

Report

Supporting Document – East Hamersley Railway Project s38 Referral

East Hamersley Railway Project

26 April 2023 NY-RP-EN-0020 Rev 0



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TABLE OF CONTENTS

EXECU	TIVE SU	MMARY	V
1	INTRO	DUCTION	1
	1.1	Proponent Details	1
	1.2	Tenure	2
2	PROPO	SAL DESCRIPTION	5
	2.1	Local and Regional Context	8
3	LEGISL	ATIVE FRAMEWORK	14
	3.1	Other Approvals and Regulation	14
4	STAKE	HOLDER ENGAGEMENT	17
5	ENVIRO	ONMENTAL FACTORS	25
	5.1	Flora and Vegetation	27
	5.1.1	EPA Objective, Policy and Guidance	27
	5.1.2	Receiving Environment	27
	5.1.3	Potential Impacts, Management and Likely Environmental Outcome	39
	5.2	Terrestrial Fauna	40
	5.2.1	EPA Objective, Policy and Guidance	40
	5.2.2	Receiving Environment	40
	5.2.3	Potential Impacts, Management and Likely Environmental Outcome	48
	5.3	Inland Waters	48
	5.3.1	EPA Objective, Policy and Guidance	48
	5.3.2	Receiving Environment	49
	5.3.3	Potential Impacts, Management and Likely Environmental Outcome	50
	5.4	Social Surroundings	52
	5.4.1	EPA Objective, Policy and Guidance	52
	5.4.2	Receiving Environment	52
	5.4.3	Potential Impacts, Management and Likely Environmental Outcome	54
	5.5	Greenhouse Gas Emissions	55
	5.5.1	EPA Objective, Policy and Guidance	55
	5.5.2	Receiving Environment	55
	5.5.3	Potential Impacts, Management and Likely Environmental Outcome	55



	6.1	Policy and Guidance	. 57
	6.2	Proposal Surveys	. 58
	6.3	Controlling Provisions	. 58
7	HOLIS	TIC IMPACT ASSESSMENT	. 59
8	СОМО	_ATIVE IMPACT ASSESSMENT	. 61
9	CONCL	-USION	. 62



List of Tables

Table 1:	Proponent Details	1
Table 2:	Proposal Summary	6
Table 3:	Decision Making Authorities (DMAs) and Other Approvals	. 15
Table 4:	Consultation Summary	. 19
Table 5:	Identification of key environmental factors	. 25
Table 6:	Relevant Flora and Vegetation Surveys to the East Hamersley Railway	. 27
Table 7:	Vegetation associations within the Rail Development Envelope (Governme of Western Australia, 2019)	nt 28
Table 8:	Vegetation types in the Rail Development Envelope	. 29
Table 9:	Vegetation condition in the Rail Development Envelope	31
Table 10:	Flora and Vegetation: Potential Environmental Impacts and Management	39
Table 11:	Fauna Surveys	40
Table 12:	Terrestrial Fauna Habitats within the Rail Development Envelope	41
Table 13:	Terrestrial Fauna: Potential Environmental Impacts and Management	48
Table 14:	Inland Waters: Potential Environmental Impacts and Management	. 50
Table 15:	Summary of aboriginal heritage values listed with DPLH	. 52
Table 16:	Social Surroundings: Potential Environmental Impacts and Management	54
Table 17:	Greenhouse Gas Emissions: Potential Environmental Impacts and	
	Management	56

List of Figures

Proposal Location	3
Rail Development Envelope and Indicative Disturbance Footprint	4
Regional Context	10
Pastoral Leases	11
Native Title Determination Areas	12
Conservation Estate	13
Flora and Vegetation Survey Area	35
Vegetation Types	36
Significant Flora Records	37
Vegetation Condition	38
Fauna Survey Area	45
Fauna Habitats	46
Conservation Significant Fauna Records	47
	Proposal Location Rail Development Envelope and Indicative Disturbance Footprint Regional Context Pastoral Leases Native Title Determination Areas Conservation Estate Flora and Vegetation Survey Area Vegetation Types Significant Flora Records Vegetation Condition Fauna Survey Area Fauna Habitats Conservation Significant Fauna Records

List of Schematic Maps



EXECUTIVE SUMMARY

The Pilbara Infrastructure Pty Ltd (TPI), a wholly owned subsidiary of Fortescue Metals Group Ltd (Fortescue), propose to develop the East Hamersley Railway Project (the Proposal) in the Pilbara Region of Western Australia. The East Hamersley Railway will link the proposed Nyidinghu Iron Ore Mine (the subject of a separate referral) with the existing Fortescue rail network and the Cloudbreak Mine approximately 14 km northwest of the Cloudbreak Mine. The proposed East Hamersley Railway may also be utilised for the transport of ore to Port Hedland from other future mining operations within Fortescue's Eastern Hamersley prospects.

The Proposal activities are contained within a Rail Development Envelope (RDE) of approximately 31,507 hectares (ha), TPI is proposing to disturb up to 4,837 ha as the Indicative Disturbance Footprint (IDF).

TPI has completed a preliminary review against the Environmental Factors to identify those that are relevant to the Proposal. The following key environmental factors are relevant to the Proposal:

- Flora and Vegetation.
- Terrestrial Fauna.
- Inland Waters.
- Social Surroundings.

Greenhouse Gas Emissions is considered relevant as an 'Other Factor' to the Proposal.

The purpose of this document is to support the referral of the proposed East Hamersley Railway Project under section 38 of the *Environmental Protection Act 1986* (EP Act). This document also provides additional information to support the support the Referral Form and Proposal Content Document.



1 INTRODUCTION

The Pilbara Infrastructure Pty Ltd (TPI), a wholly owned subsidiary of Fortescue Metals Group Ltd (Fortescue), propose to develop the East Hamersley Railway Project (the Proposal) in the Pilbara Region of Western Australia (Figure 1). The Proposal comprises the development and operation of the East Hamersley Railway. The railway corridor will link the proposed Nyidinghu Iron Ore Mine (the subject of a separate referral) with the existing Fortescue rail network and the Cloudbreak Mine approximately 14km north west of the Cloudbreak mine. The proposed East Hamersley Railway may also be utilised for the transport of ore to Port Hedland from other future mining operations within Fortescue's Eastern Hamersley prospects.

The Proposal is predominantly located adjacent to the existing BHP Railway and follows the existing Mindy Mindy rail footprint in large parts which was approved under Ministerial Statement 690 (Stage A, Part 2) from the Chichester Ranges to Mindy Mindy. The Stage A, Part 2 for the Mindy Mindy rail section permitted 715 ha of disturbance in the rail corridor and follows, in sections, a separate path to the proposed East Hamersley Railway. TPI is proposing to disturb up to 4,837 ha for the Indicative Disturbance Footprint (IDF) associated with the East Hamersley Railway Project and as such, a new proposal is being referred for assessment.

Preliminary planning for the location of the railway corridor and associated infrastructure has been undertaken but detailed design of the East Hamersley Railway is still underway. To accommodate refinements in Project layout during the design process, the Proposal area has been defined through the use of a Rail Development Envelope (RDE). The RDE is 31,507 ha and is shown in Figure 2.

This Supporting Document has been developed to support the Referral Form and Proposal Content Document. The Proposal Content Document attached to this referral provides information on the physical construction and operational elements required under section 38 of the *Environmental Protection Act 1986* (EP Act).

1.1 Proponent Details

The proponent for this Proposal is The Pilbara Infrastructure Pty Ltd (TPI), a wholly owned subsidiary of Fortescue Metals Group Ltd (Fortescue). TPI operates a port and rail network in accordance with the *Railway and Port (The Pilbara Infrastructure Pty Ltd) Agreement Act 2004* (TPI Agreement). TPI's rail network connects Fortescue's mining operations with TPI's Herb Elliot Port facility at Port Hedland. The proponent details and key contact for this Proposal is provided in Table 1.

Proponent	The Pilbara Infrastructure Pty Ltd (TPI)
Australian Business Number (ABN)	52 103 096 340
Registered Address	87 Adelaide Terrace, EAST PERTH WA 6004

Table 1: Proponent Details



Proponent	The Pilbara Infrastructure Pty Ltd (TPI)
Key Contact/s	
Name	Jarrod Pittson
Position	Group Manager Environment and Governance
Email	jarrod.pittson@fmgl.com.au

1.2 Tenure

TPI will apply for tenure under the *Mining Act 1978* to cover the extent of the proposal activities. TPI propose to develop the Proposal pursuant to the *Railway and Port (The Pilbara Infrastructure Pty Ltd) Agreement*. Tenements, once granted, would then be included in the *Railway and Port (The Pilbara Infrastructure Pty Ltd) Agreement*.







2 PROPOSAL DESCRIPTION

The Proposal comprises a dedicated railway corridor linking the proposed Nyidinghu Iron Ore Mine (the subject of a separate referral) with the Fortescue Main Railway line to allow for the transport of ore to Port Hedland. The Proposal also includes a corridor from the Nyidinghu Iron Ore Mine to the Chichester Operations (which include the Cloudbreak Mine) for access and a water pipeline.

The Proposal includes the construction of 106 km of railway, a rail maintenance track, a rail loop, conveyors, and train loadout. The Proposal also includes a water pipeline and associated water conveyance infrastructure, which will convey water from the Nyidinghu Iron Ore Mine to the Chichester Operations and/or a third party. Power transmission lines which will connect Fortescue's integrated power network with the Nyidinghu Iron Ore Mine are also proposed.

The proposed East Hamersley Railway may also be utilised in the future to support the transport of ore from other future mining operations in the surrounding area. All necessary environmental approvals would be sought for any future mining operations.

The Indicative Disturbance Footprint (IDF) for the proposed rail corridor is approximately 200 m wide to allow for the rail formation, rail maintenance track, water pipeline and associated infrastructure as well as powerline infrastructure (including a setback from the rail). The IDF is contained within a Rail Development Envelope (RDE).

The construction workforce for the development of the Proposal will be accommodated within several construction camps situated at various locations along the proposed route. Borrow areas and ballast quarries will be constructed within the RDE to provide material for the construction of the Railway.

Other supporting infrastructure for the Proposal includes access roads, bridges, culverts, signalling and communications infrastructure, water storage facilities, pump station, construction and potable water supply borefields, fuel storage and wastewater treatment plants. The Proposal includes for rail over rail and road over rail bridges to cross the existing BHP railway, along with eight creek crossings. Creek crossings are a combination of bridges and box culverts depending on the nature of the surface water feature.

The Proposal includes abstraction of up to 5 gigalitres (GL) of groundwater per year during construction (from a groundwater borefield within the RDE). Construction of the rail is anticipated to cover two years, with a maximum total of 10 GL abstracted. It is anticipated that groundwater abstraction will not be required for the Proposal beyond the construction phase.

Groundwater supply during construction will be sourced from nearby groundwater bores within the RDE and a pipeline from the Nyidinghu Iron Ore Mine. To transport water along the corridor, it is likely a combined approach of bores, turkey nests and pipelines to meet rail construction water requirements.



The Proposal also includes water pipelines that cross the RDE to allow water from the Nyidinghu Iron Ore Mine south of the RDE to reach the mine re-reinjection borefield to the north of the RDE. Outside of the RDE, these pipelines, dewatering and reinjection infrastructure are within the Mine Development Envelope (MDE) for the Nyidinghu Iron Ore Mine which is not part of this referral, the location of both the RDE and MDE in relation to one another is shown in Figure 3. The Proposal also includes for water pipelines and discharge points for disposal of mine dewatering within the RDE. Abstraction activities to allow for mining are not part of this referral.

All disturbance associated with this Proposal occurs in an IDF of up to 4,837 ha within a 31,507 ha RDE as shown in Figure 2. The exact location of the footprint may change within the RDE as the remaining studies, investigations and detailed design are completed. For this reason, the RDE is large and allows for flexibility in route selection which will be confirmed during detailed design.

The Proposal Content Document attached to this referral provides information on the physical construction and operational elements required under s.38 of the *Environmental Protection Act 1986.* A summary of that information is provided in Table 2 below.

