and will be re-submitted to DMP at least every three years for assessment. Post-closure drainage planning will be incorporated into the MCP;</li> <li>Develop a Rehabilitation Procedure in accordance with EPA Guidance Statement No. 6 Rehabilitation of Terrestrial Ecosystems (EPA, 2006), which sets out the general</li> </ul>	<ul> <li>The key characteristics of the Revised Proposal are expected to retain the current statement that mine pits are to be backfilled if required so that the final surface levels of all mine pits are at a higher elevation than the predicted post development groundwater levels to prevent the formation of pit lakes;</li> <li>The CS Act will manage any potential contamination resulting from hydrocarbon or chemical spills within storage areas; and</li> <li>The Mining Act approval processes will require the submission of a MCP</li> </ul>	<ul> <li>Predicted Outcomess</li> <li>The need to regulate led to the requirem MCP's for each minor role in the regulation proponent will be r and FMS will contine</li> <li>The Proposal will n contained within m small WRL is require upper reaches of the water courses will let water courses will let with the exception issues that are different under MS 924. As of leachate demonstratisk.</li> <li>Alignment with EPA Based on the above, reappropriately manage Proposal can therefore</li> </ul>

### Predicted Outcomes

to counterbalance the significant residual environmental y associated with the Proposal, specifically the a of Good to Excellent condition vegetation.

### **Objective**:

s proposed it is expected that the Proposal will meet the

unacceptable liability to the State.

te the rehabilitation and closure of mining operations has nent under the Mining Act for proponents to develop ne site. This requirement has allowed DMP to take a lead on of rehabilitation and closure for mining projects. The required to submit a MCP to DMP prior to construction, nue to liaise with DMP over the life of the Proposal; not result in the formation of pit lakes, tailings will be nine pits which minimises the risk of breaches, and only a ired for this Proposal. Mine pits are all located in the he catchments which means that impacts to downstream be minimal.

of the TSFs, the Proposal does not raise any closure erent to those assessed for the PIOP Stage 1 approved discussed earlier in this table, testing of the tailings and ated that the material is unlikely to be a contamination

### Objective:

ehabilitation and closure is expected to be able to be ed and regulated under alternative legislation. The re meet the EPA objective.

Inherent Impact (without mitigation)	Environmental Aspect	Mitigation Actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	
<ul> <li>An additional WRL will be developed to service the new Paragon mine pit. As most of the waste rock from Paragon will be used for construction, this WRL will be relatively small in size, covering an area of approximately 15 ha; and</li> <li>TSFs will be located in one or more mined-out pits at the Paragon deposit, with an initial pit in the Delta deposit being used if required.</li> <li>Inherent Significant Impacts: <ul> <li>Contamination of soils and / or waters;</li> <li>Surface water and groundwater regimes are not suitably reinstated;</li> <li>Disturbed land may not recover to become a self-sustaining ecosystem;</li> <li>Final landform slopes and surfaces may not be suitable for rehabilitation;</li> <li>Contamination (i.e. from hydrocarbon storage areas, TSFs, WRL etc.);</li> <li>Lack of reinstatement of pre-mining groundwater regimes;</li> <li>Increased erosion associated with unstable structures;</li> <li>Introduction and / or spread of weeds; and</li> </ul> </li> </ul>		<ul> <li>expectations about re-establishing biodiversity values where a site is to be rehabilitated back to native vegetation;</li> <li>Conduct a Mine Closure Risk Assessment to ensure key risks are identified and mitigated as part of the mine planning and mine closure planning process. The risk assessment will consider relevant standards and guidelines including Risk Management – Principles and Guidelines (AS/NZS ISO 31000:2009) and Environmental Risk Management – Principles and Process (HB 203:2006). Key areas to be addressed in the Mine Closure Risk Assessment will be stakeholder consultation, management of pits, design and construction of landforms, management of surface and groundwater, acid and/or metalliferous drainage and re-establishment of vegetation;</li> <li>Following the Mine Closure Risk Assessment, develop and incorporate objectives and actions into the Rehabilitation Procedure, MCP and EMPs, as appropriate, to ensure key risks are mitigated through the implementation of practicable action plans for rehabilitation and closure;</li> <li>Rehabilitate land back to native vegetation;</li> <li>Consider further general information on mine rehabilitation contained in the Australian "leading practice" handbook Mine Rehabilitation: Leading Practice Sustainable Development Program for the Mining Industry (Department of Resources, Energy and Tourism, 2011); and</li> <li>Consult with stakeholders and engage with relevant regulators throughout the life of the Proposal to identify and refine closure issues appropriate completion objectives and criteria</li> </ul>	prior to construction of the Proposal. The MCP will detail the closure plans for all items that were included in each Mining Proposal. The MCP will be updated and re-submitted either with any new Mining Proposal, or every three years, whichever occurs first.	

**Predicted Outcomes** 





Figure 7: Location of Priority Flora identified during surveys



Figure 8: GDEs in proximity to Proposal





Figure 10: Land systems that intersect with the Study Area

## **7 OTHER ENVIRONMENTAL FACTORS**

FMS has assessed the potential impacts of the Proposal on the various environmental factors listed in *EAG 8: for Environmental Factors and Objectives* (EPA 2013). This API Document focuses on the environmental factors that are deemed to be 'key' factors, those with the potential to be significantly impacted and could not be appropriately managed under other existing legislation. Potential impacts to these key factors are described in detail in Section 6 and assessed using relevant studies specific to the Proposal.

