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ROY HILL IRON ORE PTY LTD

Roy Hill Iron Ore Pty Ltd

Roy Hill to Port Hedland Rail Line

Addendum to Environmental Referral Document

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Infrastructure & Environment

Level 7, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
WorleyParsons Services Pty Ltd
ABN 61 001 279 812

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ROY HILL IRON ORE PTY LTD

ROY HILL IRON ORE PTY LTD - ROY HILL TO PORT HEDLAND RAIL LINE

ADDENDUM TO ENVIRONMENTAL REFERRAL DOCUMENT

SYNOPSIS

This document provides further information on the southern-most 125km of the proposed Roy Hill to Port Hedland Rail Line project.

The entire 300km railway and associated infrastructure proposal was referred to the EPA for formal assessment on the 2nd October 2009.

The EPA Chairman subsequently requested that a workshop be held involving the EPA SU, RHIO and technical specialists from within government and consultants to identify the key environmental issues and risks associated with the southern-most 125km of the railway.

That workshop was held on 10 November 2009 and the outcomes are detailed within this addendum. The overall conclusion from the workshop was that all identified environmental issues can largely be managed by using avoidance when selecting the final alignment within the corridor and the use of good engineering in the detailed design. Any residual risks can be managed through actions taken under management plans that will minimize the environmental impacts.

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CONTENTS

1.	INTRODUCTION	5
1.1	Referral Progress.....	5
2.	RISK ASSESSMENT	8
3.	KEY ENVIRONMENTAL ASPECTS.....	16
3.1	Habitats.....	19
3.1.1	Permanent Spring.....	19
3.1.2	Wona Land System.....	22
3.2	Flora and Vegetation	25
3.2.1	Declared Rare Flora (DRF).....	25
3.2.2	Potential Conservation Significant Floristic Communities	25
3.2.3	Mulga	25
3.3	Vertebrate Fauna.....	26
3.3.1	Bilby (<i>Macrotis lagotis</i>).....	27
3.3.2	Mulgara (<i>Dasyercus cristicauda</i> , <i>D. blythi</i> , <i>D. hillieri</i>).....	27
3.3.3	Ghost bat (<i>Macroderma gigas</i>)	28
3.3.4	Pilbara Leaf-nosed Bat (<i>Rhinonicteris aurantius</i>).....	28
3.3.5	Star Finch (western race) (<i>Neochima ruficauda</i> subsp. <i>Subclarescens</i>)	28
3.3.6	Northern Quoll (<i>Dasyurus hallucatus</i>).....	29
3.4	Short Range Endemic Species (SREs)	29
3.5	Stygofauna and Troglifauna	29
4.	COMMITMENTS.....	30
5.	CONCLUSIONS AND RECOMMENDATIONS	32
6.	REFERENCES	33

List of Figures

Figure 1 – Location of the southern section of the Roy Hill to Port Hedland rail line.....	6
Figure 2 – Land Systems within 15km either side of centre line and construction disturbance	18
Figure 3 – Permanent spring identified in the southern section of the corridor	20
Figure 4 – Permanent spring identified in the southern section (source: APM 2009)	21
Figure 5 – Permanent spring identified in the southern section (source: APM 2009)	21
Figure 6 – Wona land system within the Pilbara region.....	23
Figure 7 – Locations where the rail line intersects the Wona land system.....	24

List of Tables

Table 1 – Risk matrix.....	9
Table 2 – Results of risk assessment	10
Table 3 – Land systems and levels of associated construction disturbance	16
Table 4 – Conservation significant fauna potentially occurring in the rail corridor.....	26
Table 5 – RHIO environmental management commitments.....	30

Appendices

APPENDIX 1 – MEETING MINUTES

APPENDIX 2 - SUMMARY OF RELEVANT EXPERIENCE

1. INTRODUCTION

Roy Hill Iron Ore Pty Ltd is proposing to construct a 300km railway and associated infrastructure to transport iron ore from its proposed Roy Hill 1 mine to a port infrastructure facility near to Port Hedland as part of the Roy Hill 1 Iron Ore project. On 2 October 2009 the railway and associated infrastructure project was referred to the Environmental Protection Authority (EPA) for assessment under Section 38 of the *Environmental Protection Act 1986*. The referral recommended that the rail project be assessed at an "Assessment on Referral Information (ARI)" level of assessment. The mine and port facilities are the subject of separate referrals.

The EPA convened a meeting with RHIO and relevant technical experts to provide further information on the southern-most 125km ('southern section') of the proposed railway. This addendum provides the summary and commitments requested by the EPA SU at the end of the meeting.

1.1 Referral Progress

In reviewing the October referral the EPA identified that there was limited field data along the 125km section of the rail corridor from the Roy Hill 1 mine to Coon Siding. The extent of this southern section is shown in Figure 1. The remaining section of the proposed rail corridor was considered to be adequately characterised as the nearby environment had been previously surveyed for other railway corridors (e.g. for BHP Billiton, Fortescue Metals Group and Hope Downs railways).

At the request of the EPA Chairman, a workshop was held on Tuesday, 10 November 2009 at the EPA offices to:

- Discuss the likely impacts to key environmental aspects (such as flora, fauna and land systems) identified on a risk basis by specialist botanists and zoologists who have experience in the Pilbara region and specifically in the environment where the southern section of the railway is proposed to be located;
- Discuss the management measures that could be taken to address the inherent (unmitigated) risks of the railway on the key environmental aspects; and
- Confirm that all issues can be addressed such that construction and operation of the railway would pose a low risk to the environment.

At the workshop HPPL provided a short briefing on the Roy Hill project as a whole, WorleyParsons described the multi-criteria analysis and the QANTM methodology used to select the preferred rail corridor. Animal Plant Mineral presented an overview of the field reconnaissance survey completed by the company along the rail corridor section;

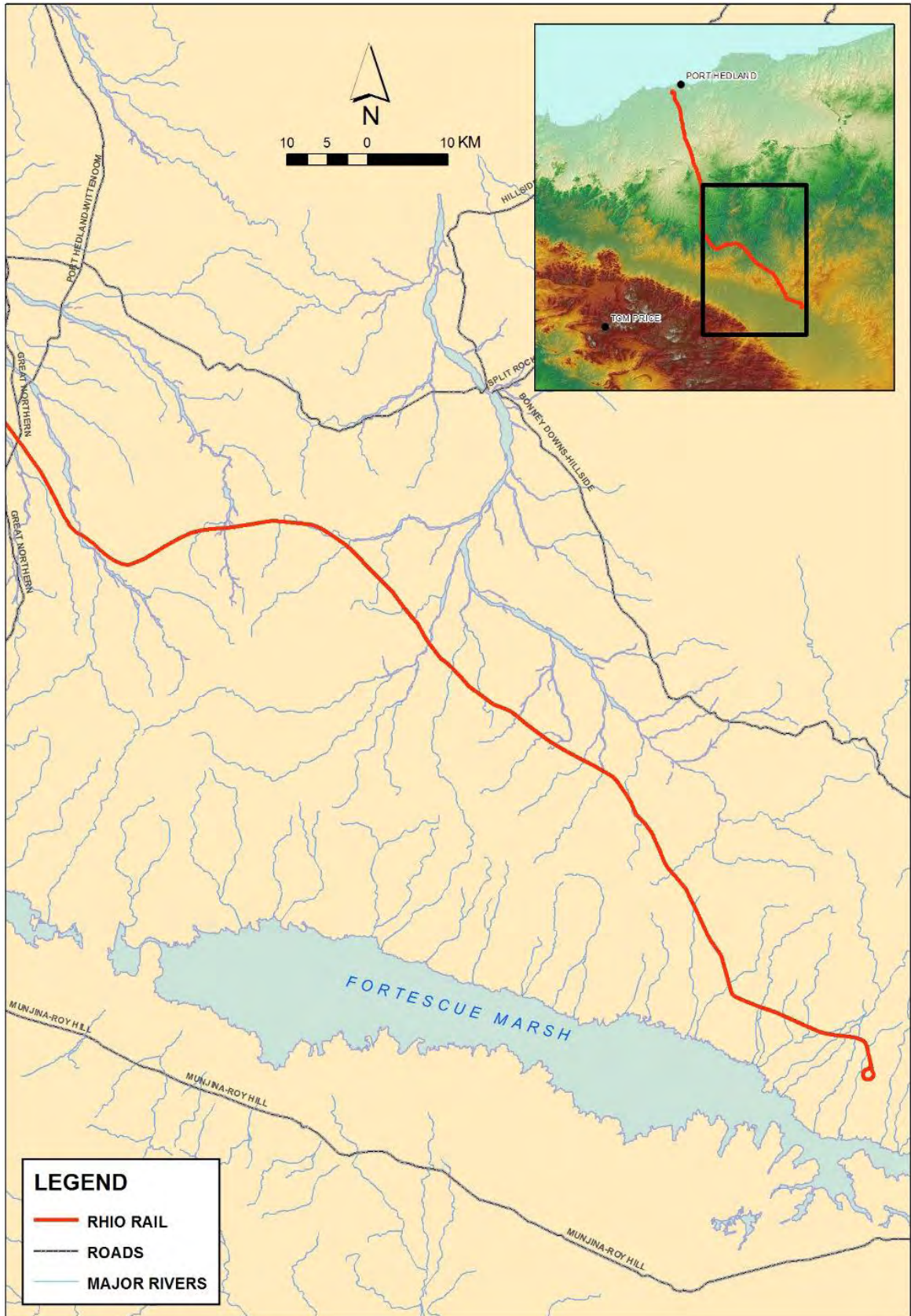


Figure 1 – Location of the southern section of the Roy Hill to Port Hedland rail line

The workshop was chaired by the EPASU, with representatives of the following organisations participating in the workshop:

- Roy Hill Iron Ore Pty Ltd (RHIO)
- Environmental Protection Authority Service Unit (EPASU)
- Department of Environment and Conservation Environmental Management Branch
- WorleyParsons Services Pty Ltd
- Ecologia Environment
- Terrestrial Ecosystems
- Ecoscape
- ENV Australia
- EM Matiske and Associates
- Animal Plant Mineral (APM)

The minutes of the workshop are presented in Appendix 1. A summary of the relevant experience of each botanist and zoologist attending the workshop is presented in Appendix 2.