Key Element	Details
Location	The rail loop (adjacent to proposed Nyidinghu Iron Ore Mine) is approximately 85 km north-west of Newman with the rail corridor proposing to connect with the existing Fortescue rail network approximately 14 km north-west of the Cloudbreak Mine.
Main Activities	Develop and operate a 106 km railway linking the proposed Nyidinghu Iron Ore Mine (subject to a separate referral) with Fortescue's existing main rail network and the Cloudbreak mine.
Proposal Life	33 years
Link to Existing Proposals	Iron ore from the proposed Nyidinghu Iron Ore Mine (not part of this referral) will be loaded through the train load-out and transported to Port Hedland. The train loadout is located in the RDE and is adjacent to the Nyidinghu Iron Ore Mine Development Envelope.
	Water from the proposed Nyidinghu Iron Ore Mine will be transferred through a water pipeline in the RDE to the Chichester Operations, a third party and/or discharged to creeks within the RDE.
	Water conveyance infrastructure will also cross the RDE from the Nyidinghu Iron Ore Mine abstraction borefield to a proposed re-injection borefield located to the north of the RDE. The abstraction and re-injection borefield are both located within the Nyidinghu Iron Ore Mine Development Envelope and are not part of this referral.
	The proposed transmission power line within the RDE will connect the proposed Nyidinghu Iron Ore Mine with Fortescue's existing integrated power network.
Proposal Footprints	Rail Development Envelope: 31,507 ha
	Indicative Disturbance Footprint: 4,837 ha
Key Infrastructure	Rail loop
	Train loadout
	Conveyors
	Railway and associated embankment
	Crossing/passing loops
	Banker sidings
	Railway overpass

 Table 2:
 Proposal Summary

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Key Element	Details
	Borrow areas
	Ballast quarries
	Rail maintenance track
	Access Roads
	Haul Roads
	Bridges
	Surface water management infrastructure including culverts
	Signalling infrastructure
	Gas and water pipelines
	Power transmission lines
	Construction and potable water supply borefield, infrastructure and water storage facilities
	Communications infrastructure (including towers and fibre optic cables)
	Fuel storage
	Wastewater treatment plants
	Construction camps
Water	Pipelines crossing the RDE between the mine dewatering borefield and reinjection borefield associated with the Nyidinghu Iron Ore Mine Development Envelope.
	Construction water supply will be sourced from a rail water supply borefield with abstraction of up to 5 GL/annum for up to two years, and/or a pipeline from the Nyidinghu Iron Ore Mine Development Envelope.
	Water from the proposed Nyidinghu Iron Ore Mine will be transferred through a water pipeline in the RDE from the Nyidinghu Iron Ore Mine to the Chichester Operations, a third party and/or disposed to creeks within the RDE.
Power	Temporary diesel-powered generators during construction and early operations, then renewable energy and/or power from Fortescue's integrated network (via transmission lines) during operations.
Transport	Access roads to be used during construction.
	Ore transported via railway connecting to the Fortescue Main Line 14km north- west of Cloudbreak Mine during operations.
	Rail maintenance track to be used during operation for access and rail maintenance works.
Timing	Rail construction commences July 2026 to be operational in 2028.



2.1 Local and Regional Context

The southern half of the RDE is located within the Shire of East Pilbara and the northern half in the Shire of Ashburton. The closest town is Newman which is located approximately 85 km south east. The RDE is located across three pastoral leases, these being Marillana Pastoral Lease in the south, Mulga Downs and Hillside Pastoral Leases in the north of the RDE (Figure 4). These Leases are all currently used for cattle grazing. The RDE crosses three native title determination areas, these being the Nyiyaparli and Nyiyaparli #3 (WCD2018/008), Banjima People (WCD2014/001) and Palyku Part A (WCD2019/002) Native Title Determinations (Figure 5).

The RDE is located in the Pilbara Bioregion as described by the Interim Biogeographic Regionalisation for Australia (IBRA). The majority of the RDE is within the Fortescue Plains subregion while the northern end of the RDE is within the Chichester subregion. The Fortescue Plains subregion is characterised by alluvial plains, river frontages, extensive salt marsh with mulga-bunch grass and short grass communities on alluvial plains in the east (Kendrick, 2002). Deeply incised gorge systems characterise the western (lower) part of the drainage with river gum woodlands fringing the drainage lines (Kendrick, 2002). This is the northern limit of Mulga (*Acacia aneura*) (Kendrick, 2002). The Chichester subregion comprises the northern section of the Pilbara Craton and is characterised by undulating Archaean granite and basalt plains with significant areas of basaltic ranges (Kendrick & McKenzie, 2002). The Plains support a shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on the ranges (Kendrick & McKenzie, 2002).

The Proposal intersects one Environmentally Sensitive Area (ESA) corresponding with the Fortescue Marsh which is declared under Section 51B of the EP Act and described in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005.*

The Proposal is located across four of the Fortescue Marsh Management Zones as described in *Environmental and water assessments relating to mining and mining-related activities in the Fortescue Marsh management area* (EPA, 2013). The intersection of these management zones with the RDE are described below:

- The northern portion of the RDE is located within the highest environmental significance 'Northern Flank' Fortescue Marsh Management Zone 1a.
- The central portion of the RDE where the rail corridor crosses the Fortescue Marsh is located within the highest environmental significance 'Marsh' Fortescue Marsh Management Zone 1b.
- The remainder of the RDE from the central portion to the far south is located within the medium environmental significance 'Poonda Plain' Fortescue Marsh Management Zone 2b and the lowest environmental significance 'Marillana Plain' Fortescue Marsh Management Zone 3b.

These four management zones in relation to the RDE are shown in Figure 6.



The RDE also intersects with the Weeli Wolli Creek which flows into the Fortescue Marsh.

The *Conservation and Land Management Act 1984* (CALM) provides for the use, protection and management of identified Crown and public land parcels for conservation. In particular, the CALM Act establishes the Conservation and Parks Commission (CPC) to manage land that is vested in its care. The closest land parcels vested under the CALM Act to the RDE are shown in Figure 6 and include:

- Karijini National Park (25 km west of the RDE); and
- Mungaroona Range Nature Reserve (55km north west of the RDE).

Approximately 25 km of the proposed rail alignment intersects with Unallocated Crown Land (UCL) (ex-Marillana Pastoral Lease) which is proposed for conservation as part of the proposed Fortescue Marsh National Park (Figure 6). The Fortescue Marsh is also a proposed for addition to the State conservation reserve as a nature reserve. The Department of Biodiversity, Conservation and Attractions (DBCA) is recognised as the land manager for these parcels.

Other mining projects located in the surrounding area (Figure 3) include:

- BCI Minerals Limited Iron Valley Mine (operated by Mineral Resources Limited) located 12 km south of the RDE and directly south of the Nyidinghu MDE.
- Mineral Resources Limited Phils Creek Mine located approximately 15 km southwest of the RDE.
- Rio Tinto Iron Ore mines (Hope Downs 1 Mine approximately 40 km south, Yandicoogina Mine approximately 20 km southwest and Billiard South Mine approximately 7 km south, Koodaideri Mine approximately 6 km south).
- BHP mines (Yandi Mine approximately 25 km west, Marillana Area C Mine approximately 35 km southwest and South Flank Mine approximately 50 km southwest, Jimblebar Mine approximately 90 km south east of the RDE).
- Roy Hill Iron Ore Mine operated Roy Hill Iron Ore Pty Ltd approximately 40 km east of the RDE.

The existing BHP railway runs alongside the proposed rail corridor for approximately 60 km.



LEGEND

Marble Bar

Nullagin

Newman

Auski Roadhouse

- 🛄 MDE (Nyidinghu Iron Ore Mine)
- RDE (East Hamersley Railway . . .
- Development Envelope) Homesteads
 - FMG
- BHP
- Rio Tinto
- Mineral Resources Limited
 - Highway

— Road

- --- FMG Rail
- --- BHPB Rail
- --- Rio Tinto Rail
- 🕂 Roy Hill Rail
- Fortescue River
- Watercourses
- Fortescue Marsh

Data Sources: Watercourses, GA. Marsh, Aus GOV, DOE. Roads, Homesteads, Landgate 3rd Party Rail, Various Basemap, ESRI, 2022

Figure 3: East Hamersley Railway

Regional Location

 Integration
 Date: 02/12/2022

 Drawn By: S. Costello
 Size: A3P

 Revised By: scostello
 Revision: 0

 Approved By: P. Mastalir
 Confidentiality: 1

 Scale: 1:460.000
 Coordinate System: GDA 1994 MGA Zone 50

 Document Name: 550NY_00000_MP_EN_0027_001_r1_regional_loc
 CDR94
 Date: 02/12/2022 Size: A3P Revision: 0 FMG accepts no liability provided including its ac ranty, express or implied, as to the infor or fitness for purpose. All information prov s to the information rmation provided is Fall applicable laws.









3 LEGISLATIVE FRAMEWORK

The EP Act is the primary environmental legislation governing environmental protection and impact assessment in Western Australia. Part IV of the EP Act provides for the consideration and assessment of proposals that may, or will, have a significant impact on the environment. This Supporting Document has been prepared in accordance with EPA Instructions for '*Referral of a proposal under section 38 of the Environmental Protection Act 1986*'.

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined as 'matters of national environmental significance' (MNES). If a proposed development or 'action' is likely to have a significant impact upon a protected matter then it must be referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for assessment under the EPBC Act.

If deemed a Controlled Action under section 75 of the EPBC Act the Action will require further assessment and approval under the EPBC Act before it can proceed. The Proposal will also be referred under the EPBC Act. Should the Proposal be deemed a Controlled Action, TPI request the Proposal be assessed by the EPA as an accredited assessment on behalf of the Commonwealth under section 87 of the EPBC Act.

This supporting document provides information on studies and investigations conducted by TPI in relation to the key environmental factors.

TPI propose to develop the Proposal pursuant to the *Railway and Port (The Pilbara Infrastructure Pty Ltd) Agreement*. Approval of development proposals under the Agreement are subject to the EP Act.

3.1 Other Approvals and Regulation

The relevant decision-making authorities (DMAs) identified by TPI for the Proposal are shown in Table 3.

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Table 3: Decision Making Authorities (DMAs) and Other Approvals

DMA	Legislation	Approval Required	Statutory
Department of Jobs, Tourism, Science and Innovation (JTSI)	Railway and Port (The Pilbara Infrastructure Pty Ltd) Agreement	Detailed Proposal	TPI proposes to develop the Proposal pursuant to the <i>Railway</i> and Port (The Pilbara Infrastructure Pty Ltd) Agreement. Approval of development proposals under the Agreement is subject to the EP Act.
Department of Mines, Industry Regulation and Safety (DMIRS)	Mining Act 1978	Mining Proposal Native Vegetation Clearing Permit	Whilst the Proposal is subject to State Agreement, small mining proposals may be required for some minor elements of the Proposal in areas outside of the State Agreement. Mining Proposals nominate environmental objectives for each mine site. DMIRS is responsible for regulating the performance of proponents against these environmental objectives. That is, that the environmental objectives for the site are being met.
Department of Water and Environmental Regulation (DWER)	Environmental Protection Act, 1986 – Part V (EP Act)	Works Approvals Licenses	These statutory instruments regulate the emissions and discharges from prescribed premises. The Proposal will require licensing for a number of activities that meet the threshold for prescribed premises including discharge of mine dewatering, ore processing (including tailings storage), landfill, concrete manufacturing and wastewater treatment. The conditions of works approvals and licenses control the nature and volume of emissions and discharges and require regular monitoring of these emissions to ensure they remain within threshold limits.
Department of Water and Environmental Regulation (DWER)	Environmental Protection Act, 1986 – Part IV	Mine Closure Plans	As the Proposal is subject to State Agreement, the assessment under Part IV may include a Mine Closure Plan. DWER will be the DMA for the closure plan, which will outline the objectives, strategy and actions for closure as the mine life progresses.
Department of Climate Change, Energy, the Environment and Water (Cwlth) (DCCEEW)	Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Ministerial Approval – Controlled Action	This statutory approval manages impacts to Matters of National Environmental Significance (MNES). Conditions are placed on Commonwealth Ministerial Statements to mitgate the impacts to MNES. However, in practice, these conditions often refer to State Ministerial Conditions to manage these impacts. It is open to DCCEEW to impose additional conditions if MNES are not adequately managed through State Ministerial Conditions.
Department of Water and Environmental Regulation (DWER)	Rights in Water and Irrigation Act 1914 (RIWI Act)	Water Licensing (s26D and s5C) Bed and Banks Permit (s17)	Groundwater Abstraction Licenses under Section 5C of the RIWI Act require a Groundwater Operating Strategy (GOS) for large volumes of groundwater. The GOS will outline how
Supporting Document – East Hamersley This document is uncontrolled when printe	/ Railway Project s38 Referral d		NY-RP-EN-0020 Rev 0 Page 15 of 71

DMA	Legislation	Approval Required	Statutory
			groundwater will be abstracted, which users are impacted, including environmental values, and how these impacts are managed. DWER endorse the GOS as a condition of the 5C license.
			A Bed and Banks permit is required if work is being undertaken that obstructs, interferes, diverts or destroys the bed or banks of a watercourse or wetland.
Department of Biodiversity, Conservation and Attractions (DBCA)	Biodiversity Conservation Act 2020 (BC Act)	Licence to take flora Reg 17 License to take Fauna	These statutory instruments provide authorisations to take threatened flora species, and authorisations to take or disturb threatened fauna species.
Department of Planning, Lands and Heritage (DPLH)	Aboriginal Heritage Act 1972 (AH Act) Aboriginal Cultural Heritage Act 2021 (ACH Act)	S18 consent Provisions under the ACH Act to interact with aboriginal heritage sites when these are in effect.	Where the Proposal cannot avoid impacts to heritage places, applications will be made under s.18 of the AH Act or Cultural Heritage Management Plan under the ACH Act, as relevant in consultation with the Banjima, Nyiyaparli and Palyku People. This process will ensure the Banjima, Nyiyaparli and Palyku People are consulted prior to the disturbance of any heritage sites, and that impacts are mitigated as far as practicable.
Department of Mines, Industry Regulation and Safety (DMIRS)	Dangerous Goods Safety Act 2004 (DGS Act)	Dangerous Goods Licence	This statutory instrument provides authorisation for the storage and handling of dangerous goods.

