

Native Vegetation Clearing Permit – Supporting Report

Flora, Vegetation and Fauna Habitat Assessment –
Caliwingina and Mt Pyrton

August 2022



Hamersley Iron Pty Limited

152-158 St Georges Terrace

Perth WA 6000

Restrictions on use

This report has been prepared by Rio Tinto, on behalf of Hamersley Iron Pty Limited. Neither the report nor its contents may be referred to without the express approval of Rio Tinto, unless the report has been released for referral and assessment of proposals.

Document Status

Rev	Author	Reviewer/s	Date	Approved for issue	
				Distributed to	Date
0	C. Gill	N. Murdock			
1					

Executive Summary

Rio Tinto is proposing to undertake an exploration drilling program within AML70/0004 ML4SA hereafter referred to as 'the study area'. The study area covers an area of approximately 64.4 ha, and is in the Caliwingina, Mt Pyrton area approximately 97 km northwest of Tom Price in the Pilbara region of Western Australia.

The proposed drill program will comprise 53 drill holes ranging from 40 to 250 m and 10.9 km of new track using blade up technique when grading and will require the clearing of 7.34 ha of native vegetation.

This report is intended as a supporting document for a Native Vegetation Clearing Permit (NVCP) application by Rio Tinto, as required under Section 51A of the *Environmental Protection Act 1986* (EP Act) and has been prepared on the basis of a review of existing information for the study area, combined with a flora and vegetation reconnaissance survey and a fauna habitat assessment. The study area has been the subject of several flora and fauna surveys in recent years. Detailed flora and vegetation, and fauna surveys were completed over the study area as part of much larger surveys by Astron (2011) and Rapallo (2012) respectively. Desktop and reconnaissance flora, vegetation and fauna assessments have also been undertaken over parts of, and immediately adjacent to, the study area by Rio Tinto (2014 and 2016).

The study area was surveyed by Rio Tinto ecologists Scott Reiffer, Dean Main and Carrie Gill on the 10-11th March 2022

Six vegetation types were identified across four major landforms within the study area. Three were described from hillslopes, one from gorges and gullies, one from plains, and one from minor flowlines.

None of the vegetation associations occurring within the study area correspond to any ecosystems listed as Threatened under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) or correspond to any ecological communities listed as Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) by the Department of Biodiversity, Conservation and Attractions (DBCA).

One vegetation unit (EiChAiTeTw) mapped and described for the upper hillslopes within the study area is considered to be of conservation significance as it represents 'hill-top floras, Hamersley Range' ecosystem at risk. This ecosystem is however, considered to be of low reservation priority (L). The mid to low hillslope and floodplain vegetation types are widespread in the Pilbara and the medium creeklines within the study area were not considered large enough to constitute major ephemeral water courses.

A total of 90 taxa from 57 genera representing 30 families were recorded during the current survey. The number of taxa recorded by the current study appears consistent than what was expected when compared with smaller sized previous surveys within the Greater Brockman region. Three Priority-listed species were recorded during the survey: two Priority 3 species, *Indigofera rivularis* and *Triodia basitricha*, and one Priority 4 flora species, *Rhynchosia bungarensis*. The proposed clearing within the application area is unlikely to have a significant impact on these species due to the prevalence of suitable habitat for all three of these species outside of the application area and their documented broad ranges across the Pilbara bioregion.

Three broad fauna habitat types were recorded within the study area: Scree/ Hillslope; Drainage; and Valley. These fauna habitats are not considered to be restricted at a local or regional level.

One Priority 4 listed fauna species, *Pseudomys chapmani* (Western pebble mound mouse), was considered 'likely' to occur within the study area based on the presence of an inactive mound of the Western pebble mound mouse. The mound was deemed to be inactive (i.e. a mound that had significantly lost their dome formation) and considered unlikely to have been inhabited in recent years.

Two threatened fauna species, *Macroderma gigas* (Ghost bat) and *Dasyurus hallocatus* (Northern Quoll) were considered 'Potential' occurrences within the study area however, due to the small size of the study area, it is considered unlikely the Proposal will negatively impact these conservation significant species, on a local or regional scale.