The key outcomes of the workshop are summarised below:

- a permanent spring that was identified during the reconnaissance survey must be avoided by adjusting the rail alignment because it presented a suitable habitat for a range of flora and fauna species;
- the Wona land system should be avoided wherever possible by adjusting the rail alignment. Where this is not possible, careful management will be required;
- vertebrate fauna capture and release programs targeting species such as Northern Quoll (*Dasyurus hallucatus*) and Mulgara (*Dasyercus cristicauda*, *D. blythi*, *D. hillieri*) should be undertaken immediately prior to construction of the railway;
- roosting sites for bats to be avoided by adjusting the rail alignment;
- by avoiding the permanent spring impacts to the star finch will be avoided;
- operational and construction management plans should be developed for feral fauna, waste, weeds and fire.

The EPASU requested that RHIO collate the information presented during the workshop into an addendum to the referral documentation. The addendum would summarise the risk assessment process used to identify the key environmental aspects for the southern section of the railway, the workshop outcomes and describe the proposed management actions by RHIO to address those issues.

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2. RISK ASSESSMENT

Prior to the workshop a risk assessment was conducted by the private sector botanists and zoologists mentioned above to identify the key environmental aspects for the southern section of the railway.

The risk matrix used to complete the assessment is presented as Table 1. The results of the risk assessment are presented in Table 2.

A limited number of environmental aspects were identified as having a high inherent (unmitigated) risk which required consideration during the workshop. These were:

- Habitats
 - Permanent spring at 7545460N, 765983E
 - Wona land system and cracking clays
- Flora and Vegetation
 - Rare (DRF) flora
 - Potential conservation significant floristic communities
 - Mulga dominated vegetation communities
- Vertebrate Fauna
 - Bilby (*Macrotis lagotis*)
 - Mulgara (*Dasyercus cristicauda*, *D. blythi*, *D. hillieri*)
 - Ghost bat (*Macroderma gigas*)
 - Pilbara Leaf-nosed Bat (*Rhinonictoris aurantius*)
 - Star Finch (western Race) (*Neochima ruficauda* subsp. *Subclarescens*)

Although the Northern Quoll (*Dasyurus hallucatus*) was not identified as having a high inherent risk (due to wide spread habitat throughout the Pilbara and low disturbance to habitat from the railway) the species was included during the workshop as a key environmental aspect because it is listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act, 1999*.

Table 1 – Risk matrix

Risk Assessment Rating		LIKELIHOOD				
		5: Almost Certain Is expected to occur in most circumstance	4: Likely Will probably occur in most circumstance	3: Possible Could occur	2: Unlikely Could occur but not expected	1: Rare Occurs in exceptional circumstances
CONSEQUENCES	5: Catastrophic Significant impact (loss of population) to taxa or feature of conservation significance or regional biodiversity	25	20	15	10	5
	4: Major Permanent impact (reduction in population size or extent) to taxa or feature of conservation significance in project area.	20	16	12	8	4
	3: Moderate Longer term (>3yrs) localised impact to taxa or feature of conservation significance or biodiversity in project area.	15	12	9	6	3
	2: Minor Limited short term (<2yr) localised impact to taxa or feature of conservation significance or biodiversity.	10	8	6	4	2
	1: Insignificant No impact to taxa or feature of conservation significance or biodiversity.	5	4	3	2	1

11-25	High risk, specific management programmes required, advice/approval from regulators required.
6 – 10	Medium risk, specific management and procedures must be specified.
1 – 5	Low risk, managed by routine procedures.

Table 2 – Results of risk assessment

Risk Issue (Taxa or feature of conservation /environmental significance)	Event or Action	Impact	Inherent Risk			Controls	Residual Risk		
			Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level
Flora and Vegetation									
Rare (DRF) Flora	Land Clearing, clearing of Rare Flora	Loss or decrease in extent and range of DRF species	4	3	12	Pre-construction corridor survey, amend alignment footprint within corridor to avoid impact on DRF populations, minimise clearing. Clearing boundaries to be clearly defined. Unlikely for DRF to be present	2	3	6
Priority Listed Flora (P1 - <i>Eremophila pilosa</i> ; P2 - <i>Gonocarpus ephemerus</i> , <i>Stylidium weeliwoilli</i> , <i>Euphorbia clementii</i>)	Land Clearing	Loss or decrease in extent and range of Priority 1 and 2 listed species	3	3	9	Pre-construction corridor survey, amend alignment footprint to avoid populations, minimise clearing. Clearing boundaries to be clearly defined.	2	2	4
<i>Acacia levata</i>	Potential Direct Impact	Could occur especially on sand or sandy loam over granite on hill slopes.	2	3	6	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined.	2	2	4
<i>Acacia leeuweniana</i>	Potential Direct Impact	Could occur especially on gritty, skeletal red-grey sandy loam, light orange- brown gravelly sand, granite. In rock fissures in outcrops, among boulders.	2	3	6	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined.	2	2	4
<i>Bulbostylis burbidgeae</i>	Potential Direct Impact	Could occur especially on granitic soils. May occur on granite outcrops, cliff bases.	2	3	6	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined.	2	3	6
<i>Eremophila forrestii</i> subsp. <i>viridis</i>	Potential Direct Impact	Unlikely this species will occur.	1	3	3	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined.	1	3	3

Risk Issue (Taxa or feature of conservation /environmental significance)	Event or Action	Impact	Inherent Risk			Controls	Residual Risk		
			Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level
<i>Eremophila spongiocarpa</i>	Potential Direct Impact	Could occur especially on weakly saline alluvial plain on margins of marsh.	2	3	6	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined.	2	3	6
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	Potential Direct Impact	Could occur especially on flats/plains, floodplains, sometimes semi-saline, clay flats.	2	3	6	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined. Avoid clay-flats and known locations	1	3	3
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	Potential Direct Impact	Could occur especially on red-brown clay soil, calcrete pebbles. Low undulating plain, swampy plains.	2	3	6	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined.	1	3	3
<i>Goodenia nuda</i>	Potential Direct Impact	Could occur especially on skeletal red-brown loams and clay. Flats/ plains and floodplains.	3	3	9	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined.	2	3	6
<i>Nicotiana heterantha</i>	Potential Direct Impact	Could occur especially on black clay. Seasonally wet flats.	2	3	6	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined.	1	3	3
<i>Peplidium</i> sp. Fortescue marsh (S. van Leeuwen 4865)	Potential Direct Impact	Unlikely this species will occur. Marshes and floodplains.	1	4	4	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined.	1	4	4
<i>Stylidium weeliwolli</i>	Potential Direct Impact	Could occur especially on gritty sand soil, sandy clay. Edge of watercourses.	2	4	8	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined. Avoid known areas and drainage lines near Weeli Wolli where possible.	2	2	4
<i>Tecticornia</i> sp. Christmas Creek	Potential Direct Impact	Unlikely this species will occur. Marshes and floodplains.	1	4	4	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined. Avoid fringes of Fortescue Marsh.	1	4	4

Risk Issue (Taxa or feature of conservation /environmental significance)	Event or Action	Impact	Inherent Risk			Controls	Residual Risk		
			Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level
<i>Tecticornia</i> sp. Roy Hill	Potential Direct Impact	Unlikely to occur. If present will often be found on red clayey sand. Flat floodways, lake beds, saline alluvial plains, drainage sumps.	1	4	4	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined. Avoid fringes of Fortescue Marsh.	1	4	4
Potential conservation significant floristic communities	Land Clearing	loss or decrease in extent and range of community	4	5	20	Pre-construction corridor survey, amend alignment footprint to avoid conservation significant floristic communities, minimise clearing. Clearing boundaries to be clearly defined.	2	3	6
Mulga dominated vegetation communities	interruption to surface water flows	community stress or death due to alteration to surface water regime	4	4	16	In vicinity of Mulga dominated communities ensure culverts are appropriately located and aligned on rail line and access roads to ensure surface water flows are maintained	2	2	4
Priority Ecological Communities (PEC) - Wona Land System	Land Clearing	loss or decrease in extent	5	2	10	Pre-construction corridor survey, amend alignment footprint to avoid PEC, minimise clearing wherever possible	4	2	8
Fortescue Marshes	Indirect Impacts from Construction of Railway Line and interference of drainage	Alteration of flows into system	2	2	4	Engineering design to minimize changes in local flows	2	1	2
Vertebrate Fauna									
<i>Bilby (Macrotis lagotis)</i>	Clearing of vegetation	Loss of localised population or a few individuals	4	4	16	Search of all habitat suitable for Bilbies in the couple of weeks before clearing and translocate individuals in the cleared area.	1	4	4
Mulgara (<i>Dasycercus cristicauda</i> , <i>D. blythi</i> , <i>D. hillieri</i>)	Clearing of vegetation	Death of a localised population or significant number of individuals	5	3	15	Trap all suitable habitat for Mulgara in the couple of weeks before clearing and translocate individuals in the cleared area.	2	3	6