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4 STAKEHOLDER ENGAGEMENT

TPI has identified key stakeholders for the Proposal which have been and will continue to be engaged throughout the assessment process. These include:

- State and Commonwealth Government Agencies.
 - Department of Water and Environment Regulation EPA Services, Licensing, Regional Services.
 - Department of Biodiversity, Conservation and Attractions.
 - Department of Mines, Industry Regulation and Safety.
 - Department of Jobs, Tourism, Science and Innovation.
 - Department of Climate Change, Energy, Environment and Water.
- Local Government Authorities.
 - Shire of East Pilbara.
 - Shire of Ashburton.
- Aboriginal traditional owners.
 - Banjima People and Elders
 - Banjima Native Title Aboriginal Corporation (BNTBC) native title body corporation representative of the Banjima People Native Title Determination area.
 - Nyiyaparli People and Elders
 - Karlka Nyiyaparli Aboriginal Corporation (KNAC) native title body corporation representative of the Nyiyaparli and Nyiyaparli #3 Native Title Determination Area.
 - Palyku People and Elders
 - Palyku-Jartayi Aboriginal Corporation (PJAC) native title body corporation representative of the Palyku Part A Native Title Determination Area.
- Underlying land, tenement, and pastoral lease owners.
 - Hillside, Marillana and Mulga Downs Pastoral Leases.
 - o BHP.

• Other interest groups including community and environmental groups.

TPI, through Fortescue, has commenced consultation on the Proposal with key stakeholders. Consultation on the Proposal will continue throughout the environmental impact assessment and for the life of the Project. A summary of consultation undertaken to date is shown in Table 4.

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Table 1.	
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Table 4: Consultat	ion Summary			
Stakeholder	Date	Summary of Discussion	Topics Raised / Discussed	Outcome
Nyiyaparli People	23 March 2022,	Fortescue has met with the Nyiyaparli	Nyiyaparli have provided Fortescue with	Fortescue will address Social
	25 August 2022	people on many occasions to present information to the community on the	their feedback on the Proposal. These include:	Surroundings concerns through the impact assessment process and
	9 November 2022	Proposal. These include:	 Caring for country. 	ongoing consultation with Nyiyaparli to
	9 March 2023	Presentations at Working Group Meetings	Water management. Drotection of immortant places	develop a Social Cultural Heritage Management Plan (SCHMP). Matters
		Social Surroundings including two on-	 Continued access to country. 	regarding business opportunities will be
		country visits and targeted workshops.	Mine closure objectives.	audiessed vid Fortescue's Aboriginal Business Development Team.
		 Presentations at heritage sub- committee Meetings. 	 Employment and training opportunities for environment and 	Employment and training opportunities
		A copy of the S38 East Hamersley Rail	monitoring works.	activities will be addressed via the
		Keierral and summary documents were sent to Nivivanarii Deonle (via KNAC) on 8	 Dustriess opportunities. Crimitative impacts on country. 	SCHMP.
		November 2022.		Fortescue has considered feedback
				from Nyiyaparli on the East Hamersley Railway referral documents and will
				continue to discuss key topics raised
				as part of ongoing consultation
Banjima People	14 July 2022	Nyidinghu project including East	Banjima People suggested initial support	Social Surroundings Workshops are in
	25 October 2022	Hamersley Rail has been presented at the	of the alignment adjacent to BHP Rail.	the process of being arranged.
		Banjima Working Group Meetings. Agenda	Requested further consultation be	Fortescue will address Social
		Included an overview of the Nyldinghu	undertaken.	Surroundings through the impact
		Mine and East namersiey Kall project,		assessment process and ongoing
		Culterit activities and all overview of the Social Surroundings process Eortescue		consultation with Banjima to develop a
		bodial surroundings process. For tescue has proposed further workshops to discuss		Social Cultural Heritage Management
		details of the East Hamersley Rail project		
		and Social Surroundings values.		
		Since initial introduction to Social		
		Surroundings required for the SCHMP,		
		Fortescue provided an update on the \$38		
		East namelsley Kall relenan to the banjima Working Group on 25 October 2022.		

Rev 0 Page 19 of 71 NY-RP-EN-0020

Fortescue
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Stakeholder	Date	Summary of Discussion	Topics Raised / Discussed	Outcome
		A copy of the S38 Rail Referral and summary documents were sent to Banjima Idja Martu (via BNTAC) on 8 November 2022.		
Palyku People	9 June 2022	An introduction to Social Surroundings	No specific feedback has been raised	Social Surroundings Workshops are in
	20 October 2022	consultation process and the Nyidinghu Mine and East Hamersley Rail project was presented at the Palyku Working Group meeting. Fortescue has proposed further workshops to discuss details of the East Hamersley Rail project and Social Surroundings values. Since initial introduction to Social Surroundings required for the SCHMP, Fortescue provided an update on the East Hamersley Rail referral to the Palyku Working Group on 20 October 2022. A copy of the S38 Rail Referral and summary documents were sent to Palyku People (via PJAC) on 8 November 2022.	regarding the East Hamersley Kall project as Social Surroundings consultation is still ongoing.	the process of being arranged. Fortescue will address Social Surroundings through the impact assessment process and ongoing consultation with Palyku to develop a Social Cultural Heritage Management Plan (SCHMP).
Department of Climate Change, Environment,	8 March 2023	An overview of both the Mine and Rail Proposed Actions were presented to a	DCCEEW expressed interest or concern regarding the following:	Fortescue resolved queries during the meeting:
Energy and Water (DCCEEW)		panel of DCCEEW representatives.	 The quality of water subject to reiniaction 	Excess dewater would be reinjected on a water guality fits for like' basis
			 Confirmation of whether there is an 	but a water quality line for line basis into the deep saline aquifer.
			existing crossing for the BHP Rail	Confirmed Fortescue's rail line would
			across Fortescue Marsh.	cross at the narrowest point on the
			 Confirmation of the location of known potential Night Parrot habitat mapped as Marsh / halophytic shrubland 	western extent of the marsh, adjacent to BHP's existing rail crossing.
			adjacent the marsh.	Fortescue acknowledged advice
				regarding 'split proposals' and will
Supporting Document – This document is uncontrol	East Hamersley Railway lled when printed	r Project s38 Referral		NY-RP-EN-0020 Rev 0 Page 20 of 71

Stakeholder	Date	Summary of Discussion	Topics Raised / Discussed	Outcome
			 Should Fortescue wish to refer the Mine and Rail Projects as separate Proposed Actions, DCCEEW recommend Fortescue consider relevant guidance published by the Department. 	consider guidance for staged developments.
	12 April 2023	 Meeting to present the split referral rationale with key reasoning being: Separate entities and proponents for Mine and Rail proposals respectively. Separate State Agreements for Mine and Rail proposals respectively. 	DCCEEW accepted the rationale for split referrals submitted under separate entities as a valid reason. No further clarifications needed at the time. Likely to discuss this topic further after submission of referrals. Need to be clear on the intent on what the proposed actions are. Keeping infrastructure separate within each Development Envelope.	No further clarifications needed at the time.
Department of Water and Environment Regulation – EPAS	10 November 2022	Pre-referral meeting with EPAS and Fortescue to provide an overview of the Nyidinghu Iron Ore Mine and East Hamersley Railway projects.	EPAS provided initial feedback on the development envelopes.	Referral documents to include commentary on the development envelopes extent. Referrals for the Mine and Rail projects to be submitted separately.
	17 March 2023	Meeting with EPAS to discuss the approach for separate referrals for the Nyidinghu Iron Ore Mine and East Hamersley Railway projects.	EPAS requested sound reasoning for separate referrals to present to the Chair. Fortescue outlined the Mine and Rail referrals have different proponents, entities and will be undertaken on separate State Agreements.	EPAS to present information to the Chair
	24 March 2023	Meeting with EPAS to discuss separate referrals for the Nyidinghu Iron Ore Mine and East Hamersley Railway projects.	EPAS informed Fortescue that the Chair would prefer one referral and presented several options to progress including using new administration act to split the Ministerial Statement.	Fortescue to present reasoning for split referrals to the Chair
	5 April 2023	Meeting with Chair of EPA and EPAS to discuss split referrals.	Chair understood separate entities and the potential for the rail to service other mines in the future.	Fortescue to submit separate referrals. Likely to receive an RFI to further clarify split referrals when submitted.
Supporting Document – This document is uncontro	East Hamersley Railway lled when printed	Project s38 Referral		NY-RP-EN-0020 Rev 0 Page 21 of 71

Fortescue

				Fortescue
Stakeholder	Date	Summary of Discussion	Topics Raised / Discussed	Outcome
Department of Water and Environment Regulation – Water	15 August 2021	Meeting held with DWER in August 2021 to provide a briefing on the project.	 DWER provided initial comments on the proposal including: Data requirements (water quantity and quality) Advice to define the upper limits of dewatering volumes in the first instance 	Fortescue will address these comments through the impact assessments, as well as the RIWI Act approvals required for the project.
Department of Jobs, Tourism, Science and Innovation	27 June 2022	Discussions with JTSI have focussed on the process to include the proposal in the <i>Railway and Port State Agreement.</i> This process has commenced. With the submission of a Draft Notice to JTSI. Monthly meeting with JTSI	Draft notice to be submitted to JTSI	Project to be managed under the State Agreement. Draft notice sent to JTSI 27/05/22
	25 July 2022	Monthly meeting with JTSI	JTSI RFI Update to Draft Clause 12(1) Notice and RFI Response Other agency review	JTSI RFI received 5/07/22 Updated Draft Clause 12(1) Notice and RFI response sent 25/07/22 Query other agency review
	22 August 2022	Monthly meeting with JTSI	Fortescue submission of detailed proposal	Fortescue must provide justification up front as to why detailed proposal won't meet the 18 month timeframe to submit the proposal
	28 September 2022	Monthly meeting with JTSI	Fortescue Marsh National Park FMG resubmission.	JTSI made note of the plans for the Fortescue Marsh National Park. FMG resubmitted 5/10/22
	27 October 2022	Monthly meeting with JTSI	JTSI review of impacts of DBCA Fortescue Marsh Conservation Area Other agency comments	JTSI are reviewing impacts of DBCA Fortescue Marsh Conservation Area JTSI to provide other agency comments
	10 November 2022	Nyidinghu Mine and Rail Spur Investigation Envelope Review	Nyidinghu Mine and Rail Spur Investigation Envelopes and their proximity to Fortescue Marsh, Proposed Fortescue Marsh NR Class A and Non	JTSI stated if investigation corridor was slightly amended then it would be acceptable to send notice to the Minister for review.
Supporting Document –	East Hamersley Railway	Project s38 Referral		NY-RP-EN-0020 Rev 0

Page 22 of 71

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Stakeholder	Date	Summary of Discussion	Topics Raised / Discussed	Outcome
			Class A to ensure a pathway forward for the scopes.	
	2 December 2022	Monthly meeting with JTSI	Fortescue provided map TPI reply to JTSI regarding other agency comments	Fortescue provided map and questions regarding progression of rail spur notice on 14/11/2022, awaiting JTSI response. TPI provided reply to JTSI in response to other agency comments 28/11/2022, awaiting JTSI response. 2/12/22 – FMG sent JTSI amended figure where investigation corridor has been removed form DBCA proposed conservation areas. 6/12/22 JTSI advised that the notice can be sent to the Minister.
	17 January 2023	Monthly meeting with JTSI	JTSI to liaise with DPLH	8/12/22 – Notice submitted to Minister 5/1/23 – Notice approved by Minister JTSI to liaise with DPLH to advise them of the Minister for State Development's in principle approval in accordance with Clause 4.
BHP Group Limited (BHP)		Water Working Group Fortescue has commenced a working group with BHP to discuss the challenges of surface water management Senior Working Group Fortescue has commenced a senior working group with BHP to discuss impacts on BHP assets including Marillana Station, BHP's Railway and BHP's adjacent projects (Marillana and Mindy) Objection Matters from BHP against Fortescue tenements	Impact on BHP rail Impact on BHP assets	Continue working group to work through issues First meeting held in late 2021. Follow- up meeting to occur soon now that project definition and studies have progressed.
Supporting Document -	East Hamerslev Railwav	Proiect s38 Referral		NY-RP-EN-0020 Rev 0

This document is uncontrolled when printed

zu kev u Page 23 of 71

Outcome	Currently waiting for outcome from BHP	Further meeting to be scheduled once s91 granted	Further meetings scheduled to discuss current matters and commence negotiations for resolution
Topics Raised / Discussed	Fortescue tenement applications affect BHP tenure Pending response	Work to be commenced following investigations Fortescue tenement applications affect RTIO tenure Pending response	Fortescue tenement applications affect MRL tenure
Summary of Discussion	Sent various emails requesting negotiations for access agreements to commence. No response Meeting held with the Land Access Manager at BHP.	 Billiard North tenure Meeting held to discuss next steps for construction of levees on RTIO tenure. Objection Matters from RTIO against Fortescue tenements Sent various emails requesting negotiations for access agreements to commence. 	Objection Matters from RTIO against Fortescue tenements Email correspondence has been exchanged regarding the current objection matters by MRL against Fortescue
Date			
Stakeholder		Rio Tinto Iron Ore (RTIO)	Mineral Resources Limited (MRL)

5 ENVIRONMENTAL FACTORS

Environmental Factors are those parts of the environment that may be impacted by an aspect of a proposal (EPA, 2021). The EPA has 14 Environmental Factors, organised into five themes: Sea, Land, Water, Air and People (EPA, 2021). A preliminary review has been completed against the Environmental Factors to identify those that are relevant to the Proposal. Consideration has been given to all available information at the time of preparing this document including baseline surveys, rail design, regional environmental and social context. The identification of key environmental factors is presented in Table 5.