The 'other' environmental factors have been considered by FMS and due to the low level of impact, application of industry standard controls and other regulatory mechanisms, these factors are not expected to be required to be assessed in detail by the EPA. Table 9 provides the relevant EIA information for 'other' environmental factors to ensure the EPA has a high degree of confidence that the potential impacts are not significant and are manageable under standard industry controls and other regulatory mechanisms. FMS understands the importance of compliance with the relevant statutes that will be used to manage these environmental factors.

To ensure that the assessments are as concise as possible, the following sections only contain the baseline environmental information that was deemed to be relevant to each factor. For detailed information of broader existing environmental information (i.e. geology, climate and weather), please refer to the biological survey reports attached in Appendix 1 and 2.

### Table 9: Environmental assessment – other environmental factors

Potential impact (without mitigation)	Aspect	Mitigation Actions to address residual impacts	Proposed mechanism for ensuring mitigation
Landforms – To maintain the variety, integrity, ecological functions and environmental values of	f landforms and soils.		
<ul> <li>Context:</li> <li>The Proposal is located in a region of tall ranges intersected by drainage channels and is typical of the Hamersley Ranges in geology (Ecoscape, 2011a);</li> <li>The site elevations range between 500 m and 900 m above Australian Height datum (AHD) (WorleyParsons, 2012a); and</li> <li>The ranges are defined by near vertical scarps, ranging in elevation from 650 – 680 m AHD, with the valley floors located at 450 – 550 m AHD.</li> <li>Relevant Design Considerations:</li> <li>One WRL is included in the Proposal (15 ha).</li> <li>Inherent Significant Impacts:</li> <li>Alteration of landscape , creating deeper valleys at the Paragon deposit (although this will be offset by the deposition of tailings), and a new WRL;</li> <li>Alterations of final surface water regimens;</li> <li>Disturbance of soil profiles and landforms;</li> <li>Erosion resulting from unstable landforms; and</li> <li>Poor rehabilitation success on landform surfaces.</li> </ul>	<ul> <li>Development of WRL; and</li> <li>Excavation of mine pits.</li> </ul>	<ul> <li>Strip topsoil and store it onsite for rehabilitation. Topsoil is to be stored for the shortest time period possible to maintain viability of the seed bank and soil fertility;</li> <li>Cap the final surface of the TSFs with waste rock and allow to settle prior to rehabilitation;</li> <li>Develop the WRL such that the outer slopes are shallow enough to allow successful rehabilitation;</li> <li>Develop landforms so they have similar characteristics to surrounding landforms;</li> <li>Develop landforms such that natural surface water regimes are maintained where practicable;</li> <li>Design final landforms such that are long-term, safe, stable and non-polluting with a self-sustaining and resilient vegetative cover comparable to analogue sites, following decommissioning and closure, as verified by DMP;</li> <li>Rehabilitate final landforms to minimise erosion; and</li> <li>Implement surface water controls on the landform surfaces to promote infiltration and integration with surrounding flow systems, in consultation with DMP.</li> </ul>	The Mining Proposal and MCP approval processes under the Mining Act will consider design, development, rehabilitation and closure of the mine and landforms.
Subterranean Fauna – To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.			
Context:         Policy         • EAG 12 - Consideration of subterranean fauna in EIA in WA; and         • Surveys were completed in accordance with the now withdrawn EPA Guidance Statement 54a. FMS considers that the survey methods are suitable to allow appropriate EIA to occur.         Relevant Information (information below from Bennelongia Pty Ltd, 2012; Appendix 2):         Large proportions of subterranean fauna were only found within the mine pits however it is predicted that the ranges of these species are much larger. This is due to the sampling locations being within potential economic ore areas. Some species were only found in low numbers, which also restricts predictions of habitat range. The Paragon deposit was not sampled for subterranean fauna during the Bennelongia Pty Ltd survey.         Troglofauna:       94% of the Blacksmith tenement is considered to be troglofauna habitat, including the proposed mine pits at the Paragon deposit;         66 species of 19 orders represents a rich troglofauna community for the Pilbara region;       22 species were recorded only within the Blackjack, Champion, Delta and Eagle mine pits;         With the exception of diplurans and dipterans, all troglofauna species showed clear preference for valley edges and footslopes rather than valleys. It is also predicted that habitat extends onto ridges between deposits; and         The Paragon mine pits do not represent isolated troglofauna habitats based on evidence derived from habitat characterisation. This is demonstrated in Figure 6 of Bennelongia Pty Ltd, 2012.         Stygofauna:       2,755 ha (25%) of the Blacksmith tenement is saturated and considered to be suitable stygofauna habitat; <td><ul> <li>Mining of the Paragon deposit (70 ha); and</li> <li>Water supply abstraction. The additional 2 GL/yr abstraction is expected to result in a deeper and steeper drawdown around the dewatering bores, however the extent of the drawdown is likely to be reduced from what was approved under MS 924, due to the reduced mine life.</li> </ul></td> <td>No additional mitigation actions are proposed. Only an additional 4% of potential troglofauna habitat will be disturbed in addition to that approved under MS 924, and the revised groundwater abstraction plans will result in a smaller area of impact to stygofauna habitat than what was approved under MS 924 (although the vertical impact will be greater close to the dewatering bores). Studies also determined that there was good evidence that subterranean fauna habitat potentially impacted by the Proposal is well connected to surrounding habitats (Bennelongia Pty Ltd, 2012). The Proposal is therefore unlikely to result in significant additional impacts to those already approved under MS 924. Existing MS 924 conditions (that will be transferred to the replacement MS) and the mitigation actions proposed for the Hydrological Processes factor below will allow residual impacts to be minimised.</td> <td><ul> <li>The replacement MS is expected to contain conditions or details in the key characteristics table regarding water abstraction and mining limits; and</li> <li>A 5C Licence issued by DoW under the RIWI Act will manage groundwater abstraction.</li> </ul></td>	<ul> <li>Mining of the Paragon deposit (70 ha); and</li> <li>Water supply abstraction. The additional 2 GL/yr abstraction is expected to result in a deeper and steeper drawdown around the dewatering bores, however the extent of the drawdown is likely to be reduced from what was approved under MS 924, due to the reduced mine life.</li> </ul>	No additional mitigation actions are proposed. Only an additional 4% of potential troglofauna habitat will be disturbed in addition to that approved under MS 924, and the revised groundwater abstraction plans will result in a smaller area of impact to stygofauna habitat than what was approved under MS 924 (although the vertical impact will be greater close to the dewatering bores). Studies also determined that there was good evidence that subterranean fauna habitat potentially impacted by the Proposal is well connected to surrounding habitats (Bennelongia Pty Ltd, 2012). The Proposal is therefore unlikely to result in significant additional impacts to those already approved under MS 924. Existing MS 924 conditions (that will be transferred to the replacement MS) and the mitigation actions proposed for the Hydrological Processes factor below will allow residual impacts to be minimised.	<ul> <li>The replacement MS is expected to contain conditions or details in the key characteristics table regarding water abstraction and mining limits; and</li> <li>A 5C Licence issued by DoW under the RIWI Act will manage groundwater abstraction.</li> </ul>
<ul> <li>Stygolauna nabitat;</li> <li>34 species of 10 higher level groups represents a moderately rich stygofauna community;</li> <li>Habitat characterisation provides good evidence that underlying aquifers and stygofauna habitat are part of the wider groundwater systems of the Caliwingina and Weelumurra Creeks (Figure 11). This is supported by data that shows species are widely distributed between catchments;</li> <li>Eight species were shared between the Ajax and Delta (the most western and eastern) deposits, indicating that there is good habitat connectivity through the survey area;</li> <li>Seven species (21% of total) have not been recorded outside the Blacksmith tenement, however it is likely that most, if not all of them occur more widely in the Caliwingina and Weelumurra catchments; and</li> </ul>			