Risk Issue (Taxa or feature of conservation /environmental significance)	Event or Action	Impact	Inherent Risk			Controls	Residual Risk		
			Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level
Spectacled Hare-wallaby (<i>Lagorchestes conspicillatus</i>)	Clearing of vegetation	Death of a localised population or significant number of individuals	3	3	9	Search all suitable areas for the Spectacled Hare-wallaby prior to finalising the exact location of the rail line. Shift rail line to minimise disturbance.	2	3	6
<i>Macroderma gigas</i> Ghost Bat	Clearing of fauna habitat	Loss of habitat (roost and maternity caves)	3	4	12	No management required. Impacts not likely, alignment will not traverse suitable habitat	1	4	4
<i>Rhinonicteris aurantius</i> Pilbara Leaf-nosed Bat	Clearing of fauna habitat	Loss of habitat (roost and maternity caves)	3	4	12	No management required. Impacts not likely, alignment will not traverse suitable habitat	1	4	4
<i>Pseudomys chapmani</i> Western Pebble-mound Mouse	Clearing of fauna habitat	Loss of family groups in burrow systems	3	2	6	Minimise clearing. Trap and translocate prior to disturbance	4	2	8
<i>Falco hypoleucus</i> Grey Falcon	Clearing of fauna habitat	Disturbance to predating individuals	2	1	2	No management required. Impacts not likely	2	1	2
<i>Dasyurus hallucatus</i> Northern Quoll	Clearing of fauna habitat	Loss of habitat and possible death of individuals	3	2	6	Minimise clearing in suitable habitat. Move rather than destroy all large hollow logs that are temporary refuges, clear and soft translocate individuals prior to disturbance	2	2	4
<i>Liasis olivaceus barroni</i> Pilbara Olive Python	Clearing of fauna habitat	Impact to individuals during construction and maintenance	4	2	8	Educated clearing contractors. Olive Pythons are large, easy to spot and easy to avoid	2	2	4
<i>Leggadina lakedownensis</i> Lakeland Downs Mouse	Clearing of fauna habitat	Loss of individuals	5	2	10	Minimise clearing in suitable habitat and soft translocate individuals prior to disturbance	3	2	6
<i>Neochima ruficauda subsp. subclarescens</i> Star Finch (Western Race)	Clearing of fauna habitat	Disturbance to specific habitat required by this species	5	4	20	Avoid the permanent spring at 7545460S, 765983E	2	2	4
<i>Coreoica gutturalis subsp. gutturalis</i> Crested Bellbird (Southern race)	Clearing of fauna habitat	Disturbance to individuals	4	2	8	Minimise clearing	2	2	4
<i>Sminthopsis longicauda</i> Long-tailed Dunnart	Clearing of fauna habitat	Loss of individuals during clearing and construction	5	2	10	Minimise clearing	2	2	4

Risk Issue (Taxa or feature of conservation /environmental significance)	Event or Action	Impact	Inherent Risk			Controls	Residual Risk		
			Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level
Night Parrot (<i>Pezoporus occidentalis</i>)	Clearing of vegetation	Death of a nesting parrot or eggs	1	5	5	Minimise clearing	1	5	5
<i>Amytornis striatus subsp. striatus</i>	Clearing of fauna habitat	Loss of individuals during clearing and construction	3	2	6	Minimise clearing	2	2	4
<i>Ardeotis australis</i> Australian Bustard	Clearing of fauna habitat	Disturbance to individuals	3	1	3	No management required. Impacts not likely	3	1	3
<i>Burhinus grallarius</i> Bush Stone-curlew	Clearing of fauna habitat	Disturbance to individuals	3	1	3	No management required. Impacts not likely	3	1	3
<i>Falco peregrinus subsp macropus</i> Peregrine Falcon	Clearing of fauna habitat	Disturbance to predating individuals	3	1	3	No management required. Impacts not likely	3	1	3
<i>Ramphotyphlops ganei</i> Blind Snake	Clearing of fauna habitat	Loss of individuals	4	2	8	No possibility for management other than reduction of clearing footprint particularly around low stony hills	3	2	6
Migratory fauna	Habitat Removal, Breeding Habitat Impacts	Could occur but would mainly be a transitory visitor, especially where surface water is present.	2	2	4	Deviate formation alignment within 2km corridor, minimise clearing. Clearing boundaries to be clearly defined.	2	1	2
Permanent spring at 7545460S, 765983E	Clearing of fauna habitat	Loss of fauna habitat that is poorly represented	4	4	16	Deviate formation alignment within 2km corridor, Minimise clearing. Clearing boundaries to be clearly defined.	1	4	4
Invertebrate Fauna									
SRE	Clearing of fauna habitat	Loss of SRE populations or habitat	2	3	6	Pre-construction corridor survey, amend alignment footprint within corridor to avoid impact on SRE populations, minimise clearing. Clearing boundaries to be clearly defined.	2	2	4
Troglofauna	Excavation of troglofauna habitat	Reduction in troglofauna habitat and loss of individuals	2	3	6	Significant excavation unlikely, some cuttings will be required, unlikely to be deeper than 20- 25m or large volumes	2	3	6

Risk Issue (Taxa or feature of conservation /environmental significance)	Event or Action	Impact	Inherent Risk			Controls	Residual Risk		
			Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level
Stygofauna	Dewatering or groundwater extraction stygofauna habitat	Reduction in stygofauna habitat and loss of individuals	3	3	9	Pre-construction corridor survey, Low volumes of construction water required for short duration at any one location (3-4 months). Monitoring during extraction & modify pumping regime if impact may occur	2	2	4

3. KEY ENVIRONMENTAL ASPECTS

The key environmental aspects identified during the risk assessment and discussed during the workshop with the EPASU are discussed in Section 3.1 to 3.3. The southern section of the railway crosses 20 land systems as described in van Vreeswyk et al (2004).

Table 3 lists the extent of each of these land systems in the near vicinity to the rail corridor centre line and an estimate of the level of impact on each land system based on a construction disturbance width of 50m either side of the centre line. In only one case is this more than 1% and even that case is less than 2% disturbance.

Figure 2 shows the land systems within 15km either side of the rail centre line and the construction disturbance width 50m either side of the centre line (to scale). It illustrates that construction of the railway will have an insignificant impact on the land systems of the region.

Table 3 – Land systems and levels of associated construction disturbance

Land System Code	Land System	Habitat	Land System area within 15km either side of centre line (ha)	Land System area within construction disturbance - 50m either side of centre line (ha)	Construction disturbance on land system area within 15km either side of centre line
BGD	Boolgeeda Land System	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.	49.35	0	0%
BLK	Black Land System	Linear ridges of dolerite or basalt supporting hard spinifex grasslands, with unvegetated boulder slopes and rock piles along summits.	1871.20	9.09	0.5%
BNY	Bonney Land System	Low rounded hills and undulating stony plains supporting soft spinifex grasslands.	6875.82	42.20	0.6%
BOO	Boolaloo Land System	Granite hills, domes and tor fields and sandy plains with shrubby spinifex grasslands.	833.12	14.52	1.7%
CAL	Calcrete Land System	Low calcrete platforms and plains supporting shrubby hard spinifex grasslands.	401.45	0	0%
CWA	Cowra Land System	Plains fringing the Marsh land system and supporting snakewood and mulga shrublands with some halophytic undershrubs.	4750.14	0	0%
GRC	Granitic Land System	Rugged granitic hills supporting shrubby hard and soft spinifex grasslands.	54890.61	144.08	0.3%
JAM	Jamindie Land System	Stony hardpan plains and rises supporting groved mulga shrublands, occasionally with spinifex understorey.	12799.27	102.23	0.8%

Land System Code	Land System	Habitat	Land System area within 15km either side of centre line (ha)	Land System area within construction disturbance - 50m either side of centre line (ha)	Construction disturbance on land system area within 15km either side of centre line
MAC	Macroy Land System	Stony plains and occasional tor fields based on granite supporting hard and soft spinifex grasslands.	119722.55	475.04	0.4%
MCK	McKay Land System	Hills, ridges, plateaux remnants and breakaways of meta sedimentary and sedimentary rocks supporting hard spinifex grasslands.	36310.63	100.90	0.3%
MSH	Marsh Land System	Lakebeds and flood plains subject to regular inundation, supporting samphire shrublands, salt water couch grasslands and halophytic shrublands.	18234.86	0	0%
NEW	Newman Land System	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.	13222.23	26.86	0.2%
RIV	River Land System	Active flood plains, major rivers and banks supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands.	4569.35	2.58	0.1%
ROB	Robe Land System	Low plateaux, mesas and buttes of limonites supporting soft spinifex (and occasionally hard spinifex) grasslands.	3024.74	0	0%
ROC	Rocklea Land System	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands.	51518.40	117.29	0.2%
TLG	Talga Land System	Hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands.	14698.24	68.54	0.5%
TUR	Turee Land System	Stony alluvial plains with gilgaied and non-gilgaied surfaces supporting tussock grasslands and grassy shrublands of mulga and snakewood.	18769.43	126.41	0.7%
WAI	Warri Land System	Low calcrete platforms and plains supporting mulga and cassia shrublands and minor halophytic low shrublands.	675.06	0	0%
WHS	White Springs Land System	Stony gilgai plains supporting tussock grasslands and hard spinifex grasslands.	626.78	0	0%
WON	Wona Land System	Basalt upland gilgai plains supporting tussock grasslands and minor hard spinifex grasslands.	9073.61	21.05	0.2%