Factor	Objective	Relevance to Proposal	Key Factor
Sea			
Benthic Communities and Habitat	To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.	There are no benthic, marine, or coastal receptors. Not relevant to the Proposal.	Not relevant
Coastal Processes	To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.	There are no benthic, marine, or coastal receptors. Not relevant to the Proposal.	Not relevant
Marine Environmental Quality	To maintain the quality of water, sediment and biota so that environmental values are protected.	There are no benthic, marine, or coastal receptors. Not relevant to the Proposal.	Not relevant
Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.	There are no benthic, marine, or coastal receptors. Not relevant to the Proposal.	Not relevant
Land	·	•	
Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	Removal and loss of vegetation. A number of conservation significant flora species are known to occur within the RDE.	Key Factor
Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	Removal and loss of fauna habitat.	Key Factor
Subterranean Fauna	To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	The Proposal does not include dewatering or alteration of habitat from mining. A minor volume of water may be abstracted during the construction phase only. Not relevant to the Proposal.	Not a Factor
Landforms	To maintain the variety and integrity of significant physical landforms so that environmental values are protected.	The Proposal will not substantially alter any significant landforms as described by the Environmental Factor Guideline - Landforms. Not relevant to the Proposal.	Not a Factor
Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	The Proposal will not substantially alter the land or soils or use waste rock materials for construction purposes.	Not a Factor

Table 5: Identification of key environmental factors

Factor	Objective	Relevance to Proposal	Key Factor
Water		-	
Inland Waters	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.	The Proposal will require bridges, culverts and drains over a number of major drainage lines including Weeli Wolli Creek and the Fortescue Marsh. Abstraction of a minor volume of groundwater for rail construction purposes is required.	Key Factor
Air			
Air Quality	To maintain air quality and minimise emissions so that environmental values are protected.	The Proposal will not substantially alter the local air-shed. Not relevant to the Proposal.	Not a Factor
Greenhouse Gas Emissions	To reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change	The Proposal will use temporary diesel-powered generators during construction and early operations. During operations, power will be sourced from renewable energy and/or Fortescue's transmission line network. The Proposal has the potential to contribute to Greenhouse Gas Emissions.	Other Factor
People		·	
Social Surroundings	To protect social surroundings from significant harm.	The Proposal is located within the Banjima, Nyiyaparli and Palyku Native Title determinations and has the potential to impact on social, cultural, aesthetic, economic and social surroundings within and surrounding the Project area.	Key Factor
Human Health	To protect human health from significant harm.	The Proposal will not generate emissions that may impact on human health. Not relevant to the Proposal.	Not a Factor

Based on the above, TPI has identified the following key environmental factors relevant to the Proposal:

- Flora and Vegetation.
- Terrestrial Fauna.
- Inland Waters.
- Social Surroundings.

Greenhouse Gas Emissions is considered relevant as an 'Other Factor' to the Proposal.

A summary of each environmental factor to support the referral is provided in the sections below. EPA Factors not considered relevant to the Proposal have not been discussed further. TPI has completed baseline surveys across the RDE and surrounds since 2012. In addition to TPI studies, multiple surveys have been undertaken in the immediate surrounds and wider region by mining

proponents and the DBCA. This provides a high level of confidence that baseline values are well understood.

5.1 Flora and Vegetation

5.1.1 EPA Objective, Policy and Guidance

The EPA Objective for Flora and Vegetation is "*to protect flora and vegetation so that biological diversity and ecological integrity are maintained*" (EPA, 2016a). Policy and guidance considered as part of this Factor include:

- Statement of Environmental Principles, Factors and Objectives (EPA, 2021).
- Environmental Factor Guideline Flora and Vegetation (EPA, 2016a).
- Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b).

5.1.2 Receiving Environment

5.1.2.1 Studies and Surveys

TPI has commissioned flora and vegetation surveys across the RDE and surrounding areas since 2012. This includes a detailed flora and vegetation survey completed over two phases in 2021 (Ecoscape, 2022) with part of the RDE also included in a detailed flora and vegetation survey completed in 2017 (Ecoscape, 2018). Surveyed areas are shown in Figure 7 and listed in Table 6. The 'Nyidinghu Transport Corridor Detailed Flora and Vegetation Survey' is the most relevant to the proposed East Hamersley Railway corridor; however, a portion of the 2017 survey also included a small part of the RDE. Neither survey covers the full extent of the RDE. TPI will continue to undertake flora and vegetation studies to ensure the full extent of the RDE has been surveyed.

Report Name	Survey Dates	Reference
Fortescue Valley Flora and Vegetation Survey	26-30 May 2017	(Ecoscape, 2018)
	12-25 June 2017	
	12-24 September 2017	
Nyidinghu Transport Corridor Detailed Flora and Vegetation	4-16 th May 2021	(Ecoscape, 2022)
Survey	16-25 July 2021	
Nyidinghu Targeted Flora and Vegetation Survey	4-16 th May 2021	(Ecoscape, 2021)
	16-25 July 2021	

Table 6: Relevant Flora and Vegetation Surveys to the East Hamersley Railway

5.1.2.2 Regional Vegetation

Regional scale vegetation has been mapped and described by Beard (1975) and refined by Shepherd (2002). Vegetation associations are broad scale and aligned with landform, soils and

topography. Seven Vegetation Associations are mapped within the RDE and are described in Table 7.

Vegetation Association	Description	Original Extent in Pilbara (ha)	Extent remaining in Pilbara (ha / percent)
29	Sparse low woodland; Mulga; discontinuous in scattered groups	1,133,219.76	1,131,712.01 / 99.98%
93	Hummock grasslands, shrub steppe; kanji over soft spinifex	3,042,114.27	3,038,471.67 / 99.88%
111	Hummock grasslands, shrub steppe; <i>Eucalyptus gamophylla</i> over hard spinifex	550,286.99	550,232.45 / 99.99%
157	Hummock grasslands, grass steppe; hard spinifex, <i>Triodia wiseana</i>	199,832.17	198,409.23 / 99.29%
173	Hummock grasslands, shrub steppe; kanji over soft spinifex & <i>Triodia wiseana</i> on basalt	1,752,520.89	1,747,677.63 / 99.72%
562	Mosaic: Low woodland; mulga in valleys / Hummock grasslands, open low tree-steppe; snappy gum over <i>Triodia wiseana</i>	103,606.82	103,606.82 / 100%
676	Succulent steppe; samphire	92,363.78	92,303.26 / 99.93%

 Table 7:
 Vegetation associations within the Rail Development Envelope (Government of Western Australia, 2019)

The RDE intersects one Environmentally Sensitive Area (ESA) corresponding with the Fortescue Marsh which is declared under Section 51B of the EP Act and described in the *Environmental Protection (Environmentally Sensitive Areas) Notice*.

5.1.2.3 Local Vegetation

Ecoscape mapped 29 vegetation units within the survey area associated with the railway corridor (Ecoscape, 2022). Of these, 26 vegetation communities are mapped within the RDE and the extent of these are shown in Figure 8 (Ecoscape, 2018; Ecoscape, 2022). These vegetation communities are common vegetation types regularly encountered in the Pilbara, a full summary of the vegetation types mapped in the RDE is provided in Table 8.

Vegetation Type	Vegetation Description	Extent in RDE (ha)	Total Surveyed Extent (ha / %)
AaAsCc	Acacia aptaneura low woodland over Acacia synchronicia, A. tetragonophylla and Senna artemisioides subsp. oligophylla mid sparse shrubland over * <i>Cenchrus ciliaris</i> mid closed tussock grassland	1,367.85	1,757.68 ha 5.51%
AaCf	Acacia aptaneura and A. catenulata subsp. occidentalis low woodland over Chrysopogon fallax, Dichanthium sericeum subsp. humilius and Iseilema vaginiflorum closed tussock grassland	10.78	10.78 ha 0.03%
AaEfEp	Acacia aptaneura, A. pruinocarpa and A. aneura low open woodland over Eremophila forrestii and Dodonaea petiolaris mid sparse shrubland over Enneapogon polyphyllus, Aristida contorta and A. inaequiglumis low open grassland	5,939.64	8,252.53 25.85%
AaEfTb	Acacia aptaneura and A. sibirica low woodland over Eremophila forrestii subsp. forrestii mid sparse shrubland over Triodia brizoides low open hummock grassland	18.17	223.39 0.7%
AaPITe	Acacia ayersiana and A. pruinocarpa low open forest over Petalostylis labicheoides mid sparse shrubland over Triodia epactia low sparse hummock grassland	161.39	161.39 0.51%
AaSaEh	Acacia aptaneura and Atalaya hemiglauca mid woodland over Senna artemisioides subsp. oligophylla and Acacia tetragonophylla mid sparse shrubland over Eriachne helmsii, Sida fibulifera and Rhynchosia minima low tussock grassland/forbland	28.45	28.45 0.09%
AaSaEp	Acacia aptaneura and A. pruinocarpa low woodland over Senna artemisioides subsp. oligophylla, Ptilotus obovatus and Acacia tetragonophylla mid open shrubland over Enneapogon polyphyllus, Aristida contorta and Chrysopogon fallax low grassland	684.14	877.29 2.75%
AaTb	Acacia ancistrocarpa, A. sclerosperma subsp. sclerosperma and A. synchronicia mid open shrubland over Triodia basedowii and *Cenchrus ciliaris low hummock grassland/tussock grassland	191.50	191.50 0.60%
AaTp	Acacia aptaneura and A. pruinocarpa low open woodland over Triodia pungens low open hummock grassland	1,485.78	1,617.86 5.07%
AcCc	Acacia citrinoviridis and A. pruinocarpa low open woodland over *Cenchrus ciliaris and *C. setiger low tussock grassland	144.61	362.32 1.14%
AdTb	Acacia dictyophleba and Stylobasium spathulatum mid open shrubland over Triodia basedowii, T. schinzii and *Cenchrus ciliaris mid hummock/tussock grassland	83.76	83.76 0.26%
AiTw	Acacia inaequilatera and A. bivenosa mid sparse shrubland over Triodia wiseana low hummock grassland	113.68	276.46 0.87%
ApAsCc	Acacia pruinocarpa low open woodland over Acacia sclerosperma subsp. sclerosperma and A. dictyophleba mid sparse shrubland over *Cenchrus ciliaris and *C. setiger low open tussock grassland	126.48	382.81 1.20%
АрТр	Acacia pachyacra, A. ancistrocarpa and A. inaequilatera mid sparse shrubland over Triodia pungens, *Cenchrus ciliaris and Eragrostis eriopoda low hummock grassland/ tussock grassland	148.54	610.53 1.91%
AsCc	Acacia synchronicia tall open shrubland over *Cenchrus ciliaris and Enneapogon polyphyllus low open tussock grassland	455.16	503.16 1.58%

Fortescue

Supporting Document – East Hamersley Railway Project s38 Referral This document is uncontrolled when printed

NY-RP-EN-0020

Rev 0 Page 29 of 71

Vegetation Type	Vegetation Description	Extent in RDE (ha)	Total Surveyed Extent (ha / %)
AtTp	Acacia tumida var. pilbarensis, A. pyrifolia var. pyrifolia and G. wickhamii mid open shrubland over Triodia pungens and *Cenchrus ciliaris low hummock/tussock grassland	138.77	185.01 0.58%
AxEc	Acacia xiphophylla, A. synchronicia and A. aptaneura low open shrubland over Eremophila cuneifolia, Maireana pyramidata and Senna artemisioides subsp. helmsii low sparse shrubland	2,225.53	3,122.73 9.78%
EgAaTb1	Eucalyptus gamophylla sparse mallee shrubland over Acacia ancistrocarpa mid sparse shrubland over Triodia brizoides and Bonamia erecta low hummock grassland/forbland	96.64	296.16 0.93%
EgAaTb2	Eucalyptus gamophylla and Corymbia hamersleyana low open woodland over Acacia ancistrocarpa, A. sclerosperma subsp. sclerosperma and A. inaequilatera mid sparse shrubland over Triodia basedowii low hummock grassland	1,803.83	2,516.32 7.88%
ElAiTe	Eucalyptus leucophloia subsp. leucophloia low open woodland over Acacia inaequilatera, A. atkinsiana and A. arida mid open shrubland over Triodia epactia and T. vanleeuwenii hummock grassland	5,397.51	7,591.72 23.78%
ElAmTw	Eucalyptus leucophloia subsp. leucophloia low open woodland over Acacia monticola, Acacia maitlandii and A. bivenosa mid open shrubland over Triodia wiseana low open hummock grassland	8.67	38.09 0.12%
EvAcCc	<i>Eucalyptus victrix</i> mid open woodland over <i>Acacia citrinoviridis, A. pyrifolia</i> var. <i>pyrifolia</i> and <i>G. wickhamii</i> tall sparse shrubland over <i>Corchorus crozophorifolius, Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186) and * <i>Cenchrus ciliaris</i> open low shrubland/tussock grassland	125.10	350.38 1.10%
EvApTe	Eucalyptus victrix mid open woodland over Acacia pyrifolia var. pyrifolia, Gossypium robinsonii and Petalostylis Iabicheoides mid open shrubland over Triodia epactia, Eriachne tenuiculmis low open hummock/tussock grassland	297.20	390.35 1.22%
MgTI	Melaleuca glomerata and Acacia sclerosperma subsp. sclerosperma mid sparse shrubland over Triodia longiceps low hummock grassland	438.71	478.35 1.50%
PN	Neptunia dimorphantha, Eriachne mucronata and Aristida latifolia low open shrubland/tussock grassland with Acacia synchronicia and A. tetragonophylla isolated shrubs	57.91	60.15 0.19%
ц	Tecticornia indica subsp. leiostachya, T. auriculata and T. sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) low samphire shrubland	175.34	431.78 1.35%
AaTe	Acacia ancistrocarpa, A. bivenosa and Senna artemisioides subsp. oligophylla mid open shrubland over Triodia epactia, T. longiceps and Aristida latifolia mid hummock/tussock grassland	I	149.45 0.47%
Eb	Eriachne benthamii, Eragrostis xerophila and Aristida latifolia low tussock grassland	1	2.48 0.01%
EIGwTv	Eucalyptus leucophloia subsp. leucophloia low open woodland over Grevillea wickhamii, Acacia inaequilatera and Senna glutinosa subsp. glutinosa mid sparse shrubland over Triodia vanleeuwenii low hummock grassland	1	611.62 1.92%
No Vegetation		325.51	354.59 1.11%
	Total	22,050.65 ha	31,919.09 ha

Fortescue

Supporting Document – East Hamersley Railway Project s38 Referral This document is uncontrolled when printed

NY-RP-EN-0020

Vegetation condition within the RDE ranges from degraded to excellent with vegetation in the RDE predominantly rated as very good as shown in Figure 10 and Table 9. Areas of hills typically supported vegetation in better condition while plains, valley floors and drainage lines are typically in a state of lesser condition (Ecoscape, 2022). The main factors affecting vegetation condition are grazing, weed infestation and existing infrastructure (Ecoscape, 2022).