Potential impact (without mitigation)	Aspect	Mitigation Actions to address residual impacts	
• Stygofauna species distribution displayed little recognition of the surface water boundaries of the Caliwingina and Weelumurra catchments, which suggests that these catchments share groundwater and therefore there is habitat connection between the Champion and Delta deposits.			
Relevant Design Considerations:			
<ul> <li>The Proposal includes mining at the Paragon deposit only, which will occur above the water table and will not require dewatering; and</li> <li>2 GL/yr of groundwater will be required to be abstracted. This is in addition to the 4 GL/yr approved for PIOP Stage 1 under MS 924.</li> </ul>			
Inherent Significant Impacts:			
<ul> <li>Direct loss of 70 ha of potential troglofauna habitat; and</li> <li>Steepening of water table drawdown around dewatering bores resulting in a loss of stygofauna habitat in a vertical direction. Overall however the extent of the loss of habitat will be reduced due to the shorter mine life (drawdown affects a smaller portion of the aquifer).</li> </ul>			
Terrestrial Environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality of land and soils so that the environmental Quality - To maintain the quality - To maint	onmental values, both ecologica	l and social, are protected.	
Context: The majority of vegetation within the Development Envelopes remain in Good to Excellent condition, supporting a view that the quality of the land and soils is good. There was evidence of grazing to the valley floors and was most obvious through the valley floor and riparian areas in the western portion of the study area. No areas of potential contamination are located in proximity to the Development Envelopes. Inherent Significant Impacts: • Disturbance of soil profiles and landforms; • Localised contamination of soil, groundwater and / or surface water and subsequent impacts on surrounding ecosystems.	<ul> <li>Generation and disposal of waste including:</li> <li>General domestic waste such as paper, cardboards, some plastics and food scraps;</li> <li>Industrial wastes (e.g. pallets, packaging, scrap metals and tyres);</li> <li>Hazardous wastes such as hydrocarbons and contaminated material;</li> <li>Sewage from accommodation camps; and</li> <li>Waste rock and tailings from mining activities.</li> </ul>	<ul> <li>Adopt the waste management hierarchy as a basic principle for the Proposal; avoid, reduce recycle, recover, treat, dispose;</li> <li>Include the following in training and awareness programs: <ul> <li>Requirements for application of the waste management hierarchy;</li> <li>The location and operation (i.e. waste segregation) of waste disposal receptacles; and</li> <li>Requirements with regards to littering and maintaining a tidy workplace.</li> </ul> </li> <li>Provide adequate waste storage receptacles which facilitate the separation of materials, wh (e.g. recycling, reuse, return, disposal, etc.);</li> <li>Provide signage on bins indicating the specific materials to be disposed within the different Locate waste storage receptacles at suitable locations near to waste generating activities ar appropriately labelled;</li> <li>Appropriately secure waste storage receptacles in order to prevent the uncontrolled releas windblown, leaks, etc.);</li> <li>Obtain works approval and licence under Part V of the EP Act for all prescribed activities, in power station, bulk fuel storage and wastewater treatment plant;</li> <li>Segregate waste and remove from site via an authorised waste contractor and dispose of at landfill licensed under Part V of the EP Act;</li> <li>Store hydrocarbons and chemicals in accordance with Dangerous Goods Safety (Storage an Non-explosives) Regulations 2007 and AS1940: Storage and Handling of Flammable and CotLiquids;</li> <li>Construct fuel storage tanks in accordance with AS 1940-2004 (Storage and Handling of Flacombustible Liquids);</li> <li>Equip re-fuelling bays at bulk fuel storage facilities with concrete aprons or equivalent linin</li> <li>Ensure spill clean-up material is readily available at work sites and on mobile service truck where hydrocarbons and chemicals are stored and/or used;</li> <li>Clean up any spill or leakage with the contaminated soil and recovery agent being disposed licensed offsite landfill facility;</li> <li>Develop and implement a spill response procedure pri</li></ul>	
Hydrological Processes – To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.			
<ul> <li>Context: <u>Policy</u></li> <li>The Proposal is located within the Pilbara Groundwater Area and within the Millstream Priority 2 PDWSA, which is a gazetted water reserve under the RIWI Act. Development and groundwater use within the Millstream PDWSA is subject to the Millstream Water Reserve Drinking Water Source Protection Plan (DoW, 2010);</li> <li>An abstraction of 4 GL/yr was approved under MS 924 for PIOP Stage 1;</li> </ul>	Groundwater abstraction activities.	<ul> <li>Implement the following industry best-practice controls:</li> <li>Proposal EMPs will contain detailed management actions, monitoring, reporting, corrective acresponsibilities for hydrological processes. Key management actions will include:</li> <li>Integrate mine planning and dewatering activities with the overall site water balance to mi impacts; and</li> <li>Operate groundwater abstraction bores in accordance with DoW licence conditions.</li> <li>Implement the following additional Proposal-specific controls:</li> </ul>	
		<ul> <li>Comply with existing conditions in MS 924, which are expected to be transferred to the rep</li> <li>Liaise with DoW and obtain a 5C Licence for groundwater abstraction activities;</li> </ul>	