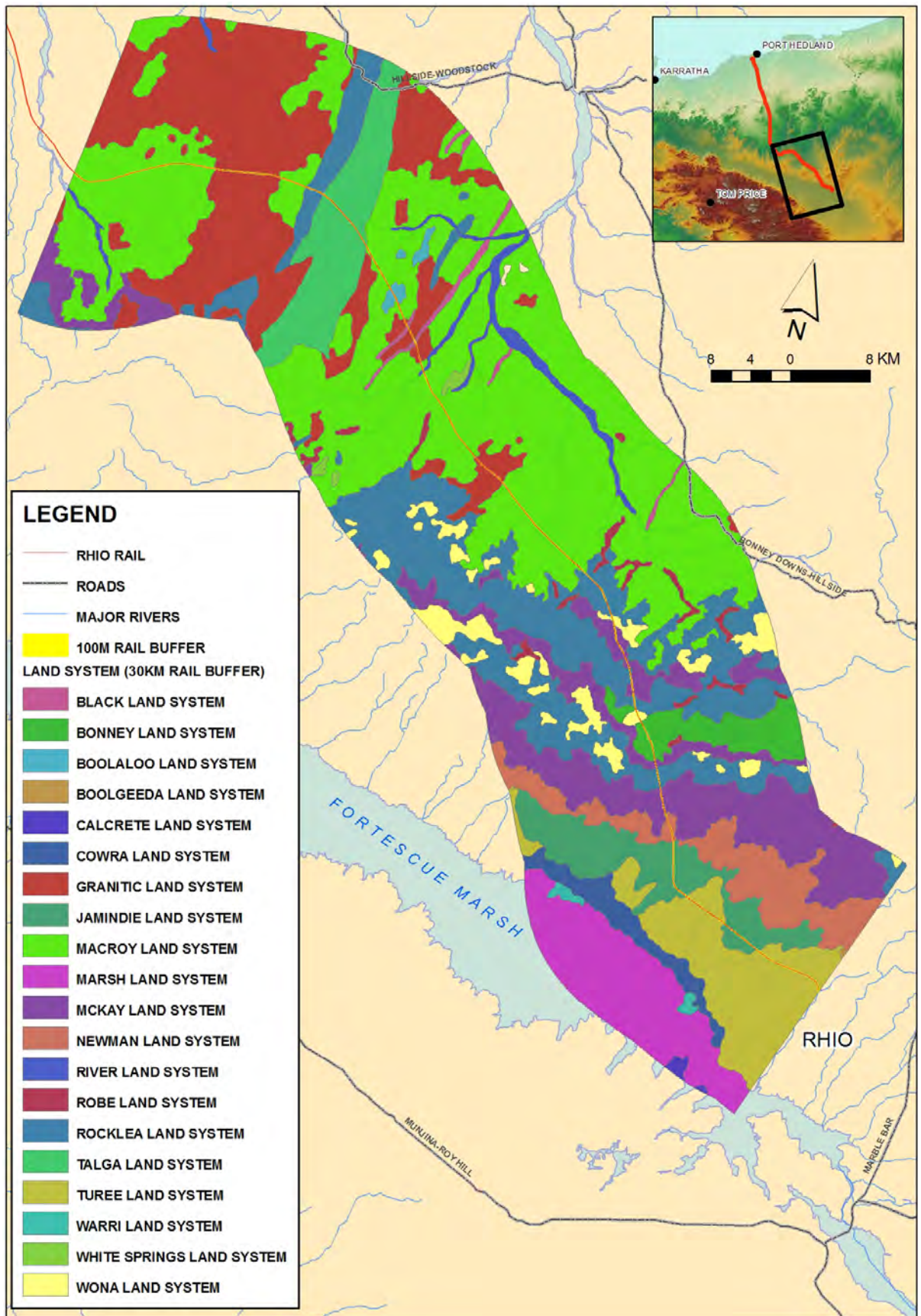


Figure 2 – Land Systems within 15km either side of centre line and construction disturbance

3.1 Habitats

The site reconnaissance survey by APM (2009) identified three key habitats that required consideration at the workshop (see Sections 3.1.1 and 3.1.2).

3.1.1 Permanent Spring

The reconnaissance survey identified a small permanent spring at 7545460S, 765983E (Figure 3) which offers habitat for a diverse range of species; see Figure 4 and Figure 5 below. The spring should be avoided as the loss of this spring would result in a loss of a limited habitat resource in the Pilbara.

The technical specialists at the meeting agreed that while the area could be probably crossed in a way that avoided any damage, avoidance was preferred. All participants agreed it would be best to avoid. The area to be protected is small enough that it can easily be avoided by a minor change to the rail alignment.

RHIO has committed to a rail realignment that will avoid the spring.



Figure 3 – Permanent spring identified in the southern section of the corridor



Figure 4 – Permanent spring identified in the southern section (source: APM 2009)



Figure 5 – Permanent spring identified in the southern section (source: APM 2009)

3.1.2 Wona Land System

The Wona land system is found in the Chichester Range; primarily at the western end, with scattered areas elsewhere (van Vreeswyk et al. 2004). The Wona land system is a resilient system but is considered a priority ecological community (PEC) due to grazing pressure. The system itself is a widespread system (Figure 6) which supports tussock grasses, annual grasses and herbs that are highly preferred by livestock and kangaroos. Tussock grasslands degrade to annual grasslands/herb fields if livestock grazing is poorly controlled and this has happened in many locations in the Pilbara.

The proposed rail route crosses two small areas of Wona land system (Figure 7). Engineering design within the Wona requires the removal of the clays and replacement with suitable fill. Drying of clays (to make them suitable for use as fill) would result in a larger disturbance footprint than other parts of the rail corridor due to the need for additional clearing to provide areas for drying. In the case where clays requiring drying prior to use are to be used, RHIO proposes to use existing borrow pits to minimise the disturbance footprint.

The cracking clays that are associated with the Wona land system support mixed tussock grassland on the low lying flat/plains and provide a fauna habitat. However, the area of this habitat likely to be disturbed by the railway is very small (refer Table 3 and Figure 6).

Construction of the railway will not significantly impact fauna assemblages associated with cracking clays due to the small disturbance footprint and management commitments to avoid or relocate significant fauna.

It was agreed at the specialist workshop that the impacts on the Wona land system and the cracking clays are manageable.

The following management actions will be used by RHIO to manage the construction impacts on the Wona land system and cracking clays:

- maintain as small a disturbance footprint as feasible;
- avoid significant flora and fauna assemblages using engineering design and avoidance;
- develop a weed management plan for construction and operation; and
- RHIO will use existing borrow pits wherever possible to dry clays to be used for construction purposes, reducing the requirement for additional clearing and disturbance to create drying areas.