The Proposal was assessed against the 10 Clearing Principles as defined in Schedule 5 (Principles for Clearing Native Vegetation) of the *Environmental Protection Act 1986* and assessed as unlikely to be at variance with any of the Clearing Principles.

Contents page

1.	Introduction	11
1.1	Project background and study area location	11
1.2	Scope of survey	11
1.3	Limitations	13
1.4	Background Information	14
1.4.1	Climate	14
1.4.2	Geology and soils	15
1.4.3	Land systems	15
1.4.4	Surface hydrology and groundwater	18
1.4.5	Regional biogeography	18
1.4.6	Beard's regional vegetation mapping	18
1.4.7	Pre-European vegetation extent	18
1.4.8	Conservation areas and environmentally sensitive areas	21
1.4.9	Priority ecological communities	21
2.	Methodology	23
2.1	Desktop assessment	23
2.1.1	Literature review	23
2.1.2	Database searches	26
2.2	Likelihood of occurrence assessment	26
2.2.1	Flora	26
2.2.2	Fauna	26
2.3	Field Survey	26
2.3.1	Vegetation descriptions condition assessment and mapping	29
2.3.2	Flora identification	29
2.3.3	Fauna habitat assessment	29
2.3.4	Other vegetation of significance	30
2.3.5	Environmentally significant areas	30
3.	Desktop assessment results	31
3.1	Flora	31
3.1.1	Flora diversity	31
3.1.2	Conservation significant flora (pre-field likelihood)	31
3.2	Fauna	36
3.2.1	Fauna diversity	36
3.2.2	Conservation listed fauna returned from the desktop study	36
4.	Field Results	42
4.1	Vegetation of the study area	42

4.2	Vegetation condition	51
4.3	Vegetation of conservation significance	51
4.4	Native flora recorded during survey	51
4.5	Conservation listed flora recorded during survey	52
4.6	Potential conservation listed flora occurring in the study area	56
4.7	Introduced flora occurring within the study area	59
4.8	Fauna and Fauna habitats of the study area	59
4.8.1	Fauna habitats of the study area	59
4.9	Fauna habitats of significance	64
4.10	Other habitats of significance	64
4.11	Conservation listed fauna recorded during survey	64
4.12	Potential conservation listed fauna occurring in the study area	64
5.	Statement addressing the 10 clearing principles	69
5.1	Comprises high level of biological diversity	69
5.2	Potential impact to any significant habitat for fauna indigenous to Western Australia	70
5.3	Potential impact to any rare flora	70
5.4	Presence of any threatened ecological communities	70
5.5	Significance as a remnant of native vegetation in the area that has been extensively cleared	71
5.6	Impact on any watercourse and / or wetlands	71
5.7	Potential to cause appreciable land degradation	71
5.8	Potential to impact on the environmental values of adjacent or nearby conservation areas	71
5.9	Potential deterioration in the quality of surface or underground water	72
5.10	Potential of clearing to cause, or exacerbate, the incidence or intensity of flooding	72
6.	Conclusions	72
7.	References	74
8.	Appendices	77

Tables

Table 1-1: Constraints and limitations of the current study.....	13
Table 1-2: Land Systems occurring within the study area and their representation in the Pilbara bioregion.....	15
Table 1-3: Beard's mapping unit occurring within the study area, its current and pre-European extent within the Pilbara bioregion and its extent across the study area.....	19
Table 2-1: Summary of previous flora and vegetation and fauna reports utilised for the desktop assessment.....	24
Table 3-1: Summary of flora species returned from the NatureMap and Rio Tinto database searches.....	31
Table 3-2: Conservation listed flora species returned by database searches, including pre-field likelihood of occurrence assessment and potential presence via habitat preference and proximity of previous recordings.....	32
Table 3-3: Summary of terrestrial vertebrate fauna species returned from the NatureMap search.....	36
Table 3-4: Conservation listed fauna species returned by database searches, including pre-field likelihood of occurrence assessment and potential presence via habitat preference and proximity of previous recordings**.....	38
Table 4-1: Vegetation type summary.....	43
Table 4-2: Vegetation condition of the study area.....	51
Table 4-3: Total recorded numbers of families, genera, taxa, priority species and weeds recorded for the survey.....	52
Table 4-4: Revised likelihood of occurrence of conservation listed flora species within the study area.....	57
Table 4-5: List of habitat types within the study area including microhabitats and extent.....	60
Table 4-6: Revised likelihood of occurrence for conservation significant fauna within the study area.....	66