	Proposed mechanism for
e, reuse, here possible t bins; nd se of waste (i.e. ncluding TSF, t an offsite ad Handling for ombustible ammable and ng; ts of vehicles, d of at a art V of the EP	<ul> <li>DER is able to prosecute proponents for a breach of the <i>Litter Act 1979</i>, Environmental Protection regulations, or pollution impacts via the general provisions of the EP Act (i.e. for serious environmental harm) or the Environmental Protection (Unauthorised Discharges) Regulations 2004 (i.e. for unauthorised pollution);</li> <li>DER will manage contaminated sites via the CS Act and the Contaminated Sites Regulations 2006;</li> <li>DER will manage the discharge of treated sewage to land, the storage of hydrocarbons at the Bulk Fuel Storage Area and Power Station, and the disposal of tailings to the TSFs via Works Approvals and a Licence issued under Part V of the EP Act; and</li> <li>DMP manages the storage and handling of dangerous goods via the DG Act and the Dangerous Goods Safety (Storage and Handling for Non-explosives) Regulations 2007.</li> </ul>
ctions and inimise placement MS;	<ul> <li>The replacement MS is expected to regulate impacts to hydrological processes, either via limits in the key characteristic table or via conditions, including the following requirements:         <ul> <li>6 GL/yr groundwater abstraction limit; and</li> </ul> </li> </ul>