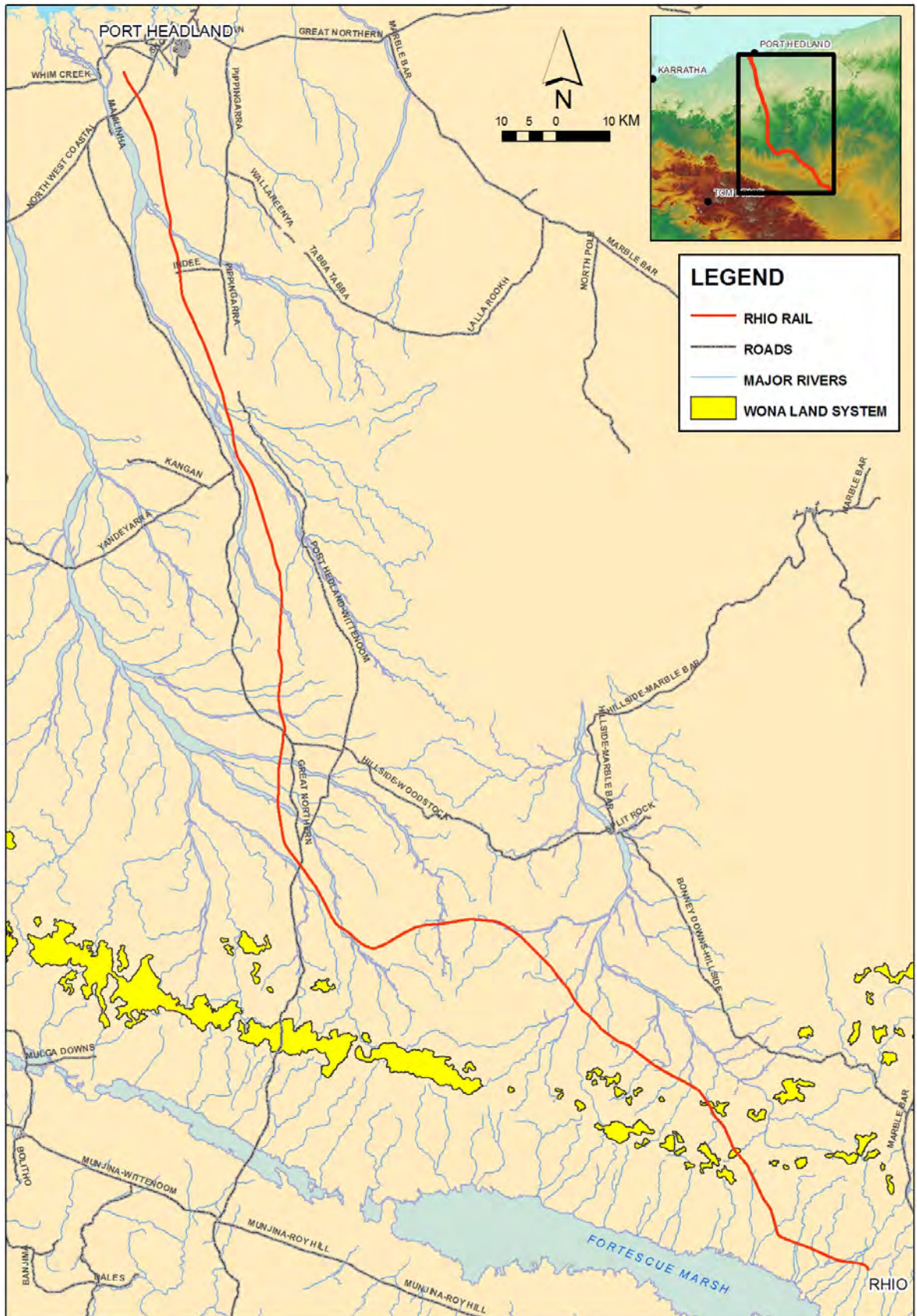


Figure 6 – Wona land system within the Pilbara region

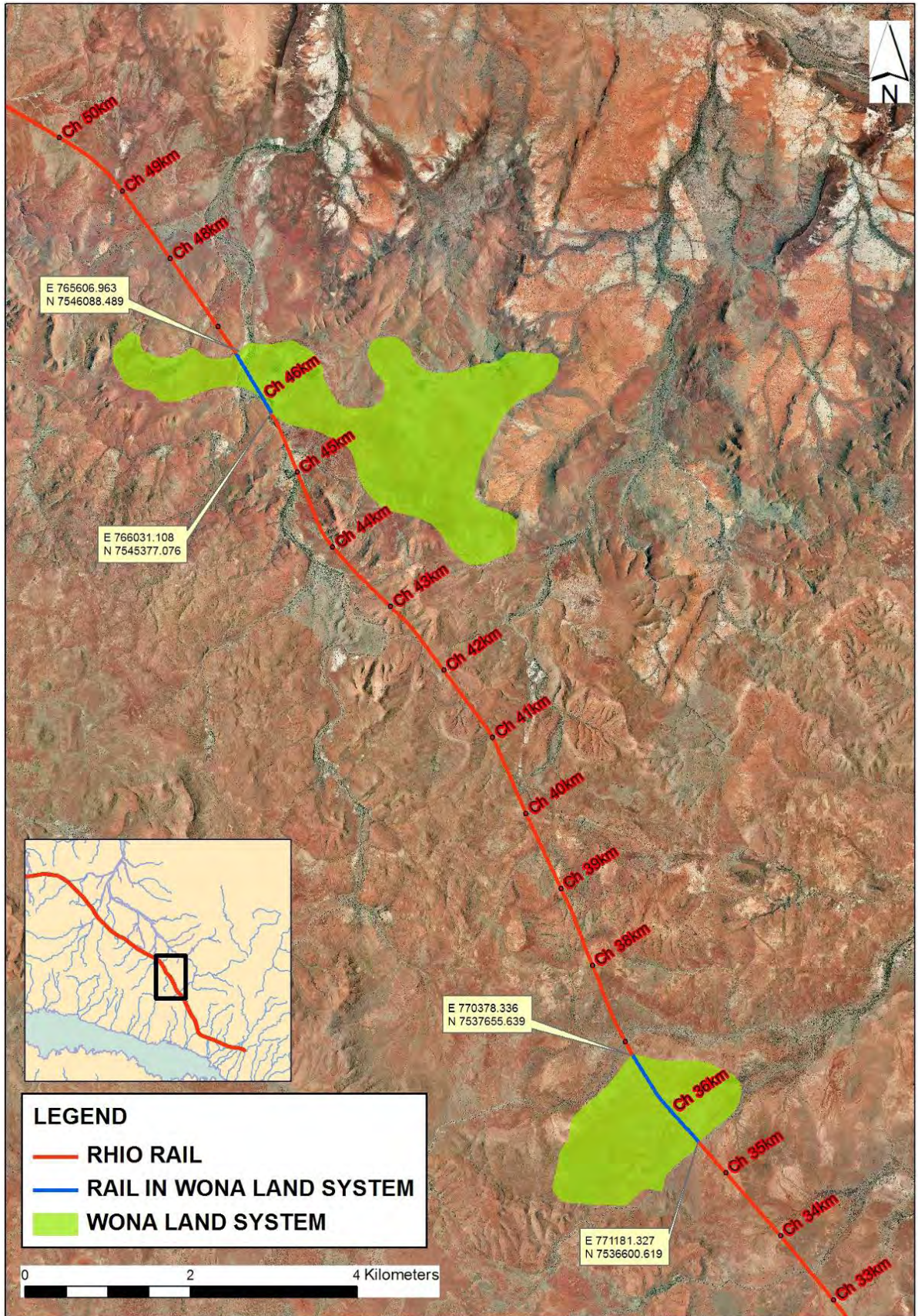


Figure 7 – Locations where the rail line intersects the Wona land system

3.2 Flora and Vegetation

The risk matrix (Table 2) identified three flora and vegetation aspects that had high unmitigated risks. These were:

- Declared Rare Flora (DRF);
- Potential conservation significant floristic communities; and
- Mulga dominated vegetation communities.

Following the implementation of management controls, two of these aspects were considered to have medium level residual risks, with the other being of low risk.

The three flora and vegetation aspects were discussed and assessed during the specialist workshop. The group concluded that the impact risks that the railway presents could be managed and mitigated to an acceptable level.

3.2.1 Declared Rare Flora (DRF)

There is no DRF in the Pilbara outside of the Hamersley Ranges, although there are Priority 1-4 species likely to be found on the cracking clays referred to in Section 3.1.2.

3.2.2 Potential Conservation Significant Floristic Communities

Land clearing during railway construction presents the greatest risk to potential conservation significant floristic communities. The workshop attendees agreed that the controls to best minimise this risk include:

- design of the rail alignment to avoid locations where these communities are known to exist;
- conduct a pre-construction survey along the rail alignment to confirm that these communities will not be cleared;
- minimise clearing footprint wherever possible (e.g. by using existing borrow pits); and
- delineate clearing boundaries and areas that must not be cleared or disturbed (e.g. using a ground disturbance control system with GPS tracking).

RHIO has committed to adopting the controls listed above in its construction management plans.

3.2.3 Mulga

The potential impact to Mulga communities was discussed during the specialist workshop. It was agreed that the southern section of the rail is generally devoid of Mulga communities north of the Chichester Ranges, although some are present to the south. Clearing impacts will be managed by pre-construction corridor surveys and realignment of the rail where appropriate. Clearing boundaries will be well marked and designed for the minimal footprint possible. A Surface Water Management Plan will be developed which outlines preventative controls to minimise impacts on sheetflow sensitive Mulga communities. Appropriate surface water management measures, including environmental culverts and rip rap rock protection, will be incorporated into the drainage design to minimise disruption to natural surface water regimes in the immediate vicinity of the railway.

3.3 Vertebrate Fauna

The following sections provide an overview of the conservation significant fauna considered to have the potential to occur within the southern section of the rail corridor and surrounds. Potential to occur is based on the habitats present, known distribution, DEWHA and DEC database searches and the results of previous biological surveys in the surrounding region. Table 4 presents a summary of the species conservation status, preferred habitat and likelihood of occurrence based on habitat requirements and previous records.

Table 4 – Conservation significant fauna potentially occurring in the rail corridor

Species	Conservation Significance			Habitat	Previous records	Likelihood of occurrence	Regional impacts
	EPBC	WCA	DEC				
Bilby (<i>Macrotis lagotis</i>)	VU	S1		Spinifex hummock grassland and acacia scrub. Large multi-entranced burrow systems characteristic.	Known to exist in the Pilbara region	MEDIUM	LOW No suitable habitat located in the project area. Low likelihood of utilising project corridor if present due to lack of habitat.
Mulgara (<i>Dasyercus cristicauda</i> , <i>D. blythi</i> , <i>D. hillieri</i>)			P4	Sandy areas with moderately dense spinier with 'runways' between clumps.	Known to exist in the Pilbara region	LOW	LOW Impacts restricted Small proportion of population affected by project.
Ghost bat (<i>Macroderma gigas</i>)			P4	Roosts in hot, humid caves.	No records in the region. No suitable habitat within the survey area.	LOW No suitable roost sites within project area and no nearby records.	LOW No suitable habitat present. Low likelihood of occurrence in the project area
Pilbara leaf-nosed bat (<i>Rhinioncteris aurantius</i>)	VU	S1		Roosts in hot, humid caves.	No records in the region. No suitable habitat within the survey area.	LOW No suitable roost sites within project area and no nearby records.	LOW No suitable habitat present. Low likelihood of occurrence in the project area
Star Finch (western race) (<i>Neochima ruficauda</i> subsp. <i>Subclarescens</i>)			P4	Vegetation around watercourses.	Known to exist in the Pilbara region.	HIGH – resident	LOW Impacts restricted Small proportion of population affected by project. Habitats will be avoided.
Northern Quoll (<i>Dasyurus hallucatus</i>)	EN	S1		Rocky areas, also eucalypt forest and woodland.	Known to exist in the Pilbara region.	MEDIUM Suitable habitat recorded. Specimens recorded in surrounding areas.	LOW Impacts restricted Small proportion of population affected by project.

3.3.1 Bilby (*Macrotis lagotis*)

Bilbies occur in a variety of habitats, including spinifex grassland, acacia shrubland, open woodland, and cracking clays (Maxwell, Burbidge et al. 1996; Johnson 2008).

Bilbies congregate in small colonies and colony areas are best avoided. Development of the rail is unlikely to impact this species regionally and the proposed disturbance within the project area represents a low threat to the local populations if managed.

Bilby burrows and individuals are easily located on the ground and can be relocated prior to construction if rail realignment to avoid active burrows is not possible.



Bilby (source: Haddon and Oliver 1988)

Comment:

RHIO has committed to ground surveys of the final alignment prior to clearing, with relocation of any Bilbies found on the alignment. The panel of specialists agreed there would be minimal environmental impact if this were undertaken. Any future surveys identifying communities which can be avoided will be taken into account in the final alignment.

3.3.2 Mulgara (*Dasyercus cristicauda*, *D. blythi*, *D. hillieri*)

Brush-tailed Mulgara are a medium-sized dasyurid with a characteristic short thick tail that is covered in black hairs for most of its length (Woolley 2008). Mulgara occur sporadically on spinifex grasslands throughout much of the arid zone (Woolley 2008).

The Brush-tailed Mulgara (*Dasyercus blythi*) has only recently been reclassified and separated from the genetically and morphologically distinct Crest-tailed Mulgara (*Dasyercus cristicauda*) (Woolley 2006). The more widespread Brush-tailed Mulgara is listed as Priority 4 (fauna in need of monitoring) in the DEC Priority and Threatened Fauna list (2008) (BHPBIO 2009).



D. blythi (source: Spencer 1986)

At the Commonwealth level there is a taxonomic discrepancy between the conservation lists. From past surveys it is known that *D blythi* are abundant at northern end of corridor near Port Hedland. *D blythi* can be managed with on ground grid surveys prior to clearing.

Comment:

RHIO has committed to ground surveys of the final alignment prior to clearing, with relocation of any Mulgara found on the alignment. The panel of specialists agreed there would be minimal environmental impact if this were undertaken. Any future surveys identifying communities which can be avoided will be taken into account in the final alignment.

3.3.3 Ghost bat (*Macroderma gigas*)

Suitable habitat appears to be determined by the availability of suitable roosting sites (Strahan 1995). Preferred roosting habitats in the Pilbara include caves beneath bluffs of low, rounded hills composed of Marra Mamba geology, and granite rockpiles. They have also been known to roost in large colonies within sandstone caves, under boulder piles and in abandoned mines (Churchill 1998).

Ghost Bats are unlikely to be affected due to a lack of suitable roosting sites within the corridor and minimal loss of foraging habitat due to clearing and ground disturbance associated with the railway.



Ghost Bat (source: Haddon and Oliver 1988)

Comment:

The panel of specialists agreed there would be no impact to Ghost Bat communities due to lack of habitat within the southern section of the rail corridor. RHIO will confirm this prior to construction. Management actions will be initiated to minimise any damage should habitat be found.

3.3.4 Pilbara Leaf-nosed Bat (*Rhinonictoris aurantius*)

The Pilbara Leaf-nosed Bat is the Pilbara form of the Orange Leaf-nosed Bat (*Rhinonictoris aurantia*) that occurs across the Kimberley and Northern Australia (Armstrong 2008).

The Pilbara Leaf-nosed Bat chooses roosts in areas of high relief with gorges and watercourses (Armstrong 2008). Pilbara Leaf-nosed Bats are unlikely to be affected by the development of the railway due to a lack of suitable roosting sites within the rail corridor

Comment:

The panel of specialists agreed there would be no impact to Pilbara Leaf-nosed Bat communities due to lack of habitat within the southern section of the rail corridor. RHIO will confirm this prior to construction. Management actions will be initiated to minimise any damage should habitat be found.