Figures

Figure 1-1: Location of the study area 12

Figure 1-2: Rainfall statistics for Pannawonica Aero (Station ID: 005069) 12 months prior to survey. Orange arrow indicates survey timing..... 14

Figure 1-3: Geology within the study area 16

Figure 1-4: Land systems within the study area 17

Figure 1-5: Beard (1975) vegetation association mapping within the study area 20

Figure 1-6: Conservation areas and ESAs in proximity to the study area 22

Figure 2-1: Previous flora and vegetation and fauna surveys in proximity to the study area 25

Figure 2-2: Relevés within study area and tracklogs from current survey 28

Figure 3-1: Rio Tinto records for conservation listed flora previously recorded within 5 km of study area 35

Figure 3-2: Rio Tinto records for conservation listed fauna previously recorded within 5 km of study area 41

Figure 4-1: Vegetation types within the study area..... 50

Figure 4-2: Vegetation condition within the study area 54

Figure 4-3: Conservation significant flora recorded during the survey 55

Figure 4-4: Fauna habitats within the study area..... 63

Plates

Plate 1: Representative photo of vegetation type ChTe/TwTb 44

Plate 2: Representative photo of vegetation type EIchTeTwTb 45

Plate 3: Representative photo of vegetation type EIchAiTeTw 46

Plate 4: Representative photo of vegetation type CfFbCaEm 47

Plate 5: Representative photo of vegetation type ChApAmTe 48

Plate 6: Representative photo of vegetation type ChAtT 49

Plate 7: Representative photo of Scree/ hillslope habitat type from the study area 61

Plate 8: Representative photo of Drainage habitat type from the study area 61

Plate 9: Representative photo of Valley habitat type from the study area 62

Appendices

Appendix 1: Results of NatureMap and EPBC Protected Matters database searches	77
Appendix 2: Likelihood of occurrence criteria for flora and fauna species	78
Appendix 3: Vegetation structural classification and condition rating scale	80
Appendix 4: GPS coordinates of relevés recorded within the study area	81
Appendix 5: Flora species recorded within the study area	82
Appendix 6: Conservation listed flora recorded for the current survey	87
Appendix 7: Relevant legislation	89
Appendix 8: Government and Rio Tinto internal operational controls for environmental management	92

1. Introduction

1.1 Project background and study area location

Rio Tinto is proposing to undertake an exploration drilling program within AML70/0004 ML4SA hereafter referred to as 'the study area'. The study area covers an area of approximately 64.4 ha, and is in the Caliwingina, Mt Pyrton area approximately 97 km northwest of Tom Price in the Pilbara region of Western Australia.

The proposed drill program will comprise 53 drill holes ranging from 40 to 250 m and 10.9 km of new track using blade up technique when grading and will require the clearing of 7.34 ha of native vegetation. The study area location is shown in Figure 1-1.

1.2 Scope of survey

This report describes the methods employed for the flora, vegetation and conservation significant fauna habitat assessment, documents the results of the survey undertaken in March 2022, and identifies vegetation, flora and fauna habitats of conservation significance relevant to the study area.