Vegetation Condition	Area (ha)
Excellent	5,719.99
Very Good	8,918.76
Good	4,448.61
Poor	2,531.14
Degraded	105.64
Completely Degraded / Cleared	326.51
 Total	22,050.65

Table 9: Vegetation condition in the Rail Development Envelope

No TEC vegetation was recorded within the RDE. Three occurrences of Priority 1 Ecological Communities (PEC) and one occurrence of a Priority 3 PEC were identified as occurring within the RDE. These PECs include the following:

- Brockman Iron cracking clay communities of the Hamersley Range Priority 1 PEC

 vegetation unit Eb. This PEC is described as a rare tussock grassland dominated by
 Astrebla lappacea in the Hamerlsey Range, on the Brockman land system. Tussock
 grassland on cracking clays derived in valley floors, depositional floors. This is a rare
 community and the landform is rare (DBCA, 2022). The indicative IDF for the proposal
 does not intersect this PEC.
- Fortescue Marsh (Marsh Land System) Priority 1 PEC vegetation unit Ti. This PEC is described as an extensive, episodically inundated samphire marsh at the upper terminus of the Fortescue River and the Western end of Goodiadarrie Hills. It is regarded as the largest ephemeral wetland in the Pilbara. It is a highly diverse ecosystem within fringing mulga woodlands (on the northern side), samphire shrublands and groundwater dependent riparian ecosystems (Ecoscape, 2022)
- Four plant assemblages of the Wona Land System (previously 'Cracking clays of the Chichester and Mungaroona Range') Priority 1 PEC – vegetation unit Nd. This PEC is described as a shrubless plain of stony gibber community that occurs on the tablelands with very little vegetative cover during the dry season, however during the wet a suite of ephemerals/annuals and short-lived perennials emerge, many of which are poorly known and range-end taxa (DBCA, 2022). The indicative IDF for the proposal does not intersect this PEC.
- Vegetation of sand dunes of the Hamersley Range/Fortescue Valley Priority 3 PEC – vegetation unit AdTb. This PEC is described as red linear iron-rich sand dunes that lie on the Divide Land system at the junction of the Hamersley Range and Fortescue Valley between Kalgan Creek and the low hills to the west. A small number are vegetated with

Acacia dictyophleba scattered tall shrubs over Crotalaria cunninghamii, Trichodesma zeylanicum var. grandiflorum open shrubland. They are regionally rare, small and fragile and highly susceptible to threatening processes (DBCA, 2022).

Sheet flow dependent vegetation (SFDV) occurs through much of the arid and semi-arid zones of the world and is characterised by a mosaic of low cover or bare areas with low water infiltration rates (run-off areas) and high biomass cover with high infiltration rates (run-on areas) (Ecoscape, 2022). The most commonly known form of SFDV in Australia is 'grove-intergrove' Mulga, wherein the 'grove' of Mulga trees and shrubs form the high-infiltration, high-biomass component and the 'intergrove' represents the low infiltration, low-biomass component of the system (Ecoscape, 2022). A portion of the RDE (approximately 35%) is mapped as sheetflow dependent vegetation as evidenced by banded mulga vegetation communities, including:

- **AaAsCc** described as *Acacia aneura* and *Acacia pruinocarpa* woodland over *Acacia synchronicia* shrubland over *Cenchrus ciliaris* and *Cenchrus setiger* tussock grassland (Ecoscape, 2022).
- **AaEfEp** described as *Acacia aptaneura, A. pruinocarpa* and *A. aneura* low open woodland over *Eremophila forrestii* and *Dodonaea petiolaris* mid sparse shrubland over *Enneapogon polyphyllus, Aristida contorta* and *A. inaequiglumis* low open grassland (Ecoscape, 2022).
- **AaSaEp** Acacia aptaneura and A.pruinocarpa low woodland over Senna artemisioides subsp. oligophylla, Ptilotus obovatus and Acacia tetragonophylla mid open shrubland over Enneapogon polyphyllus, Aristida contorta and Chrysopogon fallax low grassland (Ecoscape, 2022).

There are two potential groundwater dependent vegetation (GDV) types identified within the RDE. Both of which contain *Eucalyptus victrix*, a species considered to be a facultative phreatophyte. These vegetation types being:

- **EvAcCc** which is described as *Eucalyptus victrix* and *Eucalyptus camaldulensis* subsp. *refulgens* mid woodland over *Acacia citrinoviridis, A. pyrifolia* var. *pyrifolia* and *A.tumida* var. *pilbarensis* tall sparse shrubland over *Cenchrus ciliaris, Tephrosia rosea* var. Fortescue creeks (Ecoscape, 2022), and largely corresponds where the RDE intercepts Weeli Wolli Creek.
- **EvApTe** which is described as *Eucalyptus victrix* mid open woodland over *Acacia pyrifolia* var. *pyrifolia*, *Gossypium robinsonii* and *Petalostylis labicheoides* mid open shrubland over *Triodia epactia*, *Eriachne tenuiculmis* low open hummock/tussock grassland, and corresponds with mid-size drainage lines of the Chichester Range towards the northern parts of the RDE (Ecoscape, 2022).

In addition to the above, there is a high potential for terrestrial groundwater dependent ecosystems (GDE's) to occur where the RDE intersects the Fortescue Marsh (Ecoscape, 2022).

5.1.2.4 Flora Assemblage

The Nyidinghu Transport Corridor Detailed Flora and Vegetation Survey (Ecoscape, 2022) recorded a total of 607 vascular species of native flora. The following 12 significant flora species have been recorded within the RDE:

- Seringia exastia (Threatened since de-listed in Western Australia).
- Tecticornia sp. Christmas Creek (Priority 1).
- Euphorbia inappendiculata var. queenslandica (Priority 2).
- Atriplex flabelliformis (Priority 3).
- Dolichocarpa sp. Hamersley Station (Priority 3).
- Dysphania congestiflora (Priority 3).
- *Eragrostis* sp. Erect spikelets (Priority 3).
- Eremophila spongiocarpa (Priority 3).
- Stackhousia clementii (Priority 3).
- Swainsonia thompsoniana (Priority 3).
- Eremophila youngii subsp. lepidota (Priority 4).
- Lepidium catapycnon (Priority 4).

While *S. exastia* has been recorded, advice provided by DBCA (19/2/2021) indicates this species' listing as 'Threatened' is a technicality based on outdated taxonomy (Ecoscape, 2022). A recent review assessed the genomic and morphological characters for several *Seringia* taxa and concluded that *S. exastia* and *S. elliptica* are the same species (Ecoscape, 2022; Ecoscape, 2021). *Seringia exastia* has since been de-listed from the *Biodiversity Conservation Act 2016*.

The location of significant flora species recorded within the RDE is shown in Figure 9.

Sixteen species of introduced flora (weeds) have been recorded within the RDE. None of the introduced flora are Declared Pest plants or Weeds of National Significance (WoNS) (Ecoscape, 2022). Nine of the sixteen species are identified as 'Priority' weeds by Fortescue for management purposes including:

- Aerva javanica (Kapok Bush)
- Cenchrus ciliaris (Buffel Grass)
- *Cenchrus setiger* (Birdwood Grass)
- *Chloris virgata* (Feathertop Rhodes Grass)
- Echinochloa colona (Awnless Barnyard Grass)

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- *Malvastrum americanum* (Spiked Malvastrum)
- Rumex vesicarius (Ruby Dock)
- Setaria verticillate (Whorled Pidgeon Grass)
- Vachelia farnesiana (Mimosa Bush)

The other seven introduced flora species include the following (six of which are found only in the far south of the RDE):

- Bidens subalternans (Beggartick) found throughout RDE
- Portulaca pilosa (Djanggara)
- Solanum nigrum (Black Berry Nightshade)
- Sonchus oleraceus (Common Sowthistle)
- Argemone ochroleuca (Mexican Poppy)
- Citrullus amarus (Pie Melon)
- Tridax procumbens (Tridax)

TPI will continue to undertake flora and vegetation studies to ensure the full extent of the RDE has been surveyed.

LEGEND

- Rail Development Envelope
- Existing FMG Rail Alignment
- Proposed Rail Alignment
- ┿┿╸ BHPB Rail ┿┿╸ Rio Tinto Rail
- → Rio Hill Rail
- ---- Road
- Major Track
- Watercourse
- Fortescue Marsh

Data Source(s): Topo, Landgate, 2022 Basemap, ESR**I**, 2022 All other data, FMGL, 2022

Figure 9: East Hamersley Railway Significant Flora Records

 Requested By: Sophie Monaco
 Date: 13/12/2022

 Drawn By: Sang Li
 Size: A3P

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 Approved By:
 Confidentiality: 1

 Scale: 1:250,000
 Coordinate System: GDA 1994 MGA Zone 50

 Document Name: 550NY_00000_MP_EN_0026.08_r2_rail_sigftora
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5.1.3 Potential Impacts, Management and Likely Environmental Outcome

The potential environmental impacts and application of the mitigation hierarchy is shown in Table 10.

Potential Environmental Impacts	Application of the Mitigation Hierarchy	Assessment of Residual Impact	
Direct Impacts	Avoid	There will be a permanent loss of	
Permanent loss of native vegetation in good to excellent	Planning will consider important flora and vegetation values for the	native vegetation as a result of implementing the Proposal.	
condition as a result of clearing.	placement of infrastructure as far as practicable.	Clearing and disturbance within the Fortescue Marsh and Weeli Wolli	
Loss of conservation	Minimise	Creek areas will be minimised as far	
Significant flora species. Loss of significant vegetation communities such as	Internal permitting procedures will limit clearing to that necessary for operations.	Other ancillary infrastructure such as the proposed water pipeline will be buried at creek crossings where	
vegetation representative of a PEC and/or GDE and/or sheet	Surface water flow will be maintained to important downstream environments	practical to minimise the changes to the hydrological regime.	
Indirect Impacts	Within Fortescue Marsh and Weeli Wolli Creek Hydrological regimes within	Infrastructure such as pole pads for	
Degradation of riparian vegetation due to changes in	sheet flow areas will be retained as far as practicable.	the proposed power transmission line will be positioned appropriately to minimise impacts to the Fortescue	
surface hydrology.	Hygiene procedures to minimise the	Marsh and wires will span the Marsh	
Degradation of GDE	risk of introducing weeds.	and other major drainage lines where	
abstraction.	dust emissions.	The proposed East Hamerslev	
Degradation of sheet flow	Hot work permits to reduce the risk of	Railway corridor crosses the	
changes in surface hydrology.	be undertaken in partnership with	existing BHP rail. The corridor also	
Fragmentation of vegetation.	Traditional Owners to protect people	crosses the Weeli Wolli Creek. There may be changes to the health and	
Invasion of weed species.	Manage	structure of GDV communities within	
Changes in fire regimes.	Fortescue will develop and implement	the Fortescue Marsh and Weeli Wolli Creek catchments	
through dust deposition.	sition. the Nyidinghu Vegetation Health Monitoring and Management Plan.	There will be some changes to	
	Rehabilitate	surface water flow within areas	
	Opportunities to rehabilitate disturbed	may impact the health of riparian	
	areas will be identified throughout the life of the Proposal. Rehabilitation will consider Traditional Owner values.	be some changes to sheet flow downstream of infrastructure.	
	Rail closure will consider baseline	There is likely to be a loss of some	
	environmental values and the results of community consultation in determining	priority flora individuals as a result of implementing the proposal.	
	final closure outcomes. However, it is not possible to completely restore vegetation communities.	Vegetation fragments within the rail line corridor are unlikely to be large enough to maintain ecological value.	
		Standard management practices for dust, weeds, fire and feral animals will ensure that indirect impacts from these threats will be minimal.	

Table 10:	Flora and Vegetation: Potential Envi	ironmental Impacts and Management
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TPI consider that the Proposal can be implemented to meet the EPA's objectives for Flora and Vegetation.