3.3.5 Star Finch (western race) (*Neochima ruficauda* subsp. *Subclarescens*)

The Star Finch is found across northern Australia, including the Pilbara region where it is patchily distributed, usually in pairs or small flocks. Typical Star Finch habitat is long grass or rushes around swamps and lagoons or permanent pools. Star Finches may also be found in irrigated crops and pastures. The only suitable habitat recorded during the field reconnaissance was in the permanent spring.

Comment:

The panel of specialists agreed that by avoiding the spring (Section 3.1.1) there would be no impact to Star Finch communities due to lack of habitat along the remaining length of the rail corridor.

3.3.6 Northern Quoll (*Dasyurus hallucatus*)

Northern Quolls are both terrestrial and arboreal and use a variety of den sites including rock crevices, tree hollows, logs, termite mounds, house roofs and goanna burrows (Oakwood 2008). Because very few areas within the rail corridor provide suitable habitat for northern quolls, and individuals are found across much of northern Australia, including off shore islands, the development of the railway is not expected to significantly impact this species.

Northern Quolls are readily identified during surveys and RHIO has committed to undertake these when engineering design is at a more detailed stage. RHIO has also committed to survey any existing borrow pits for established communities prior to use .



Northern Quoll (source: Haddon and Oliver, 1988)

Comment:

RHIO has committed to on ground surveys of the final alignment prior to clearing, with relocation of any quolls found on the alignment. The panel of specialists agreed there would be minimal impact if this was done. Any future surveys identifying habitat which can be avoided will be taken into account in the final alignment.

3.4 Short Range Endemic Species (SREs)

The landscapes dissected by the southern 125km of rail corridor are gradual sloping plains that are vegetated with arid adapted plant communities. There is little suitable SRE habitat expected to be found within the proposed alignment.

Although the environmental risk to SREs is perceived to be low, RHIO will also implement the following management and mitigation measures:

- Clearing will be minimised.
- Clearing boundaries will be defined in the field to avoid accidental over clearing.
- Areas that are likely to contain potential SRE species such as drainage lines, south facing slopes and densely vegetated areas offering high moisture retention will be avoided as far as possible.
- Dust suppression measures will be implemented, including management of vehicle speed and movement on unsealed roads.
- A fire prevention strategy will be implemented.
- All vehicles will be fitted with fire extinguishers and all personnel trained in their use.

3.5 Stygofauna and Troglafauna

The impacts on stygofauna and troglafauna will be limited to short-term impacts from the abstraction of groundwater required for construction purposes. These impacts are expected to be negligible and were not considered at the workshop.

4. COMMITMENTS

RHIO is committed to achieving environmental management performance consistent with statutory obligations and industry standards. The proposed construction and operation of the railway will be conducted in a manner that will minimise impacts on the surrounding environment. Accordingly, environment management strategies and commitments have been nominated throughout this document and are summarised in Table 5. These will be expanded and refined in line with the RHIO environmental policies and as more information becomes available.

It is important to note these are based on the outputs of a risk assessment and workshop with technical specialists with working knowledge of the Pilbara.

Table 5 – RHIO environmental management commitments

Commitment	Topic	Objective	Action	Timing	Advice
1	Permanent spring	Avoid the spring as it provides habitat for a range of flora and fauna species (e.g. star finch)	Make adjustments to rail alignment to avoid permanent spring	Design	DEC
2	Wona land system	Minimise the impact on the Wona land system	Avoid Wona land system where possible	Design	DEC
3	Chichester cracking clays	Minimise the disturbance footprint	Avoid cracking clay areas where possible Minimise disturbance footprint Use existing borrow pits if clays need to be dried prior to use	Design Construction Construction	DEC
4	Vertebrate fauna	Minimise the impacts vertebrate species	Capture and release programs conducted targeting vertebrate fauna (e.g. Quoll and Mulgara)	Design	DEC
5	Threatened bat species	Preserve the number of bats found in the area	Adjust rail alignment to avoid roosting sites for bats	Design	DEC
6	Declared Rare Flora (DRF), priority flora and floristic communities	Protect any DRF, priority flora and floristic communities.	Avoid locations where these species are known to exist Pre-construction corridor survey to avoid identified locations Minimise clearing footprint by delineating clearing boundaries	Design Pre-construction Construction	DEC
7	Mulga communities	Ensure that surface drainage and sheetflows are maintained	In vicinity of Mulga dominated communities, ensure culverts are appropriately located and aligned to the rail line and access roads Pre-construction corridor survey to confirm and delineate clearing boundaries Develop and implement Surface Water Management Plan	Design Pre-construction Construction	DEC

Commitment	Topic	Objective	Action	Timing	Advice
8	Fortescue Marsh	Minimise impact of construction and operation on the Marsh	Engineering design to minimise impacts	Design	DEC
9	Bilby, Mulgara, Pebble-mound Mouse, Lakeland Downs Mouse	Avoid the loss of individuals	Avoid locations where these species are known to exist Search habitat suitable for these fauna in the couple of weeks before clearing and translocate individuals out of the area	Design Pre-Construction	DEC
10	Northern Quoll, Spectacled Hare-wallaby, Long-tailed Dunnart	Avoid the loss of individuals	Avoid locations where these species are known to exist Move rather than destroy all large hollow logs that are temporary refuges Clear and translocate individuals prior to disturbance Minimise clearing in suitable habitat	Design Pre-Construction Pre-construction Construction	DEC
11	Olive Python	Avoid the loss of individuals	Educate clearing contractors - Olive Pythons are large and easy to spot and avoid	Pre-Construction and maintenance	DEC
12	Crested Bellbird	Avoid the loss of individuals	Minimise clearing	Pre-Construction	DEC
13	Blind Snake	Avoid loss of individuals	No possibility for management other than reduction of clearing footprint particularly around low stony hills	Pre-Construction	DEC
14	SRE	Avoid loss of SRE habitat	Pre-construction corridor survey, amend alignment footprint within corridor to avoid impact on SRE populations Clearing boundaries to be clearly defined Minimise clearing	Pre-construction Pre-construction Construction	DEC
15	Troglofauna	Avoid damage to habitat	No significant excavation, with cuttings less than 20-25m deep or large volumes	Construction	DEC
16	Stygofauna	Avoid damage to habitat	Pre-construction corridor survey Only low volumes of construction water taken for short duration at any one location (3-4 months) Monitoring during extraction and modify pumping regime if impact occurs	Pre-construction Construction Construction	DEC
17	Environmental performance	Minimise the impacts of construction and operation	Develop and implement Construction and Operational Management Plan	Pre-Construction and throughout construction and operation	DEC

5. CONCLUSIONS AND RECOMMENDATIONS

The construction of the RHIO railway will involve five phases: investigation, clearing, earthworks, track-laying and rehabilitation. RHIO has identified management commitments to alleviate the impacts from construction (Section 4).

Regional impacts on flora and vegetation will be low to negligible although some localised impacts from clearing will be unavoidable. Management controls relating to the protection of significant flora species within the construction footprint will be undertaken by RHIO. Conservation significant flora and vegetation will be shown on construction plans and marked in the field to prevent accidental disturbance. A Surface Water Management Plan will be developed which outlines controls to minimise impacts on sheet flow sensitive Mulga communities. Appropriate surface water management measures, including environmental culverts and rip rap rock protection, will be incorporated into the drainage design to maintain natural surface water regimes including sheetflow.

The diversity of fauna assemblages of the subregion as a whole will not be affected by the rail corridor. Most terrestrial fauna are expected to be able to move to adjacent areas of suitable habitat, but sedentary fauna (e.g. burrowing species or species using leaf-litter or wood as shelter) are likely to be impacted. On ground surveys and relocation committed to by RHIO will mitigate against this impact. Following construction the vegetation communities will regenerate in rehabilitated areas and fauna habitats will be re-established.

Impacts to drainage and fauna habitats will be avoided during design and construction meaning that the ecosystem functions of the local area and region will not be significantly affected by the development of the railway. Impacts will be restricted to the disturbed area in the rail corridor and these have been calculated as less than 1% for the majority of land systems in the region. The rail culverts will act as fauna corridors, thereby ensuring the railway does not restrict fauna movement between habitats.

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6. REFERENCES

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ADDENDUM TO ENVIRONMENTAL REFERRAL DOCUMENT

Appendix 1 – Meeting Minutes

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MEETING RECORD

Project No: 301012-00928

Project: RHIO - Roy Hill to Port Hedland Rail Project, Section 38 Referral

Record of Discussion

PARTICIPANT NAME & ORGANISATION		DATE	10-11-2009
RHIO	Peter Murphy (PM) Ailan Tran (AT)	TIME START	13:30
EPA	Ray Claudius (RC) Peter Tapsell (PT) Vanessa Angus (VA)	TIME FINISH	14:30
DEC	Stephen Van Leeuwin (SVL)	LOCATION	EPA Boardroom
WORLEYPARSONS:	Peter Mellor (PMe)	RECORDER	Peter Mellor
ECOLOGIA	Gary Connell (GC)	DOC NO	
TERRESTRIAL ECOSYSTEMS	Graham Thompson (GT)	FILE LOC	
ECOSCAPE	Shaun Grein (SG)	PROJ REF	
ENV AUSTRALIA	Teresa Gepp (TG)		
E M MATTISKE AND ASSOCIATES	Elizabeth Mattiske (EM)		
APM	Mitch Ladyman (ML)		
SIGNATURE ORIGINATOR		DATE SIGNED	11-11-2009
SIGNATURE OTHER PARTY		DATE SIGNED	
COPIES			