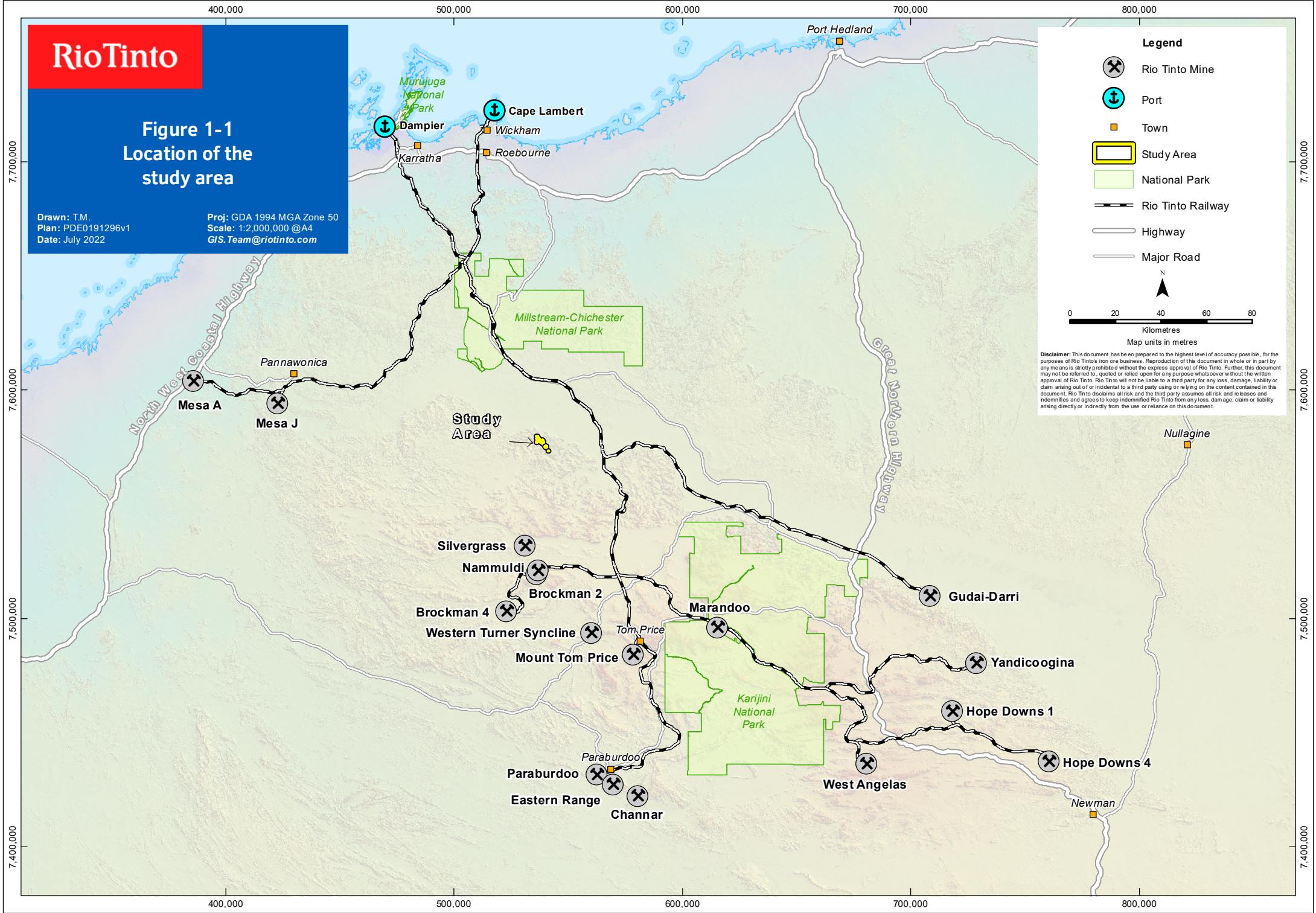
This report is intended as a supporting document for a Native Vegetation Clearing Permit (NVCP) application by Rio Tinto, as required under Section 51A of the *Environmental Protection Act 1986* (EP Act) and has been prepared on the basis of a review of existing information for the study area, combined with a field survey. This report includes a description of the:

- Local environment of the study area including flora, vegetation, threatened fauna habitats, geology, landforms, and hydrology;
- Methods employed during the field survey;
- Locations and populations of conservation listed flora, including photographs and mapping;
- Vegetation associations occurring in the study area, an assessment on their condition and conservation significance for the locality and sub-region, including mapping;
- Fauna habitats present, assessment of their significance for the locality and sub-region, including mapping; and
- Potential impacts of the Proposal on the local environment through application of the 10 Clearing Principles, as outlined in Schedule 5 of the EP Act.

Figure 1-1
Location of the study area

Drawn: T.M.
Plan: PDE0191296v1
Date: July 2022

Proj: GDA 1994 MGA Zone 50
Scale: 1:2,000,000 @A4
GIS.Team@riotinto.com



1.3 Limitations

Limitations of the current survey of the study area are summarised in Table 1-1.