5.2 Terrestrial Fauna

5.2.1 EPA Objective, Policy and Guidance

The EPA Objective for Terrestrial Fauna is "*To protect terrestrial fauna so that biological diversity and ecological integrity are maintained*" (EPA, 2016c). Policy and guidance considered as part of this Factor include:

- Statement of Environmental Principles, Factors and Objectives (EPA, 2021).
- Environmental Factor Guideline Terrestrial Fauna (EPA, 2016c).
- Technical Guidance Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA, 2020b).
- Technical Guidance Sampling of short-range endemic invertebrate fauna (EPA, 2016d).

5.2.2 Receiving Environment

5.2.2.1 Studies and Surveys

TPI has commissioned terrestrial fauna surveys, including short range endemic (SRE) invertebrate surveys across the RDE and surrounding areas. This includes a detailed and targeted terrestrial fauna survey completed over two phases in 2021 and a short-range endemic fauna survey in 2021 (Table 11) (360 Environmental, 2022; Ecologia, 2022). The survey area is shown in Figure 11.

Report Name	Survey Dates	Reference	
Detailed and Targeted Terrestrial Fauna Survey	3 – 15 May 2021, 31 August – 12 Sept 2021	(360 Environmental, 2022)	
Nyidinghu Short Range Endemic Invertebrate Fauna Survey	15 – 20 March 2021 17 – 19 May 2021	(Ecologia, 2022)	

Table 11: Fauna Surveys

The Detailed Terrestrial Fauna survey does not cover the full extent of the RDE. TPI will continue to undertake vertebrate fauna studies to ensure the full extent of the RDE has been surveyed.

5.2.2.2 Fauna Habitats

Nine broad fauna habitat types have been identified and mapped within the RDE. These are shown in Figure 12 and described in Table 12 (360 Environmental, 2022). The Woodland, Hills/Ranges/Plateaux, Drainage Line/River/Creek (minor) and Hummock Grassland occupy the majority of fauna habitats mapped within the RDE (approximately 94%).

In some areas, fauna habitats were noted as being in a degraded condition as a result of widespread cattle grazing (360 Environmental, 2022). In addition, substantial portions of the study area have been cleared to facilitate pastoralism and construct supporting infrastructure in the form of roads, fence lines and water points (360 Environmental, 2022). Almost all identified

fauna habitats extend outside the surveyed area and RDE to form larger ecosystems, however the extents of the Dunal (primary/secondary) habitats are very limited within the area (360 Environmental, 2022).

Fauna Habitat	Description	Area in RDE (ha)	Area (ha) and Extent (%) of Survey Area
Woodland (Open / Closed)	Predominantly comprises banded Mulga (<i>Acacia ?aptaneura</i>) woodland, with Mulga bands separated by bare patches due to surface water flow. Large continuous patches of Mulga woodland occurred in drainage areas, such as south of Coondiner Pool. The most abundant microhabitats were woody debris and peeling bark, which provide important shelter and refuge primarily for small reptiles. Severe cattle degradation was widespread throughout most of this habitat, particularly north of the Mount Newman Railway. This habitat is not critical for conservation significant fauna taxa, particularly given the widespread cattle degradation, although some species such as the Bilby may use it on occasion.	12,057.12	83,869 ha, 59.47%
Hills / Ranges / Plateaux	Rocky ironstone hills and slopes with rocky outcropping and thin soils over shallow bedrock. Vegetation consists primarily of open <i>Acacia</i> shrublands over <i>Triodia</i> hummock grasslands. Microhabitats include <i>Triodia</i> hummocks which provide shelter for a variety of species and rocky outcrops which provide abundant crevices for small fauna species. Hummocks were generally small, possibly due to a combination of burning or shallow soils. Stony slopes within this habitat will be used by the Western Pebble-mound Mouse.	3,512.34	11,344 ha, 8.04%
Drainage Line / River / Creek (Minor)	Areas of drainage consisting of narrow individual channels or, in some cases, lacking surface channelling altogether. Dense overstorey vegetation made up primarily of tall Acacia spp., with <i>Eucalyptus</i> sp. and <i>Corymbia</i> sp. Ground cover is typically <i>Triodia</i> hummock grassland or tussock grassland on substrates ranging from sand to sandy clay, with an assortment of river stones. Most minor drainage lines lack permanent or semi- permanent pooling of water. Large, hollow-bearing Eucalypts were occasionally observed within this habitat. The overstorey vegetation provides valuable nesting and foraging habitat for birds and may be used by conservation significant taxa such as the Grey Falcon and Peregrine Falcon. Key microhabitats include woody debris, leaf litter, peeling bark, hollow trees and logs, and hummock grasslands provide refuge, shelter, and foraging opportunities for a wide variety of fauna taxa.	3,073.57	10,434 ha, 7.40%
Hummock Grassland	<i>Triodia</i> hummock grassland on primarily red sand and sandy loam plain with a sparse overstorey of mixed shrubs dominated by <i>Acacia</i> spp. and scattered <i>Corymbia</i> sp. Abundant <i>Triodia</i> hummocks found within this habitat type provide an important source of shelter, refuge and nesting opportunities for small fauna taxa including birds, mammals, and reptiles. The sandy substrate is suitable for digging and burrowing. Some cattle degradation was observed, particularly north of the Mount Newman Railway which bisects the Survey Area from east to west. Conservation significant fauna taxa such as the Bilby and Brush-tailed Mulgara may use this habitat.	2,384.17	27,945 ha, 19.81%

Table 12: Terrestrial Fauna Habitats within the Rail Development Envelope

Fauna Habitat	Description	Area in RDE (ha)	Area (ha) and Extent (%) of Survey Area
Plain (stony / gibber)	Stony plain, usually with a sparse overstorey of mixed shrubs dominated by <i>Acacia</i> spp. over <i>Triodia</i> hummock grassland. <i>Triodia</i> hummocks found within this habitat type provide an important source of shelter, refuge and nesting opportunities for small fauna including birds, mammals and reptiles. The Western pebble-mound mouse was recorded within this habitat, however it is more typically found in stony slopes. Bilbies may also use this habitat.	404.08	2,869 ha, 2.03%
Drainage Line / River / Creek (Major)	Areas of drainage often consisting of multiple braided channels or broad individual channels. Dense overstorey vegetation made up primarily of <i>Eucalyptus</i> sp. and <i>Corymbia</i> sp., and occasionally <i>Melaleuca</i> sp. Ground cover is typically <i>Triodia</i> hummock grassland or tussock grassland on substrates ranging from sand to sandy clay, with an assortment of river stones. Often contains permanent or semi-permanent pooling of water, which is critical habitat for the Pilbara Olive Python. Large, hollow-bearing Eucalypts were relatively abundant within this habitat. The overstorey vegetation provides valuable nesting and foraging habitat for birds and may be used by conservation significant taxa such as the Grey Falcon and Peregrine Falcon. Key microhabitats include woody debris, leaf litter, peeling bark, hollow trees and logs, and hummocks grasslands provide refuge, shelter, and foraging opportunities for a wide variety for fauna taxa.	389.73	1,618 ha, 1.15%
Marsh/Lake (low halophytic shrubland)	Broad, open marsh consisting of samphire and <i>Triodia</i> dominated halophytic shrubland. Generally, dry cracking clays in the winter when rainfall is low and becoming seasonally inundated after large rainfall events in the summer. The marshes/lake may occasionally inundate and provide habitat for wetland-dependent taxa, including migratory birds. This habitat forms part of the broader Fortescue Marsh, a Nationally Important Wetland.	217.76	1,462 ha, 1.04%
Dunal (Primary / Secondary)	Open <i>Triodia</i> grasslands and low, open <i>Acacia</i> shrublands on a soft sandy substrate which is preferred habitat for many burrowing taxa. Landform consists of alternating dunes and swales. Key microhabitats include hummocks and burrows. Cattle degradation was observed, particularly in the swales. Conservation significant fauna taxa such as the Bilby and Brushtailed Mulgara may use this habitat.	117.43	162 ha, 0.12%
Rocky Escarpments / Ridges / Mesa	This habitat forms part of the broader Hills / Ranges / Plateaux habitat, however; has been mapped separately as it comprises escarpments and breakaways with abundant crevices, overhangs, cavities and caves. This habitat is in excellent condition as it is inaccessible to most forms of disturbance and provides critical habitat for conservation significant fauna taxa; it provides denning habitat for Northern Quolls and may be used for roosting by Ghost Bats and Pilbara Leaf-nosed Bats.	116.72	513 ha, 0.36%
Cleared	Areas that have been cleared and do not contain vegetation. These areas generally do not provide substantial habitat value to fauna taxa.	431.9	817 ha, 0.58%
Total		22,704.82	141,033 ha

Of the habitats within the RDE, the Rocky Escarpments / Ridges / Mesa habitat provides the most value for conservation significant fauna (360 Environmental, 2022). It forms part of the broader Hills / Ranges / Plateaux habitat; however, was mapped separately due to the presence of microhabitats such as crevices, overhangs, cavities, and caves (360 Environmental, 2022). These microhabitats have the potential to be used for denning by the Northern Quoll, may be used as roosting habitat by the Pilbara Leaf-nosed Bat and Ghost Bat, and provide critical habitat for the Pilbara Olive Python, particularly when occurring near Drainage Line/River/Creek (major) habitat intersecting Hills/Ranges/Plateaux habitat (360 Environmental, 2022).

The Drainage Line / River / Creek (major and minor) habitats provide substantial value for conservation significant fauna and the overall fauna assemblage due to their role as ecological linkages (360 Environmental, 2022). The habitats provide continuous corridors of vegetation cover that enable fauna to disperse across the landscape (360 Environmental, 2022). Seasonal inundation and pooling can occur, particularly in the Drainage Line/River/Creek (major) habitats, and such pooling is likely to be used by the Pilbara Olive Python (360 Environmental, 2022). These habitats constitute foraging and dispersal habitat for the Northern Quoll, foraging habitat for the Pilbara Leaf-nosed Bat and Ghost Bat, and potential nesting habitat for the Grey Falcon and Peregrine Falcon (360 Environmental, 2022).

The Dunal (primary/secondary) is very limited in extent (360 Environmental, 2022). This habitat provides shelter and sandy substrates suitable for burrowing (360 Environmental, 2022). It is potentially core habitat for conservation significant taxa such as the Bilby (360 Environmental, 2022).

5.2.2.3 Terrestrial Fauna Assemblage

Terrestrial fauna surveys have recorded a total of 164 terrestrial fauna species within the wider surveyed area (360 Environmental, 2022). Eleven significant species have been recorded within the RDE from previous surveys or from DBCA records (360 Environmental, 2022; Bamford Consulting Ecologists, 2012). These species include:

- Birds
 - Australian Painted Snipe (*Rostratula australis*) (BC Act Endangered, EPBC Act Endangered)
 - Grey Falcon (*Falco hypoleucos*) (BC Act Vulnerable, EPBC Act Vulnerable)
 - Eastern Osprey (*Pandion haliaetus cristatus*) (EPBC Act Migratory and Marine)
 - Pacific Swift / Fork-tailed Swift (*Apus pacificus*) (EPBC Act Migratory and Marine)
 - Peregrine Falcon (*Falco peregrinus*) (DBCA Other Specially Protected Fauna)
- Mammals
 - Ghost Bat (*Macroderma gigas*) (BC Act Vulnerable, EPBC Act Vulnerable)

- Pilbara Leaf-Nosed Bat (*Rhinonicteris aurantia*) (BC Act Vulnerable, EPBC Act Vulnerable)
- Greater Bilby (*Macrotis lagotis*) (BC Act Vulnerable, EPBC Act Vulnerable)
- Western Pebble-mound Mouse (*Pseudomys chapmani*) (DBCA Priority 4)
- Reptiles
 - Pilbara Olive Python (*Liasis olivaceus barroni*) (BC Act Vulnerable, EPBC Act Vulnerable)
 - Gane's Blind Snake (*Anilios ganei*) (DBCA Priority 1)

A further eight significant species have a high likelihood of occurrence with potential habitat present within the RDE (360 Environmental, 2022) and are identified below:

- Birds
 - Night Parrot (*Pezoporus occidentalis*) (BC Act Critically Endangered, EPBC Act Endangered)
 - Oriental Plover (*Charadrius veredus*) (Migratory and Marine EPBC Act)
 - Common Greenshank (*Tringa nebularia*) (Migratory and Marine EPBC Act)
 - Gull-billed Tern (*Gelochelidon nilotica*) (Migratory and Marine EPBC Act)
- Mammals
 - Northern Quoll (*Dasyurus hallucatus*) (BC Act / EPBC Act Endangered)
 - Brush-tailed Mulgara (*Dasycercus blythi*) (DBCA Priority 4)

Generally, the fauna habitat and listed species recorded within the RDE are typical of the Pilbara. There are a number of significant fauna species recorded from within the RDE and this is likely indicative of the 106 km long linear nature of the RDE with many river/creek crossings.

A number of potential SRE invertebrates have been recorded within the RDE. SRE habitats are widespread within and beyond the RDE (Ecologia, 2022). Eighteen potential SRE invertebrates have been recorded within the RDE from the field survey and previous WAM database records (Ecologia, 2022). This has included four spiders, two millipedes, fourteen pseudoscorpions, five isopods, two scorpions and one coil centipede (Ecologia, 2022). Hills/Ranges within the survey area are associated with south-facing rocky outcrops and breakaways and have a 'High' SRE suitability based on habitat complexity, protection, and presence of suitable microhabitats (Ecologia, 2022).