RECORD OF DISCUSSIONS

PRESENTER	ITEM DETAILS	ACTION BY AND DATE
PM	<p>Summary of project and key issues being:</p> <ol style="list-style-type: none"> 1. Clearing of vegetation and interruption of surface water flows: 2. The 2km rail corridor offers plenty of opportunity to fine tune the centre-line to avoid significant habitats and drainage lines etc. 3. The habitats are well represented elsewhere in the Pilbara and any impact from the railway will be limited on a regional scale. 4. Field work is proposed for next year to collect information to be used in defining the actual rail alignment <p>RHIO plan on exporting in 2013, and start construction in 2011. All decisions relating to environmental approval need to be made by 2010.</p>	-
PMe	Summary of rail corridor selection process and studies conducted as part of the ARI.	
ML	Summary of field reconnaissance survey, fatal flaws study, only a water crossing and cracking clays of environmental concern.	
PM	Described the risk assessment methodology, detailed limited environmental risks and all remaining risks could be mitigated with appropriate management.	
SVL	Suite of priority species, most not going to be issue (Priority 3 and 4), possibility of potential unknowns. Suite of fauna mostly mobile not going to be an issue. SREs may be a problem, primarily due to lack of information.	
ML	SREs unlikely to be problem. Minimal habitat identified, and width of separation would not restrict species movement.	
SVL	Most SRE studies driven by lack of information	-
ML	RHIO are making a big contribution to the knowledge of SRE's and habitat in the proposed area. As is suggested in guidance statement	
PM	<p>The project could not afford significant delays in relation to SRE's</p> <p>Issue parked - all agreed it could be managed and RHIO were making a fair contribution to knowledge in the region</p>	
PT	Start discussion regarding permanent spring (identified during ML reconnaissance survey).	
ML	The permanent spring was small and could be walked around in about 5 minutes.	
Group	General consensus that the permanent spring can be avoided by a minor change to the rail alignment.	PM to confirm
SVL	The permanent spring, although offers habitat for a diverse range of species, would be no different to others in the Chichester region, The key approval issue would be related to Aboriginal heritage.	
PT	RHIO should also consider the impacts of the rail on surface flows to the spring, and that areas around the spring may act as a soak.	
LM	Engineering design can minimise impacts on surface flows and drainage.	



PRESE NTER	ITEM DETAILS	ACTION BY AND DATE
Group	Issue parked PM to confirm avoidance of spring +7545460.724; +765983.2532	
PT	Start discussion on cracking clays	
SVL	<p>Wona land system contains Priority Ecological Communities (PECs) ranging from Priority 1 to Priority 4. Most of the PECs in the Chichester are Priority 3 and 4.</p> <p>The Wona land system is a resilient system but is considered a PEC due to grazing pressure. Engineering design within the Wona requires the removal of the clays and replacement with suitable fill. This presents a larger disturbance footprint than just the rail corridor. Also weeds become an issue in system and can be found along the railways in the Chichester.</p> <p>Overall the impacts are manageable:</p> <ul style="list-style-type: none"> maintain a small disturbance footprint avoid weed infestation use borrow pits to cure clay <p>drainage is not an issue, minimal surface flows occur because they all soak into the clay.</p>	
PT	Agreed can deal with issues re cracking clays. Are there any other issues?	
SVL	No DRF outside of Hamersley Ranges. Priority 1-4 species are likely to be found on the cracking clays. These priority species are on the DEC list due to lack of knowledge/information. They are most likely to be found on low, wet areas and the granites and Wona land systems.	
RC	Is the impact on mulga likely to be from clearing or changes to surface flow?	
PM	The impact will mostly be from clearing, since the engineering design will include culverts to allow sheetflow.	
ML	Mulga is quite limited to the south of the Chichester ranges.	
SVL	Most of the rail is not an issue for mulga. The only section that may have an impact is located closer to the Roy Hill 1 mine.	
PT	Are there any impacts on vertebrate fauna we need to consider?	
GT	Bilby, significant in small colonies, best to avoid, easy to identify on the ground and therefore relocate prior to disturbance.	
GT	Mulgara, taxonomic discrepancy between the Commonwealth and State, abundant at northern end of corridor near Port Hedland. <i>D. Blythi</i> scattered can be managed with on ground grid surveys.	
GT	Bats – maternity roosts need to be protected. At the back of the Chichesters, old mine shafts and caves make the best habitats.	
SVL	<p>DEC Pilbara surveys identified both species (Ghost Bat and Orange Leaf-nosed Bat) all across Pilbara.</p> <p>Impacts from a railway proposal are manageable.</p>	
ML	No significant breakaways were found during the reconnaissance survey. Maternity roosts are a very specific form of habitat and they were not found along the rail corridor.	
EM	Manageable by staying away from habitats (caves that lead to water / mineshfts).	



MEETING RECORD

PRESE NTER	ITEM DETAILS	ACTION BY AND DATE
Group	Railway track will not traverse preferred roosting habitats. Impacts are manageable.	
GT	Star Finch – habitat is water holes, easy to deal with on ground.	
SVL	If the rail alignment avoids the permanent spring mentioned earlier, the project will avoid impacts on the Star Finch.	
GT	<p>Quoll – can be found all over the Chichester ranges and the Pilbara. the habitat is widespread but the population is not abundant. Therefore the likelihood of the rail project having an impact on the population is low but the consequence of killing a population is significant.</p> <p>The Quoll is listed as endangered on under the Commonwealth EPBC Act (due to cane toads) and therefore we need to convince DEWHA that this is not issue.</p> <p>On the ground Quolls are swift moving and will leave an area if disturbed.</p> <p>Quolls are easy to search for on the ground.</p>	
SVL	The Northern Quoll may be an issue if RHIO uses old quarry sites as a source of borrow. Old quarry sites provide a good habitat for Quolls,	
PM	Is the EPASU satisfied with the information presented at this workshop?	
PT	<p>There were relatively few issues raised.</p> <p>Recommend RHIO provides an addendum for the ARI that summarises the risk assessment, the key issues raised, confirming avoidance of roosting sites, permanent springs and Wona land system along the rail alignment and describing the proposed management actions.</p>	
SVL	Keen to see a whole of life commitment to weed management. The area is a greenfields site. Ruby Dock will be a key weed to avoid through use of vehicle and equipment hygiene procedures and control of ballast source.	



I believe the TOC below sets out a structure that will close off concisely the issues discussed above and proposed management actions for the key elements and form the basis for the addendum. Please call to discuss further.

SUMMARY OF ADDENDUM DOCUMENT	SECTION
Purpose	1
Issues – outcomes of risk assessment	2
Habitats (Springs, Wona Land System and Cracking Clays)	3
Flora and Vegetation (DRF & Mulga)	4
Vertebrate Fauna	5
SREs	6
Commitments	7
Attachment – A – Meeting minutes	A

END OF RECORDS

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ADDENDUM TO ENVIRONMENTAL REFERRAL DOCUMENT

Appendix 2 – Summary of Relevant Experience

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CURRICULUM VITAE

GARRY CONNELL

Director – Manager Environment Major Projects



QUALIFICATIONS

Professional Experience	20 years environmental management of the resources industry, 15 years biological sciences, zoological survey experience
Academic	<ul style="list-style-type: none">▪ Bachelor of Science (Hons) (Zoology) University of Western Australia▪ ISO14001 Environmental Management Systems Auditor

SELECTED PROFESSIONAL EXPERIENCE

Employment History	<ul style="list-style-type: none">▪ 1989-present <i>ecologia</i> Environment – Director, Manager Environment Major Projects▪ 2001- '06 BHPBIO, Asset Development Projects - Manager Environment▪ 2000-'03 Portman Limited, Manager Environment▪ 2000-'01 North Ltd, Robe Development Plan Environmental Coordinator
Selected Projects	<ul style="list-style-type: none">▪ BHPB WAIO Asset Development Projects B\$4.0, 155mtpa mine, rail & port infrastructure: Area C, Yandi Stage 2, Ore Bodies 18, 23, 24, 25 Jimblebar, Whaleback & Ore Body 29, Yarricrustal Deposits, Port Hedland Finucane Island & Nelson Point upgrades, Rail infrastructure upgrades▪ Robe Development Plan B\$1.1, 20mtpa mine, rail & port infrastructure: West Angelas, Cape Lambert▪ Portman Limited Koolyanobbing Expansion Project M\$180, 8mtpa mine, road haulage infrastructure; Windarling range, Mt Jackson Range▪ Okajee Port & Rail, rail & port infrastructure B\$3.5▪ Sinosteel Midwest Corporation Weld Range 20mtpa mine, M\$400▪ Aztec Resources Limited Koolan Island Iron Ore project M\$150, mine & port infrastructure▪ Brockman Resources Marillana Project M\$300▪ Grange Resources Southdown Magnetite Project M\$600 <p>Manager in excess of 500 environmental projects for mining, gas pipelines, road infrastructure, urban development, aquaculture, conservation and resource development industries</p>

PROFESSIONAL STANDING

- 1997 Golden Gecko Awards, recipient of Certificate of Merit – Marymia Gold Project
 - 1998-2000 Department of Minerals & Energy Peer Reviewer of Notice of Intent & other environmental impact assessment documentation
 - 1997-2001 Department of Environmental Protection Peer Reviewer of environmental impact assessment documentation with respect to resources & mining sector projects
 - 2003 Golden Gecko Awards, recipient of Certificate of Merit – West Angelas Rail Project
 - Member of: Chamber of Minerals & Energy Perth Environmental Forum, Environment Institute of Australia, WA Environmental Consultants Association
- Participant as either project manager or lead environmental consultant in numerous multi-disciplinary project teams
 - Project management has encompassed total project coordination, planning, design, tracking and implementation
 - Responsible for all facets of environment approvals, contract development, tender evaluation, Environmental Management Plans, Environmental Management Systems
 - Demonstrable track record of enhancing credibility of environment function with project teams

ecologia Environment
1025 Wellington St
West Perth WA 6005

Mr Garry Connell
Director – Manager Environment

garry.connell@ecologia.com.au
Ph: (08) 9322 1944
Fax: (08) 9322 1599

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CURRICULUM VITAE

Name: Dr Libby (Elizabeth Mary) MATTISKE

Present position: Managing Director, Mattiske Consulting Pty Ltd

Educational and professional qualifications:

Bachelor of Science (Hons) (Adelaide University 1972)
Doctorate of Philosophy (Adelaide University 1976)
Adjunct Professor (Murdoch University 2009)

Relevant experience:

2003 - 2006: State of the Environment Steering Group, Environmental Protection Authority, Western Australia
2003: Mid Term Review Committee, Native Vegetation Research and Development Program
1999 - 2001: Australian State of the Environment Committee
1995 - 1997: Ministerial Task Force for the Review of Natural Resources Management and the Viability of Agriculture in Western Australia.
1994 - : Mattiske Consulting Pty Ltd (environmental consultancy)
1979 - 1994: E M Mattiske and Associates (environmental consultancy)
1987 - 1993: National Parks and Nature Conservation Authority, Western Australia (Deputy Chairman from 1991 - 1993)

Current Board Memberships:

2007 - : Australian Heritage Council
1994 - : Regional Research Committee, CSIRO Sustainable Landscapes

Former Board Memberships:

2000 - 2006: Threatened Species Scientific Committee
1999 - 2001: Australian State of the Environment Committee
1998 - 2003: Environmental Protection Authority, Western Australia (Deputy Chair from 2000 – 2003)
1998 - 2000: Bushplan Reference Group
1997 - 2001: Council for Sustainable Vegetation Management
1996 - 1998: Australian Heritage Commission
1996 - 1997: Advisory Committee on Forest Management Plans, Environmental Protection Authority, Western Australia
1995 - 1996: Ranking Panel for the Conservation of Western Australia's Threatened Flora and Fauna, Department of Conservation and Land Management
1990 - 1996: Gordon Reid Trust Foundation for Conservation
1990 - 1996: Animal Experimentation Ethics Committee, Department of Conservation and Land Management
1987 - 1989: Keep Australia Beautiful Council, Western Australia

Background

Dr Libby Mattiske is Managing Director of Mattiske Consulting Pty Ltd, which was formed in February 1994. Prior to July 1994, all consulting activities of the group were undertaken in the name of E M Mattiske and Associates. This earlier partnership was established in 1979. Mattiske Consulting Pty Ltd is a Western Australian owned and managed Company which operates in Western Australia, Australia and overseas.

Consulting Activities

Dr Mattiske's consulting activities are directed at gathering and interpreting botanical, biological and ecological data. These activities include flora and fauna inventory lists, habitat and vegetation mapping (including local and regional studies), evaluation of controlled burning programs, statistical analysis of inter-specific, plant/soil and plant/soil/moisture relationships, evaluation of the impacts of gaseous emissions on plant communities and the effects of diseases on plant communities.

Ecological studies have been undertaken primarily in Western Australia (the South-west, the Goldfields, the Wheatbelt, the Pilbara and the Kimberleys), South Australia, Queensland and Christmas Island. Dr Mattiske has been working in the Pilbara area since 1979. The studies have often involved extensive field work in local and remote areas, and in climatic conditions ranging from temperate, to arid, to semi-arid to subtropical areas.

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Curriculum Vitae – Graham Thompson

Personal Details

Graham Thompson
10 Houston Place
Mt Claremont, WA, 6010
Phone: (w) 08 9385 2398 (mob) 0438 491227
Email: graham@terrestrialecosystems.com

Qualifications

PhD (Zoology), PG Dip Sc. (Zoology), MEd (Phys. Educ.), BEd. (Phys. Educ.), Dip PE, Teachers' Cert..

Employment

Partner, Terrestrial Ecosystems
Senior Lecturer, Edith Cowan University

Professional Associations

Past President and Treasurer and now member, Royal Society of Western Australia
Member, Environmental Institute of Australia and New Zealand
Member, Australian Ecological Society
Member, Australian Society of Herpetologists.
Member, Australian New Guinea Fishes Association

Publications

Authors or collaborative author of a couple of books and book chapters, and over 80 refereed journal articles.

Pilbara experience relevant to the proposed Hancock rail corridor

- Worked extensively in the FMG Cloud Break area since 2005.
- Assisted with the search for conservation significant fauna for the entire FMG rail corridor from Port Hedland to Cloud Break, including borrow pits and water reserves.
- Undertook a fauna risk assessment using a helicopter of the whole of the FMG rail corridor.
- Wrote the report for the pre-clearing fauna surveys for the entire FMG rail corridor from Port Hedland to Cloud Break.
- Undertook the fauna assessments for the FMG Cloud Break trial mine, North Point and South Point camps, multiple borrow pits and water reserves, Cloud Break and Christmas Creek mining areas, Cloud Break to Christmas Creek rail alignment, Cloud Break Haul Rd. etc.
- Undertook translocation programs for conservation significant fauna along the FMG rail corridor.
- Walked and quad-biked most of the land between Cloud Break mine and the Newman-Nullagine Road undertaking fauna assessments.
- Participated in the fauna survey for the FMG Solomon project in the Hamersley Range, which included trapping, spotlighting, echolocation, SREs.
- Wrote the terrestrial fauna survey report for the FMG Solomon project area in the Hamersley Range.
- Quad-biked, walked or driven the proposed FMG rail corridor from near Wittenoom to the northern edge of the Karajini National Park and west to Serenity Valley in the Hamersley Range undertaking fauna habitat assessments.
- Written general fauna management plans, conservation significant fauna management plans and translocation protocols for conservation significant fauna for FMGs operations in the Pilbara.
- Published papers in the scientific literature on Mulgara and Bilby in the Pilbara.
- Published papers on best practise fauna assessments, trapping strategies, linear corridor assessments and temporal variations in Pilbara fauna surveys.

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Curriculum Vitae

Dr Mitchell Todd Ladyman

Director and Principal

Academic Qualifications and Achievements

**PhD with Distinction
Honours (1st Class)
Bachelor of Science**

**University of Western Australia 2001 - 2003
CNRS France / University of Western Australia 2000
University of Western Australia 1997 - 1999**

Relevant Employment Summary

Position	Entity	Year
Managing Director	Animal Plant Mineral	2008 - Present
Managing Director	Validus Group	2007 - 2008
Principal/Manager	ENV. Australia	2005 - 2008
Manager	<i>ecologia</i> Environment	2003 - 2005
Zoologist / Environmental Scientist	<i>ecologia</i> Environment	1997 - 2003
Research Assistant/Zoologist	<i>ecologia</i> Environment	1995 - 1997

Career Summary

I have worked in the field of Environmental Consulting for more than 15 years in various roles from Technical / Research Assistant at *ecologia* Environment to Managing Director of Validus Group Pty Ltd and Animal Plant Mineral Pty Ltd.

Some of the major projects I have managed (2003 – Present) and contributed to (pre 2003) include, but are not limited to:

- Hancock Prospecting Pty Ltd Southern Rail Corridor BAS (2009)
- Kimberley Metals Group Pty Ltd Ridges Iron Ore BAS and Environmental Approvals (2009)
- Ord River Irrigation Stage 2 BAS for Landcorp (2009)
- Northern Development Taskforce Kimberley LNG Plant BAS (2008)
- Chevron Domgas Site Selection BAS (2008)
- BHPBIO Project Quantum Port, Rail and prospective ore bodies (2008)
- Murchison Metals/ Mitsubishi Corporation Due Diligence for investment in Jack Hills (2007)
- BHP Billiton Iron Ore Resource Evaluation Group Environmental Approvals (2007)
- BHP Billiton Iron Ore Operations Environmental Approvals (2006)
- Mine and Port Development Joint Venture Asset Developments Projects (2006)
- Woodside Pluto Burrup Liquid Natural Gas (2005 & 2006)
- BHP BIO Goldsworthy Extension Project Environmental Position Statement (2005)
- BHP Billiton Iron Ore Jimblebar Life of Mine Project EPS (2005)
- BHP Billiton Iron Ore Expansion Biological Assessment Surveys (2004)
- Mine and Port Development Joint Venture BHP BIO Ongoing Works (2004)
- Capricorn Timber Pty Ltd and the Beagle Bay Community Tropical Timber Plantation (2003)
- Portman Limited Koolyanobbing Iron Ore Biological Assessment Survey (2000)
- Ord M2 and Riverside Development Terrestrial Biological Assessment Survey (1996)

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shaun grein

Shaun joined Ecoscape in 2008 as Principal, providing expert technical advice and provides day to day management, mentoring and coordination to the environmental science group. Shaun has 20 years experience in the environmental industry, working in consultancy firms, resource companies and government departments. He has designed, coordinated and undertaken many projects in the mining, industrial, infrastructure, urban development and natural resource management sectors. He has been also responsible for undertaking numerous flora and vegetation surveys through-out Western Australia as well as Oman in the Middle East and the United Kingdom. Shaun has Bachelor and Postgraduate Diploma degrees in biology, as well as a Diploma in business management.

Shaun has undertaken numerous flora and vegetation surveys within the Chichester Ranges for Fortescue Metals Group since 2005. This included Level 2 surveys of the Port Hedland to Cloudbreak rail corridor and associated borrow pit areas, as well numerous targeted flora surveys undertaken to support Ground Disturbance Permit (GDP) applications associated with Fortescue Cloudbreak and Christmas Creek mining areas. Shaun has also undertaken assessments of the impacts on dewatering and re-injection on phreatophytic and mulga vegetation associated with Fortescue mining areas and has appeared as an expert witness for Fortescue at the Wardens Court in relation to these matters.

qualifications

Bachelor of Applied Science (Biology) - Curtin University 1990
Post Graduate Diploma of Natural Resources (Environmental Biology) - Curtin University 1991
Diploma of Business (Front Line Management) - Australian Institute of Management, 2006

experience

June 2008 - current: Ecoscape, Principal Environmental Scientist
2008 – June 2008: Coffey Environments, Principal Ecologist/Manager Field Ecology
2000 –2008: ATA Environmental/Coffey Environments, Associate/Senior Environmental Scientist/Coordinator Field Ecology
1998 - January 2000: Faber Maunsell, United Kingdom, Senior Ecologist/Supervising Environmental Scientist.
1996 –1998: Maunsell (formerly Halpern Glick Maunsell), Environmental Scientist/Botanist
1993 - April 1996: Agriculture Western Australia, Research Officer.
1993 – October 1994: Department of Conservation and Land Management, Research Scientist
1992 – 1993: Department of Agriculture, Technical Officer

key skills

Biological Surveys and Assessments
Environmental Impact Assessment & Management Plans
Statutory Environment Referrals (State and Commonwealth)
Environmental Approvals
Environmental Monitoring and Planning
Land Capability Assessments
Expert Witness Statements