Potential impact (without mitigation)	Aspect	Mitigation Actions to address residual impacts	Proposed mechanism for ensuring mitigation
<ul> <li>A 5C Licence application has been submitted to DoW for the above abstraction and FMS has been notified of DoW's intention to grant the 5C Licence pending the receipt of an approved Mining Proposal; and</li> <li>The EPA's assessment (EPA, 2012c) determined that:         <ul> <li>A DoW licence would be required for groundwater abstraction and 'the DoW is bestplaced to manage the disposal of surplus dewater into off-tenement aquifers in accordance with its policies and legislative requirements;</li> <li>The potential for acid and/or metalliferous drainage to occur is low; and</li> <li>Management of surface water can be adequately regulated by DMP via the Mining Proposal process.</li> </ul> </li> <li><i>Relevant Baseline Information - Groundwater</i></li> <li>The Proposal is situated within the upper reaches of the Caliwingina Creek and Weelumurra Creek catchments;</li> <li>The majority of groundwater within the upper reaches of these catchments, is located within the more permeable CID and BID units. Localised groundwater may also be found in some areas within shallow alluvial deposits associated with watercourses, and perched above clay layers. Local aquifers are generally recharged via rivers, mid slopes or valley flanks, or rainfall (WorleyParsons, 2012b); and</li> <li>Figure 11 shows the interpreted extent of the aquifers surrounding the Proposal.</li> <li><i>Relevant Baseline Information - Surface Water</i></li> <li>The Proposal is located on a catchment and also within the Millstream Cathment area (5480 km²), and therefore is considered to provide only a minor contribution of surface water runoff and therefore is considered to provide only a minor contribution of surface water runoff and therefore is considered to provide only a minor contribution of surface water runoff and recharge to Millstream; and</li> <li>The reare no permanent waterways or rivers within the Development Envelopes, but there are nomerous small ephemeral d</li></ul>	Alteration of surface water flows.	<ul> <li>Backfill mine pits if required, so that the final surface levels of all pits are at a higher elevation than the predicted post development groundwater levels to prevent the formation of pit lakes;</li> <li>Develop a detailed MCP prior to construction, which will list the measures to be taken to reinstate groundwater and outle on budgeted regularly over the life of the mine, in-line with DMP requirements.</li> <li>Construction and Operations EMPs will include the following: <ul> <li>Install engineered culverts where natural drainage features are interrupted by haul or access roads;</li> <li>Include appropriate drainage requirements in civil engineering designs. Catchment analysis will be carried out in order to determine culvert and diversion drain design parameters;</li> <li>Where the risk of erosion is identified in specific areas during construction, erosion control structures such as silt fences, diversion and collection bunds, sediment dams and holding sumps will be installed; and</li> <li>Undertake progressive rehabilitation of disturbed areas that are not required for ongoing operations.</li> </ul> </li> <li>Implement the following additional Proposal-prior to construction, which will include design details for watercourse crossings and development within flood-prone areas. The design details will include relevant modelling of surface water flows to demonstrate that the proposed design is suitable to ensure that impacts to downstream or upstream ecosystems are avoided or minimised. DMP may seek DoW for comment prior to approval if required.</li> </ul>	<ul> <li>Mine pits are to be backfilled so that the final surface levels are at a higher elevation than the predicted post-development groundwater levels to prevent the formation of pit lakes (wording expected to remain as stated in MS 924).</li> <li>DoW is expected to manage the abstraction under the RIWI Act. A 26D Licence will be required for the drilling of abstraction and dewatering bores. A 5C Licence will be required for water supply. A Bed and Banks Permit may also be required for creek crossings; and</li> <li>A Mining Proposal and MCP will be required to be approved by DMP under the Mining Act prior to construction. The Mining Proposal will assess the design of watercourse crossings and surface water diversion / drainage structures. This assessment will ensure that surface water structures do not result in additional barriers to flow or increases in flow rates (which may lead to scouring). The MCP will list the measures to be taken to reinstate groundwater and surface water processes at closure, and will be revised and re-assessed by DMP at least every three years.</li> </ul>
Air Quality - To maintain air quality for the protection of the environment and human health and amenity.			
<ul> <li>Context: The Proposal is located in a remote area with no sensitive receptors in close proximity (closest is 11 km away).</li> <li>Inherent Significant Impacts: <ul> <li>Increased dust; and</li> <li>Elevated pollutants emitted to the airshed, particularly in proximity to the power station.</li> </ul> </li> </ul>	<ul> <li>Dust lift from stockyards, conveyors, access roads and bare ground / cleared surfaces;</li> <li>Construction and operational activities such as the mechanical disturbance of rock and soil materials by plant operation, blasting and use of vehicles on dirt roads; and</li> <li>Stack emissions from the power station.</li> </ul>	<ul> <li>Keep vegetation clearing and exposed surfaces to the minimum required for safe and efficient construction and operation;</li> <li>Apply dust suppression (water sprays or an acceptable equivalent) in areas that have high potential to generate dust, such as areas that receive heavy traffic and materials handling areas (stockyards, conveyors etc.);</li> <li>Restrict vehicle speeds;</li> <li>Monitor the performance of dust suppression equipment during regular site inspections;</li> <li>Use dust suppressants if practicable and cost effective to reduce the volume of water required to effectively minimise dust generation;</li> <li>Ensure the power station meets current industry best-practice design for diesel-fuelled power stations;</li> <li>Site the power station such that air emissions do not impact sensitive receptors;</li> <li>Obtain a Works Approval and Licence from DER for the power station under Part V of the EP Act. Predicted stack emissions will be presented to DER for assessment.</li> </ul>	<ul> <li>DMP will manage excessive dust under the Mine Safety and Inspection Regulations 1995, and general dust control will be managed under the Mining Proposal process (Mining Act);</li> <li>FMS will be required to report on emissions under the Environmental Protection (NEPM-NPI) Regulations 1998; and</li> <li>DER will regulate dust emissions from prescribed premises and stack emissions from the power</li> </ul>

Potential impact (without mitigation)	Aspect	Mitigation Actions to address residual impacts	Proposed mechanism for ensuring mitigation
			station under Part V of the EP Act (Works Approvals and Licences).
Amenity - To ensure that impacts to amenity are reduced as low as reasonably practicable.			
<ul> <li>Context:</li> <li>The Proposal is located in a remote area with no sensitive receptors in close proximity (closest is 11 km away).</li> <li>Inherent Significant Impacts: <ul> <li>Changes to the visual amenity of the area;</li> <li>Noise and vibration; and</li> <li>Public access will be limited in some operational areas.</li> </ul> </li> </ul>	<ul> <li>Development of mine pits and WRL;</li> <li>Earthmoving activities;</li> <li>Ore processing activities;</li> <li>Vehicle movements;</li> <li>General construction and operation activities / traffic;</li> <li>Use of machinery and heavy vehicles; and</li> <li>Prevention of public access for safety reasons.</li> </ul>	<ul> <li>Develop landforms to be developed so they have similar characteristics to surrounding landforms;</li> <li>Maintain equipment in accordance with manufacturers' specifications and relevant standards;</li> <li>Restrict vehicle speeds;</li> <li>Where practicable, fit mechanical plant with noise suppression devices maintained to manufacturers specifications;</li> <li>Fit internal combustion engines with a suitable muffler in serviceable condition;</li> <li>Plan blasting activities to minimise noise projection;</li> <li>Raise any noise or other amenity complaints as incidents and investigate; and</li> <li>Clearly signpost any track closures.</li> </ul>	Given the remote location, there are little to no expected impacts to amenity. DER is able to manage any excessive noise impacts via the Environmental Protection (Noise) Regulations 1997 however breaches of these regulations would be unlikely.
Heritage - To ensure that historical and cultural associations are not adversely affected.			
<ul> <li>Context:</li> <li>A search of the Department of Aboriginal Affairs (DAA) Aboriginal Heritage Inquiry System indicates that there are no registered sites within the Blacksmith tenement;</li> <li>Subsequent heritage surveys have however identified numerous sites that will likely fall under Section 5 of the <i>Aboriginal Heritage Act 1972</i> (AH Act), once they are assessed by the Aboriginal Cultural Materials Committee;</li> <li>The site falls within the Eastern Guruma native title determination area ratified by the Federal Court in March 2007; and</li> <li>Review of the following databases indicates that there are no listed European or natural heritage sites within or adjacent to the Proposal.</li> <li>Inherent Significant Impacts:</li> <li>Disturbance of Aboriginal Heritage sites.</li> </ul>	General ground disturbance activities during construction and operation.	<ul> <li>Undertake ethnographic and archaeological heritage surveys prior to any ground disturbance to identify sites of Aboriginal significance;</li> <li>Comply with FMS's Cultural Heritage Management Plan (CHMP) that was been prepared in consultation with the Eastern Guruma people and was executed on 31 July 2013. The CHMP identifies the resources, responsibilities and procedures required to manage and preserve the indigenous cultural values within the Disturbance Envelope;</li> <li>Avoid indigenous heritage sites as per the CHMP that may be identified via pre-construction inspections (unless approved by the Minister/Registrar responsible for Aboriginal heritage to disturb sites);</li> <li>Where project activities will disturb a heritage site, submit Section 18 applications to the DAA for approval to disturb the heritage site, as required under the AH Act;</li> <li>Undertake any approved site disturbance in accordance with the management and monitoring conditions of the Section 18 approval and the CHMP;</li> <li>All personnel working on the Proposal will be required to undertake cultural awareness training with the Eastern Guruma people and to understand the objectives and requirements of the AH Act; and</li> <li>Mark in the field and isolate exclusion zones and sites recorded so that they are not inadvertently disturbed, in line with relevant Native Title and Heritage agreements.</li> </ul>	Eastern Guruma and DAA will manage the potential disturbance of Aboriginal Heritage sites under the AH Act and the CHMP.