TPI will continue to undertake fauna and SRE fauna studies to ensure the full extent of the RDE has been surveyed.

- Rail Development Envelope Existing FMG Rail Alignment
- Proposed Rail Alignment
- BHPB Rail
- Rio Tinto Rail
- Roy Hill Rail
- Road
- Major Track
- Watercourse
 - Fortescue Marsh

Data Source(s): Basemap, ESRI, 2022 Fauna, DBCA, 2022 All other data, FMGL, 2022

Significant Fauna

Requested By: Sophie Monaco	Date: 24/04/
Drawn By: Sang Li	Size:
Revised By: f641963	Revisi
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Scale: 1:220,000	
Coordinate System: GDA 1994 MGA Zone 50	
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FMG accepts no liability and gives no representation or warran provided including its accuracy, completeness, merchantability or to be used in accordance with any relevant Licence Agreements, T	ty, express or implied, as to the infor fitness for purpose. All information prov ferms and Conditions and all applicable

5.2.3 Potential Impacts, Management and Likely Environmental Outcome

The potential environmental impacts and application of the mitigation hierarchy is shown in Table 13.

Potential Environmental Impacts	Application of the Mitigation Hierarchy	Assessment of Residual Impact
Direct Impacts Permanent loss of fauna habitat, including SRE invertebrate microhabitats Fauna deaths from vehicle and machinery interactions Indirect Impacts Degradation of fauna habitat, including SRE invertebrate habitat Fragmentation of habitat Invasion of weed species Increase in feral animal populations	Avoid Identify critical habitat for fauna and design to avoid where possible. Minimise Internal permitting procedures will limit clearing to that necessary for operations. Feral animal control where required. Hygiene Procedures to eliminate the risk of introducing weeds. Manage Fortescue will develop and implement the Nyidinghu Conservation Significant Fauna Management Plan. Rehabilitate Rehabilitation will establish functioning ecosystems for terrestrial fauna. Rehabilitation will consider Traditional Owner values	There will be a permanent loss of fauna habitat as a result of implementing the proposal. A number of significant fauna species have been recorded or have a high likelihood of occurrence within the RDE. Given the linear nature of the project, disturbance will be minimised within critical fauna habitat (river/creeks/drainage lines) and rocky escarpments / ridges will be avoided where possible to minimise significant engineering work and bulk earthworks. Bridges will be used at major drainage line crossings which will allow for migratory birds and other fauna to move under the rail infrastructure. Proposed powerline infrastructure over river crossings and major drainage lines will be fitted with bird diverter discs to prevent/minimise any strikes with overhead powerlines. Many of the potential SRE invertebrates recorded from within the RDE have been found outside the RDE suggesting wider distribution and good habitat connectivity.

Table 13:	Terrestrial Fauna:	Potential Environmental	Impacts and Management
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TPI consider that the Proposal can be implemented to meet the EPA's objectives for Terrestrial Fauna.

5.3 Inland Waters

5.3.1 EPA Objective, Policy and Guidance

The EPA Objective for Inland Waters is "to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected" (EPA, 2018a). Policy and guidance considered as part of this Factor include:

- Statement of Environmental Principles, Factors and Objectives (EPA, 2021).
- Environmental Factor Guideline Inland Waters (EPA, 2018a)

5.3.2 Receiving Environment

The proposed rail corridor is located adjacent and predominantly downstream of the existing BHP rail. The corridor is located to the north and south of the Fortescue Marsh within the Upper Fortescue River catchment. The rail corridor crosses numerous ephemeral creeks in the Chichester ranges where the upper catchments are typically steep with well-defined flow paths. The corridor also crosses the Fortescue Valley where flows from the Chichester and Hamersley Ranges discharge to the Marsh directly. The terrain at the base of the ranges in the Fortescue Valley is typically flat with poorly defined flow paths resulting in concentrated flows dispersing into areas of sheet flow before entering the Marsh. A large number of culverts and bridges are proposed to be installed to maintain the flow paths within the rail corridor. The pipeline from proposed Nyidinghu Iron Ore Mine to the Chichester operations will be installed within the rail corridor. The pipeline will be buried at creek crossings where practicable to maintain flow paths.

The proposed rail alignment crosses Weeli Wolli Creek, Fortescue Marsh and a number of other major drainage lines and sheetflow areas. Surface water infrastructure will be implemented to allow water to flow downstream and minimise pooling, erosion, and impacts to the existing BHP rail alignment. Proposed infrastructure includes bridges and culverts over major waterways and minor drainage lines, with allowance for environmental culverts where required. Drainage design will seek to minimise the cumulative impact with the BHP rail alignment where possible.

Bridge crossings have been nominated where the rail corridor crosses the Weeli Wolli Creek catchment. The proposed bridge locations are immediately downstream from pre-existing bridges in the BHP rail alignment.

A portion of the RDE (approximately 35%) is subject to sheetflow as evidenced by banded mulga vegetation communities which include the following vegetation types:

- AaAsCc described as *Acacia aneura* and *Acacia pruinocarpa* woodland over *Acacia synchronicia* shrubland over *Cenchrus ciliaris* and *Cenchrus setiger* tussock grassland (Ecoscape, 2022).
- AaEfEp described as Acacia aptaneura, A. pruinocarpa and A. aneura low open woodland over Eremophila forrestii and Dodonaea petiolaris mid sparse shrubland over Enneapogon polyphyllus, Aristida contorta and A. inaequiglumis low open grassland (Ecoscape, 2022).
- AaSaEp Acacia aptaneura and A.pruinocarpa low woodland over Senna artemisioides subsp. oligophylla, Ptilotus obovatus and Acacia tetragonophylla mid open shrubland over Enneapogon polyphyllus, Aristida contorta and Chrysopogon fallax low grassland (Ecoscape, 2022).

There are also two potential groundwater dependent vegetation (GDV) types identified within the RDE (approximately 2%) which are considered to be representative of groundwater dependent vegetation (GDV) including:

- EvAcCc which is described as *Eucalyptus victrix* and *Eucalyptus camaldulensis* subsp. refulgens mid woodland over Acacia citrinoviridis, A. pyrifolia var. pyrifolia and A.tumida var. pilbarensis tall sparse shrubland over Cenchrus ciliaris, Tephrosia rosea var. Fortescue creeks (Ecoscape, 2022), and largely corresponds where the RDE intercepts Weeli Wolli Creek.
- EvApTe which is described as *Eucalyptus victrix* mid open woodland over *Acacia pyrifolia* var. *pyrifolia*, *Gossypium robinsonii* and *Petalostylis labicheoides* mid open shrubland over *Triodia epactia*, *Eriachne tenuiculmis* low open hummock/tussock grassland, and corresponds with mid-size drainage lines of the Chichester Range towards the northern parts of the RDE.

In addition to the above, there is a high potential for terrestrial groundwater dependent ecosystems (GDEs) to occur where the RDE intersects the Fortescue Marsh.

Groundwater levels in the RDE near Weeli Wolli Creek are elevated above baseline levels due to third party impacts. A number of surrounding mining operations discharge excess water to Weeli Wolli Creek upstream of the RDE. Excess water discharged to the creek is allowed to infiltrate and recharge the underlying aquifers, causing elevated groundwater levels across the Nyidinghu area. The groundwater direction typically flows towards the Fortescue Marsh.

A substantial reservoir of brackish to hypersaline water exists beneath the Fortescue Valley. This water is understood to accumulate below the Fortescue Marsh, subsiding under its own density, flowing down and out towards the edges of the Fortescue Valley. Deep fractured rock flows, driven from recharge in the highlands of the Hamersley and Chichester ranges through to the base of the Fortescue Valley, also accumulate salts in transit.

5.3.3 Potential Impacts, Management and Likely Environmental Outcome

The potential environmental impacts and application of the mitigation hierarchy is shown in Table 14.

Potential Environmental Impacts	Application of the Mitigation Hierarchy	Assessment of Residual Impact
 Installation of surface water infrastructure including bridges, culverts, drains and levees, as well as placement pipelines and other rail infrastructure may result in: Changes in surface water flows Changes to flood depths or flooding in areas that do not currently experience flooding Shadowing of flow 	Minimise A Surface Water Management Plan will be developed to manage impacts to surface water flows and quality. A Groundwater Management Plan will be developed to manage impacts to groundwater resources if water supply is via the construction of bores along the rail corridor. Groundwater abstraction will be managed in accordance with the RIWI Act and may require the development of a groundwater operating strategy.	There will likely be permanent changes to surface water flow as a result of implementing the Proposal. However, TPI is committed to maintaining flows to Fortescue Marsh from Weeli Wolli Creek and other catchments such that frequent flood events will continue to reach Fortescue Marsh. Groundwater drawdown will recover over time, although final groundwater levels are to some extent dependent on the actions of other proponents

Table 14: Inland Waters: Potential Environmental Impacts and Management

Potential Environmental Impacts	Application of the Mitigation Hierarchy	Assessment of Residual Impact
Potential Environmental Impacts • Change in creek flow velocity Groundwater drawdown from annual abstraction of groundwater for rail construction purposes with construction expected to last up to two years. Use and storage of hydrocarbons has the potential to contaminate surface water and groundwater.	Application of the Mitigation Hierarchy Mitigate Installation of surface water infrastructure within the rail corridor at river and creek crossings will ensure surface water hydrological regimes are adequately maintained within the Fortescue River catchment. Any impacts to significant vegetation such as vegetation representative of GDE and sheetflow dependent vegetation will be minimised where practicable. Detailed surface water flow assessments and baseline modelling will be conducted during detailed design. Rail culvert designs shall incorporate at least the 5% (1 in 20) AEP flood immunity. A higher design ARI may be adopted for major culvert crossings in cases where the waterways carry significant flows, typically where the 5% (1 in 20) AEP design flow is greater than 50m ³ /second. Where the 2% (1 in 50) AEP design flow is greater than 500m ³ /second, a bridge may be considered. The FMG rail drainage design will consider the existing BHP rail alignment, and the associated culverts and bridges. The pipelines will be buried at creek crossings where practicable to maintain hydrological regimes. In accordance with the Fortescue Chemical and Hudragerbor	Assessment of Residual Impact within the Weeli Wolli Catchment area.
	Chemical and Hydrocarbon Management Plan (100-PL-EN-0011) and Environmental Spill Response Procedure (IO-PR-EN-0003), chemicals and hydrocarbons to be stored and contained appropriately sized bunded facilities. Spill kits will be provided and maintained in all areas where hydrocarbons and chemicals are stored or used	
	Rehabilitate	
	Disturbed areas are rehabilitated to reinstate the surface water flows where possible.	

TPI consider that the Proposal can be implemented to meet the EPA's objectives for Inland Waters.

5.4 Social Surroundings

5.4.1 EPA Objective, Policy and Guidance

The EPA Objective for Social Surroundings is "*to protect social surroundings from significant harm*" (EPA, 2016h). Policy and guidance considered as part of this Factor include:

- Statement of Environmental Principles, Factors and Objectives (EPA, 2021).
- Environmental Factor Guideline Social Surroundings (EPA, 2016h)

5.4.2 Receiving Environment

5.4.2.1 Aboriginal Heritage

A search of the Aboriginal Heritage Inquiry System identifies no known registered aboriginal heritage places located within the RDE. Four 'Other' heritage places are also known from within the RDE. A summary of these aboriginal heritage values is provided in Table 15. Ethnographic and archaeological surveys over the RDE are ongoing.

ID	Name	Status	Туре
15272	Roy Hill 01/97	Lodged	Artefacts / Scatter, Rockshelter
34824	KD11005	Lodged	Artefacts / Scatter
38539	MA12-001	Lodged	Artefacts / Scatter
38543	MA12-002	Lodged	Artefacts / Scatter

 Table 15:
 Summary of aboriginal heritage values listed with DPLH

The RDE intersects with three native title determination areas, these being the Nyiyaparli and Nyiyaparli #3 (WCD2018/008), Banjima People (WCD2014/001) and Palyku Part A (WCD2019/002) Native Title Determinations. Consultation has commenced with all three groups. Social surroundings values are in the process of being identified with the Nyiyaparli People. Social surroundings values have not yet been identified with the Banjima and Palyku People.

TPI through Fortescue has commenced consultation with the Nyiyaparli people regarding the social surroundings values within and surrounding the RDE. This consultation will continue throughout the life of the Proposal. To date, the following values have been identified as being of importance to the Nyiyaparli People:

- Water, including surface and groundwater quality, quantity and flows. TPI understands the importance of water to the Nyiyaparli People and their custodianship of the water as it flows through their Country.
- Weeli Wolli Creek has very high spiritual and recreational value to the Nyiyaparli People. There are many places along the creek of traditional and contemporary importance to the Nyiyaparli People.

- Pintakarli Law Ground and Pirntakarli Marnta mythological site have very significant cultural value to the Nyiyaparli People. While Pintakarli Law Ground and Pirntakarli Marnta are located outside of the RDE, it is recognised that these are important places within the surrounding area.
- Continued access to important places for cultural and recreational purposes, including camping, hunting, fishing and ceremonial uses.
- Native plants and animals that have significance to the Nyiyaparli People for bush tucker or medicinal purposes.
- Fortescue Marsh.
- Amenity and aesthetics of the area.
- Intrinsic value of the land linked to 'Healthy Country'.