Table 1-1: Constraints and limitations of the current study

Constraint	Limitation
Sources of information	The Pilbara bioregion has been relatively well surveyed, with increasing biological survey work occurring due to the resource expansion in the region. One detailed flora and vegetation survey and one detailed fauna survey have previously been completed over the study area, as well as two NVCP flora and vegetation surveys over parts of the study area; therefore, a suitable number of survey reports are available. Source of information was not considered a limitation for the study area.
Scope of works	The survey requirements of a reconnaissance flora and vegetation survey and targeted terrestrial fauna survey for a NVCP application were met. No quadrat sampling or fauna trapping was undertaken, however, relevés were undertaken to confirm vegetation associations in addition to foot traverses of the study area, fauna habitat assessments and targeted flora and fauna searches.
Completeness of survey	The study area was fully surveyed to the satisfaction of an equivalent reconnaissance survey. No additional surveys were deemed necessary for the purpose of this assessment. Fungi and non-vascular flora (algae, mosses and liverworts) were not sampled.
Intensity of survey	The study area was surveyed by targeted traverses on foot. Habitats with potential to support conservation significant species were searched.
Timing, weather, season, cycle	The survey was conducted during March 2022. Seasonal conditions prior to the survey were considered below average due to lower-than-average rainfall in the preceding three months, however conditions were considered adequate for this level of survey.
Disturbances	A small proportion (2.7 %) of the study area has been disturbed by historical clearing for tracks. There have been no recent fires (< 2 years) within the study area.
Resources	The biologists who undertook the surveys and reporting were suitably qualified and experienced. Carrie Gill (field survey and report writing) has more than ten years' experience as a botanist in Western Australia, with significant experience working in the Pilbara. and Scott Reiffer (field survey) has more than 13 years' experience as a zoologist and botanist in Western Australia and the Pilbara. Steven Dillon, from the Western Australian Herbarium, completed the plant specimen identifications. There were no limitations noted in reports cited in the desktop assessment due to resourcing.
Accessibility / remoteness	The study area was accessed by vehicle and on foot. The study area was adequately traversed on foot. No parts of the study area were inaccessible. Accessibility/remoteness was not considered a limitation to this survey.

1.4 Background Information

1.4.1 Climate

The closest Meteorological station providing rainfall data is the Pannawonica weather station (station ID: 005069) located approximately 112 km east northeast of the study area. For Pannawonica the mean annual rainfall for the period 1971 to 2022 is 406 mm, with most precipitation occurring between January and March, coinciding with the cyclone season (Figure 1-2).

Pannawonica received 135 mm of rainfall in the three months preceding the 2022 survey (BoM 2022) (Figure 1-2). This is 78.9 mm below the long-term average for this period therefore seasonal conditions prior to the survey were considered below average.