Figure 11: Interpreted extent of interconnected aquifers (from WorleyParsons, 2012c)

# **8 PRINCIPLES OF THE EP ACT**

The EP Act identifies a series of principles for environmental management (Section 4a, EP Act, as amended). FMS has considered these principles in relation to the development and implementation of the Proposal. Table 10 outlines how the principles relate to the Proposal.

### **Table 10: EP Act Principles**

Principle	How it will be addressed by the Proposal
<ol> <li>Precautionary principle         Where there are threats of serious irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.         In the application of the precautionary principle, decisions should be guided by:         <ul> <li>a. careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</li> <li>b. an assessment of the risk-weighted consequences of various options.</li> </ul> </li> </ol>	The Proposal has utilised existing environmental data during design and has supplemented it with a series of studies that are identified in Section 4.1. Detailed design will utilise spatial data to avoid and minimise impacts on identified constraints. Independent reviews of geochemical assessments have been completed to provide required levels of certainty.
2. Intergenerational equity The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.	The Proposal can be designed and implemented without significant impacts on the health, diversity and productivity of the environment. The Proposal, in conjunction with the BBI Port and Railway will enable economic and social benefits to flow from an iron ore project that has previously been "stranded" and would otherwise have no transport solution.
<ol> <li>Conservation of biological diversity and ecological integrity</li> <li>Conservation of biological diversity and ecological integration should be a fundamental consideration.</li> </ol>	Survey work has been used to confirm the range and status of environmental values within the Development Envelopes. The recorded baseline data from the Development Envelopes and surrounds indicate that there are not likely to be significant biodiversity or ecological integrity impacts at local or regional scales. This assumption will be verified during pre- disturbance biological surveys.
<ul> <li>4. Improved valuation, pricing and incentive mechanisms <ul> <li>a. Environmental factors should be included in the valuation of assets and services.</li> <li>b. The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement.</li> <li>c. The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.</li> <li>d. Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which benefit and/or minimise costs to develop their own solutions and responses to environmental problems.</li> </ul> </li> </ul>	Environmental constraint avoidance and management costs have been considered in the project costing phases and this will continue through the Bankable Feasibility Study stage.
<b>5. Waste minimisation</b> All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment	Waste will be minimised by adopting the hierarchy of waste controls; avoid, minimise, re-use, recycle and safe disposal.

# 9 CONCLUSION

### **9.1 PROPONENT CONCLUSIONS**

The Proposal is expected to be able to be implemented without significant residual environmental impacts. FMS consider the potential aspects and impacts that require the most consideration by the EPA to be:

- The disturbance of 300 ha of mostly Very Good to Excellent quality vegetation;
- The disturbance of potential conservation significant fauna habitat or flora; and
- The risk of contamination of the Millstream PDWSA as a result of tailings disposal.

Section 6 demonstrates that each of these impacts can be appropriately mitigated using a combination of Ministerial Conditions and other legislative controls.

The disturbance of 300 ha of mostly Good to Excellent quality vegetation and conservation significant fauna habitat will be a residual impact, and this will be offset using a condition similar or identical to the existing Condition 7 in MS 924.

The avoidance and minimisation of conservation significant flora disturbance and potential conservation significant fauna habitat disturbance will be demonstrated via an infrastructure plan to be developed after targeted surveys have been completed.

Tailings are unlikely to contaminate the Millstream PDWSA as testing has confirmed that the leachate did not contain contaminants at concentrations above the Australian Drinking Water Guidelines (NHRMC & NRMMC 2011). Nevertheless, groundwater will be regularly monitored throughout operations and at closure if required. It is expected that DMP would manage the TSFs under the Mining Act, however FMS would not object if a condition was to be added to MS 924 requiring that monitoring information be submitted to DoW on a regular basis.