Consultation is planned to commence with both Banjima and Palyku People on social surroundings values within and surrounding the RDE. A Social Cultural Heritage Management Plan (SCHMP) will be developed in consultation with each group to manage potential impacts to these values.

5.4.2.2 Historic Heritage

A search of the InHerit database identified one heritage place listed under the Shire of East Pilbara. This relates to the Railway Line from Port Hedland to Newman (place number 14240) noted for its historic, scientific and social significance for the East Pilbara region. This heritage place is located adjacent to the proposed East Hamersley Railway alignment.

There are no heritage places listed under the Heritage Council State Register within the RDE or within proximity to the RDE.

There are no heritage places listed under the National Heritage List within the RDE or within proximity to the RDE. The Fortescue Marshes is identified as an indicative place on the Register of the National Estate; however, a formal nomination has not been made for assessment of the Fortescue Marshes.

5.4.2.3 Other Social Surroundings Values

The proposed East Hamersley Railway is located across three pastoral leases: Marillana, Mulga Downs and Hillside. TPI understand that BHP are the pastoral lease owners of Marillana Pastoral Lease and that the Lease has been sub-let to the Nyiyaparli People. In discussions with the Nyiyaparli People, it is understood that they wish for the Station to remain profitable, with cattle continuing to be grazed during operations and post-mining.

5.4.3 Potential Impacts, Management and Likely Environmental Outcome

The potential environmental impacts and application of the mitigation hierarchy is shown in Table 16.

Potential Environmental	Application of the Mitigation	Assessment of Residual Impact
 Potential Environmental Impacts Implementation of the Proposal has the potential to impact on the social surroundings values of the area: Changes to water quality and water flows through the area. Restricted access to some areas for safety reasons. Increased levels of dust due to construction activities affecting amenity or vegetation health. Increased levels of noise and vibration resulting from machinery or heavy vehicles or locomotives. Changes to visual amenity from some vantage points. Impacts to the abundance of animals in some areas. Loss of some plants with traditional uses. Loss of hunting areas or other areas used for traditional purposes. Loss of flora species of cultural value. Impact to pastoral station activities, such as loss of bores or grazing areas or modified access. 	Application of the Mitigation Hierarchy Avoid Undertake social surroundings consultation with Banjima and Palyku People to understand cultural values. Avoid cultural heritage values where possible to do so. Minimise Other than an access road and rail crossing, disturbance within the low flow channel of Weeli Wolli Creek will be kept to a minimum. A Nyiyaparli Social Cultural Heritage Management Plan will be developed to manage social cultural values. A Banjima Social Cultural Heritage Management Plan will be developed to manage social cultural values. A Palyku Social Cultural Heritage Management Plan will be developed to manage social cultural values. Dust and noise will be managed in accordance with standard mine management practices. Important social, cultural and heritage values will be considered in the design of the Proposal. Mitigate Fortescue will discuss with the Nyiyaparli, Banjima and Palyku People what actions could be implemented to reduce impacts to visual amenity. Fortescue commit to maintaining pastoral bores. Where pastoral bores are removed, they will be replaced. Rehabilitate Rehabilitation activities will consider the final land use. The Nyiyaparli have	Assessment of Residual Impact Avoidance of known places of cultural heritage significance will ensure that there are no significant direct impacts to their natural environment or cultural value. Water quality and flow regime within Weeli Wolli Creek will be maintained as far as practicable given the third-party discharge activities occurring upstream. Water quality and flow regime will be maintained in other culturally important water sources where identified. The maintenance or re-establishment of access to important places will ensure that traditional and contemporary uses can continue. Impacts to the amenity of important places from dust, noise vibration and visual impacts will be managed to ensure they remain places where Traditional Owners can visit and enjoy the natural environment. The proposal can be managed so that operations of Marillana, Mulga Downs and Hillside Pastoral Stations will not be significantly impacted.
modified access.	Rehabilitate Rehabilitation activities will consider the final land use. The Nyiyaparli have expressed an interest in returning plants and animals with traditional or contemporary cultural value through mine closure activities. Post-closure land uses will be discussed with Banjima and Palyku People as part of ongoing social surroundings consultation.	

Table 16: Social Surroundings: Potential Environmental Impacts and Management

TPI consider that the Proposal can be implemented to meet the EPA's objectives for Social Surroundings.

5.5 Greenhouse Gas Emissions

5.5.1 EPA Objective, Policy and Guidance

The EPA Objective for Greenhouse Gas Emissions is "*to reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change*" (EPA, 2020a). Policy and guidance considered as part of this Factor include:

- Statement of Environmental Principles, Factors and Objectives (EPA, 2021).
- Environmental Factor Guideline Greenhouse Gas Emissions (EPA, 2020a)

5.5.2 Receiving Environment

Greenhouse gas emissions contribute to a changing climate on a global scale. The effects of the changing climate are predicted to be significant for Western Australia.

Greenhouse gas emissions resulting from the implementation of the Proposal have been estimated based on known values of existing Fortescue operations. Scope 1 emissions are estimated as approximately $56,252 \text{ tCO}_{2-e}$ per annum during construction and $86,835 \text{ t CO}_{2-e}$ per annum during operations. Soil carbon has been excluded from the clearing estimations in the FullCAM software used to estimate emissions from clearing, due to topsoil being removed and stored for future rehabilitation therefore the soil carbon is assumed to be maintained and not released as an emission.

Power for operations will be sourced from the existing Pilbara Energy Connect (PEC) integrated network for Fortescue operations. The Proposal will include the operation of ammonia fuelled/battery operated locomotives and will have net zero emissions from the train fleet.

There will be emissions during, clearing, construction and bulk earthworks for the railway from diesel use in heavy earthmoving equipment such as bulldozers, excavators and trucks and emission from diesel fuelled generator sets for power generation.

Fortescue's publicly stated commitment is for its operations to be net-zero by 2030 and intends to minimise its use of carbon offsets to achieve this. However, Fortescue are actively seeking to accelerate decarbonisation, including converting stationary power to 100% renewable sources.

Temporary diesel fuelled generators will be used during the construction and early operations phases before switching to renewable energy such as solar, and power will be sourced from Fortescue's integrated transmission line network during rail operations.

5.5.3 Potential Impacts, Management and Likely Environmental Outcome

The potential environmental impacts and application of the mitigation hierarchy is shown in Table 17.

Potential Environmental Impacts	Application of the Mitigation Hierarchy	Assessment of Residual Impact
 The Proposal has the potential to contribute to Greenhouse Gas Emissions through: Emissions associated with vegetation clearing and Proposal construction Combustion of fossil fuels for the operation of plant machinery and mining vehicles and blasting. Combustion of fossil fuels (diesel fuel) for electricity generation in the form of mobile generators 	Avoid Fortescue will reticulate power to Nyidinghu. The source of this electricity will come from a mix of renewable and gas fired power stations. Minimise During construction, some on site diesel fired power generation will be necessary. The use of fossil fuels for the operation of the Proposal will be continually monitored. Opportunities to reduce and/or optimise use will be explored on an on-going basis as new technologies become available. Mitigate Fortescue purchases Australian Carbon Credit Units (ACCUs) where necessary to meet its obligations under the National Greenhouse and Energy Reporting Act 2007 (NGER Act).	Fortescue is at the forefront of decarbonising the mining industry with publicly stated goals of becoming carbon-neutral by 2030. Technology being utilised for the ongoing operation of the locomotives will have net zero emissions during operation of the Railway.

Table 17: Greenhouse Gas Emissions: Potential Environmental Impacts and Management

TPI consider that the Proposal can be implemented to meet the EPA's objectives for Greenhouse Gas Emissions.

6 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

The Proposal will be referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for potential impacts to matters of national environmental significance (MNES). The EPBC Act is administered by the DCCEEW and provides a legal framework for the protection and management of nationally and internationally important flora, fauna, ecological communities, and heritage places, which are referred to as Matters of National Environmental Significance (MNES). Specifically, the EPBC Act protects the following nine MNES:

- World heritage properties.
- National heritage places.
- Wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed).
- Nationally threatened species and ecological communities.
- Migratory species.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mining).
- A water resource, in relation to coal seam gas development and large coal mining development.

Pursuant to the EPBC Act, any proposed action that has or is likely to have a significant impact on a MNES requires approval from the Commonwealth Minister for the Environment.

6.1 Policy and Guidance

TPI has considered relevant policy and guidance in the design of the Proposal and assessment of environmental impacts. Key policies and guidance relevant to the Proposal include:

- Environment Protection and Biodiversity Conservation Act 1999
- Department of Climate Change, Energy, the Environment and Water, 2013, Significant Impact Guidelines 1.1 Matters of National Environmental Significance.
- Guidelines for EPBC Act listed species, and associated Species Profile and Threats (SPRAT).

6.2 Proposal Surveys

Flora, vegetation, and terrestrial fauna surveys have been undertaken across the RDE. These surveys have included targeted searches for key MNES species. No Commonwealth TECs have been identified to occur with the RDE. Eight species listed under the EPBC Act have been recorded from the RDE during recent and historic fauna surveys:

- Ghost Bat (Macroderma gigas, Vulnerable).
- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*, Vulnerable).
- Greater Bilby (*Macrotis lagotis*, Vulnerable).
- Pilbara Olive Python (Liasis olivaceus barroni, Vulnerable).
- Grey Falcon (Falco hypoleucos, Vulnerable).
- Australian Painted Snipe (*Rostratula australis*, Endangered).
- Eastern Osprey (*Pandion haliaetus*, Migratory and Marine).
- Pacific Swift (Apus pacificus, Migratory and Marine).

A further two species listed under the EPBC Act have a high likelihood of occurrence with suitable habitat in the RDE:

- Night Parrot (*Pezoporus occidentalise*, Endangered).
- Northern Quoll (Dasyurus hallucatus, Endangered).
- Ten species of migratory birds.

6.3 Controlling Provisions

The Proposal will be referred to the DCCEEW under the EPBC Act for potential impacts to listed threatened species and habitats. If the Proposal is deemed a Controlled Action, TPI will consult with the EPA and DCCEEW on the appropriate assessment pathway with an accredited assessment preferred.

7 HOLISTIC IMPACT ASSESSMENT

Given the interconnections between environmental factors, the following section presents a description of these interactions to inform a holistic view of potential impacts to the whole environment. Potential impacts from the proposed activities may interact with multiple environmental factors, including:

- Removal of vegetation: Vegetation is an integral part of the ecology of an area, providing habitat for terrestrial vertebrate and invertebrate fauna. Removal of vegetation also influences fauna habitat availability. Disturbed areas are also more likely to promote the introduction of weeds, which in turn can change the susceptibility of the environment to fire and alter fauna habitats. Disturbed areas can also provide corridors for feral animals, leading to increased predation risk for native fauna. Vegetation has important ethnobotanical values for medicinal and food plants. Removal of vegetation may also alter the visual amenity of the environment. Vegetation is a carbon sink, capturing greenhouse gases from the atmosphere and the removal of vegetation results in greenhouse gas emissions.
- Changes in surface water flow regimes: Changes in surface water flow may result in changes in the health of vegetation within riparian ecosystems or in mulga communities that are sheet flow dependent. This in turn may impact the habitat quality for important conservation or culturally significant flora species, or reduce the productivity of the area as terrestrial habitat. Particularly along creek lines which may provide habitat for conservation significant fauna. These changes in vegetation health may make the area more prone to erosion or allow for more competition by weed species, which as described above, can impact on the vegetation's susceptibility to fire.

A holistic view of the potential impacts and interactions between the key environmental factors are shown diagrammatically in Schematic Map 1.

8 CUMULATIVE IMPACT ASSESSMENT

The East Hamersley Railway Project occurs adjacent to the BHP rail corridor for the majority of the alignment and crosses the Fortescue Marsh at its mid-way point. The area where the rail corridor crosses the Fortescue Marsh is altered given the existing BHP rail crossing but the envelope includes a number of priority flora species and significant vegetation types within this area.

The rail corridor also crosses the Weeli Wolli Creek. The environment within the Weeli Wolli Catchment is already in an altered state, with large areas cleared for mining, as well as the large-scale dewatering that has occurred downstream for these projects starting from the mid-late 1990s. The environment of Weeli Wolli Creek has undergone significant changes to its ecohydrology. A permanent wetting front from surplus water discharge within Weeli Wolli Creek from proponents upstream has resulted in changes to the ecology of the creek.

The implementation of the East Hamersley Railway will place additional pressures on the environment, through vegetation clearing and changes to surface water flows. These cumulative impacts will be addressed through the assessment of the proposal. TPI will identify and utilise an appropriate boundary to complete the cumulative impact assessment and will attempt to determine the cumulative impacts to various environmental values, such as:

- Loss of vegetation and conservation significant flora.
- Changes to the hydrology of Weeli Wolli Creek and Fortescue Marsh.

TPI note that publicly available information from historical Public Environmental Reviews or environmental monitoring reports is somewhat limited and often not provided at a scale or format that is easily comparable. Some subjective information may be necessary to complete the cumulative impact assessment.

9 CONCLUSION

TPI understands that the proposed East Hamersley Railway Project, should it be approved and implemented, will have significant impact to the environment resulting from:

- Clearing of 4,837 ha of native vegetation.
- Clearing of 4,837 ha of fauna habitat.

It is expected that this Proposal will require formal environmental impact assessment and Public Environmental Review. With environmental management measures applied during the construction and operation of the East Hamersley Railway Project, the Project can be implemented to meet the EPA's objectives.

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