The abstraction of an additional 2 GL/yr of groundwater can be appropriately managed by DoW under the RIWI Act.

FMS has completed extensive stakeholder consultation that will continue to develop as the Proposal proceeds into detailed design, construction and operational phases. This stakeholder consultation has demonstrated that many environmental factors can be managed under other legislation.

'Key' and 'other' environmental factors have been assessed against EPA Objectives and relevant guidelines. The Proposal has been prepared with design, layout and management controls identified to avoid, minimise or mitigate the potential environmental impacts. Given the management actions and controls to protect the environment, the Proposal is expected to meet the EPA Objectives.

## **9.2 APPLICATION OF THE SIGNIFICANCE FRAMEWORK**

Figure 12 provides a conceptual illustration of the significance framework and how it applies to the key environmental factors that may be impacted by the Proposal. It illustrates FMS's view of the level of uncertainty remaining after all available information has been considered. It is expected that the application of conditions (i.e. offsets, requirement for management plans etc.) will greatly reduce any uncertainty and ensure that the Proposal can meet the EPA's Objectives.

Please note that Figure 12 is conceptual only and is not intended to imply precision in evaluating the significance of impacts.



Figure 12: Conceptual illustration of the application of the significance framework

# **10 GLOSSARY**

Term	Meaning
AH Act	Aboriginal Heritage Act 1972
AHD	Australian Height Datum
ANZECC & ARMCANZ	Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand
ANZECC Guidelines	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
АРІ	Assessment on Proponent Information – the level of assessment relevant to this Proposal
BBI	Balla Balla Infrastructure
BID	Bedded Iron Deposit
СНМР	Cultural Heritage Management Plan
CID	Channel Iron Deposit
DAA	Department of Aboriginal Affairs
DER	Department of Environment Regulation
Development Envelopes	The Development Envelopes are the area that forms the basis for this Proposal and is the area within which the Proposal will be implemented. The Development Envelopes are outlined in red in Figure 3.
DG Act	Dangerous Goods Safety Act 2004
DID	Detrital Iron Deposit
Disturbance Area	The actual area of disturbance required to implement the Proposal. The Disturbance Area will be within the Development Envelope boundaries.
DMP	Department of Mines and Petroleum
DotE	Department of the Environment (Commonwealth)
DoW	Department of Water
DPaW	Department of Parks and Wildlife
DRMP	Dewatering and Recharge Management Plan
DSD	Department of State Development
EAG	Environmental Assessment Guideline
Ecoscape	Ecoscape Australia Pty Ltd
EIA	Environmental Impact Assessment
EMPs	Environmental Management Plans
EPA	Environmental Protection Authority (WA)
EP Act	Environmental Protection Act 1986
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth)
FMS	Flinders Mines Limited
GCA	Graeme Campbell and Associates
GDEs	Groundwater Dependent Ecosystems
GDVMMP	Groundwater Dependent Vegetation Monitoring and Management Plan
GL	Gigalitre
ha	Hectares

Term	Meaning
IBRA	Interim Biogeographic Regionalisation for Australia
km	Kilometres
m	Metres
МСР	Mine Closure Plan
Mining Act	Mining Act 1978
MNES	Matters of National Environmental Significance
MS	Ministerial Statement
NHMRC & NRMMC	National Health and Medical Research Council & Natural Resource Management Ministerial Council
OEPA	Office of the Environmental Protection Authority
OPF	Ore Processing Facility
PDWSA	Public Drinking Water Source Area
PEC	Priority Ecological Communities – plant communities listed as being potentially threatened under the <i>Wildlife Conservation Act 1950</i>
PF	Priority Flora
Phoenix	Phoenix Environmental Pty Ltd
PIOP	Pilbara Iron Ore Project
PIOP Stage 1	The original proposal approved under MS 924.
Proposal	As defined under the EP Act - a project, plan, programme, policy, operation, undertaking or development or change in land use, or amendment of any of the foregoing, but does not include scheme.
The Proposal	The proposed changes to PIOP Stage 1 as detailed in this API Document. The Proposal is to expand existing approved mining operations and to develop additional infrastructure. The proposed works include an increase in mining area, a waste rock landform, access roads, airport, accommodation camp, process plant, tailings storage facilities and supporting infrastructure.
Revised Proposal	All components of the PIOP, including those currently approved under MS 924, as well as the changes proposed in this API Document.
RGS	RGS Environmental Pty Ltd
ROM	Run-of-mine
RIWI Act	Rights in Water and Irrigation Act 1914
Rutila	Rutila Resources Ltd
SRE	Short-range Endemic
TEC	Threatened Ecological Communities – plant communities listed as being threatened and legally protected under the <i>Wildlife Conservation Act 1950</i> and / or the <i>Environment Protection and Biodiversity Conservation Act 1999</i>
TSF	Tailings Storage Facility
WA	Western Australia
WC Act	Wildlife Conservation Act 1950 (WA)
WRL	Waste Rock Landform

# **11 REFERENCES**

Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand (2000), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Volume 1. October 2000.

Australian and New Zealand Minerals and Energy Council, Minerals Council of Australia (2000), *Strategic Framework for Mine Closure.* 

Australian National Committee on Large Dams Incorporated (2012), *Guidelines on Tailings Dams* – *Planning, Design, Construction, Operation and Closure.* May 2012.

Bennelongia Pty Ltd (2011), *Flinders Mines Ltd – Pilbara Iron Ore Project: Blacksmith Subterranean Fauna Surveys.* December 2011.

Bennelongia Pty Ltd (2012), Addendum: Pilbara Iron Ore Project, Blacksmith Subterranean Fauna Surveys. March 2012.

Chamber of Minerals and Energy (1999), *Mine Closure Guidelines for Mineral Operations in Western Australia*. November 1999.

Department of Mines and Petroleum (1999), *Guidelines on the Safe Design and Operating Standards for Tailings Storage.* May 1999.

Department of Mines and Petroleum (2013), *Tailings Storage Facilities in Western Australia - Code of Practice.* 

Department of Mines and Petroleum and the Environmental Protection Authority (2011), *Guidelines for Preparing Mine Closure Plans.* June 2011.

Department of Resources, Energy and Tourism (2011), *A Guide to Leading Practice Sustainable Development in Mining.* July 2011.

Department of Water (2009), *Pilbara Water in Mining Guideline*. September 2009.

Department of Water (2010), *Millstream Water Reserve – Drinking Water Source Protection Plan West Pilbara Water Supply.* June 2010.

Ecoscape Australia Pty Ltd (2011a), *Pilbara Iron Ore Project – Blacksmith Flora and Vegetation Survey.* 19 August 2011.

Ecoscape Australia Pty Ltd (2011b), *Pilbara Iron Ore Project – Blacksmith Vertebrate Fauna and Short Range Endemic Survey.* May 2011.

Ecoscape Australia Pty Ltd (2011c), *Significant Fauna Species Management Plan, Flinders Mines Limited*. July 2011.

Ecoscape Australia Pty Ltd (2012), *Blacksmith Pilbara Iron Ore Project (EPBC 2011/6152, Response to DSEWPaC Request for Additional Information.* June 2012.

Environmental Protection Authority (2006), *Guidance for the Assessment of Environmental Factors – Rehabilitation of Terrestrial Ecosystems, No. 6.* June 2006.

Environmental Protection Authority (2012a), *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012.* Western Australian Government Gazette. Perth, December 2012. No. 223.

Environmental Protection Authority (2012b), *Environmental Assessment Guideline 1: Defining the Key Characteristics of a Proposal. Environmental Protection Act 1986.* Environmental Protection Authority. Western Australia. May 2012.

Environmental Protection Authority (2012c), *Flinders Pilbara Iron Ore Project – Stage 1.* Report 1456, Environmental Protection Authority. Western Australia. November 2012.

Environmental Protection Authority (2013a), *Environmental Assessment Guideline 6: for Timelines for environmental impact assessment of proposals.* Environmental Protection Authority. Western Australia. Revised March 2013.

Environmental Protection Authority (2013b), *Environmental Assessment Guideline 8: for Environmental Factors and Objectives. Environmental Protection Act 1986.* Environmental Protection Authority. Western Australia. June 2013.

Environmental Protection Authority (2014), *Environmental Protection Bulletin No.* 1 – *Environmental Offsets*. Revised August 2014.

Environmental Protection Authority (2015), *Environmental Assessment Guideline 14 for Preparation of an API – Category A Environmental Review Document.* WA Environmental Protection Authority. January 2015.

Government of Western Australia (2011), WA Environmental Offsets Policy. September 2011.

Government of Western Australia (2014), WA Environmental Offsets Guidelines. August 2014.

Graeme Campbell & Associates (2011), Flinders Pilbara Iron-Ore Project: Geochemical Characterisation of Process – Tailings – Solids Sample and Management Implications. 15 November 2011

Graeme McDonald (2015). *PIOP Deposit Homogeneity*. Memo written for Flinders Mines Ltd, January 2015.

GHD (2014), Flinders Mines Limited. Flinders Mines: Blacksmith Prospect Infrastructure Investigation – Vegetation, Flora and Fauna Assessment. October 2014.

Golder Associates (2010), Groundwater Summary Report – Area D.

National Health and Medical Research Council & Natural Resource Management Ministerial Council (2011), *National Water Quality Management Strategy – Australian Drinking Water Guidelines 6.* 2011. Version 3.0 Updated December 2014.

Phoenix Environmental Pty Ltd (2014), *Memo: Pilbara Iron Ore Project Level 1 Vertebrate Fauna Survey of Proposed Road Alignment.* 7 November 2014.

RGS Environmental Pty Ltd (2014), *Independent Third Party Review of Mine Waste Characterisation Pilbara Iron Ore Project: Process Waste Tailings.* 30 November 2014.

WorleyParsons (2012a), *Geochemical Characterisation of Mine Waste and Tailings – Implications for Mine Waste Management.* July 2012.

WorleyParsons (2012b), Flinders Pilbara Iron Ore Project – Stage 1. Assessment on Proponent Information – Environmental Review Document. 18 October 2012.

WorleyParsons (2012c), *Pilbara Iron Ore Project – Groundwater Impact Assessment Report*. 9 March 2012.

WorleyParsons (2013), Pilbara Iron Ore Project – Dewatering Modelling Report. Addendum to the Groundwater Impact Assessment Report. 29 July 2013.

# **12 APPENDICES**

The following Appendices are provided on the attached CD:

- Appendix 1: Flora and Vegetaion Survey Reports
- Appendix 2: Fauna Survey Reports
- Appendix 3: Groundwater Abstraction Modelling Reports
- Appendix 4: Tailings Geochemical Studies
- Appendix 5: Summary of Stakeholder Consultation PIOP Stage 1
- Appendix 6: Decision Making Authorities Communication
- Appendix 7: Flinders Pilbara Iron Ore Project Stage 1, API Environmental Review Document
- Appendix 8: Development Envelope Shapefiles
- Appendix 9: PIOP Stage 1 Significant Fauna Species Management Plan