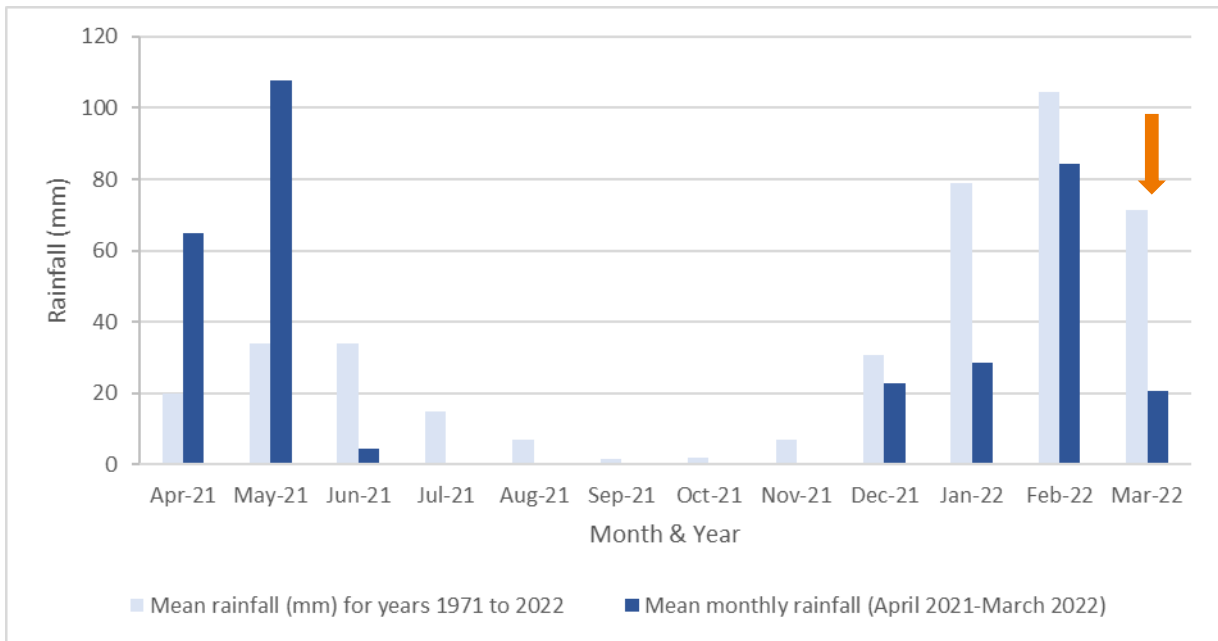


Figure 1-2: Rainfall statistics for Pannawonica Aero (Station ID: 005069) 12 months prior to survey. Orange arrow indicates survey timing.

1.4.2 Geology and soils

Soil-landscape zones of Western Australia have been mapped at a scale of 1:1,000,000 by Tille (2006). These zones describe broad soil and landscape characteristics. The study area lies within the Hamersley Plateaux zone which is characterised by hills and dissected plateaux (with areas of stony plains and hardpan wash plains) on sedimentary and volcanic rocks of the Hamersley Basin (Ophthalmia Fold Belt) and areas of stony soils red shallow loams, red/brown non-cracking clays and red loamy earths.

Two major geological units based on 1:500,000 scale map sheet series (Geological Survey of Western Australia, 2008) occur within the study area:

- Qrc: Colluvium
- Lchk: Brockman Iron Formation.

The geological units represented within the study area are shown in Figure 1-3

1.4.3 Land systems

Land system (rangeland) mapping is based on regional patterns in topography, soils and vegetation (Christian and Stewart 1953). The most recent land system mapping of the Pilbara bioregion, in which the study area lies, was completed by van Vreeswyk *et al.* (2004). The mapping classifies the Pilbara region into 102 land systems. An assessment of land systems provides an indication of the occurrence and distribution of flora and vegetation types as well as fauna habitats present in the study area.

The study area intersects two land systems - Boolgeeda Land System and the Newman Land System (Figure 1-4). The Land Systems and their extent within the study area are presented below (Table 1-2) and described as follows:

- Boolgeeda Land System – Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.
- Newman Land System – Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.

Table 1-2: Land Systems occurring within the study area and their representation in the Pilbara bioregion

Land System (Map code)	Total area (ha) in Pilbara bioregion	Area (ha) in study area	Proportion (%) of study area	Study area proportion (%) of land system extent
Boolgeeda Land System	774,800	5.06	7.86	0.001
Newman Land System	1,458,000	59.34	92.14	0.004

RioTinto

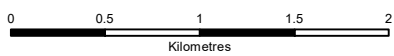
Figure 1-3
Geology within
the study area

Drawn: T.M.
Plan: PDE0191296v1
Date: July 2022

Proj: GDA 1994 MGA Zone 50
Scale: 1:40,000 @A4
GIS.Team@riotinto.com

Study Area 250k Geology

- AHd
- AHr
- Czc
- Czr
- PHb
- Qa



Map units in metres

Disclaimer: This document has been prepared to the highest level of accuracy possible, for the purposes of Rio Tinto's iron ore business. Reproduction of this document in whole or in part by any means is strictly prohibited without the express approval of Rio Tinto. Further, this document may not be referred to, quoted or relied upon for any purpose whatsoever without the written approval of Rio Tinto. Rio Tinto will not be liable to a third party for any loss, damage, liability or claim arising out of or incidental to a third party using or relying on the content contained in this document. Rio Tinto disclaims all risk and the third party assumes all risk and releases and indemnifies and agrees to keep indemnified Rio Tinto from any loss, damage, claim or liability arising directly or indirectly from the use or reliance on this document.

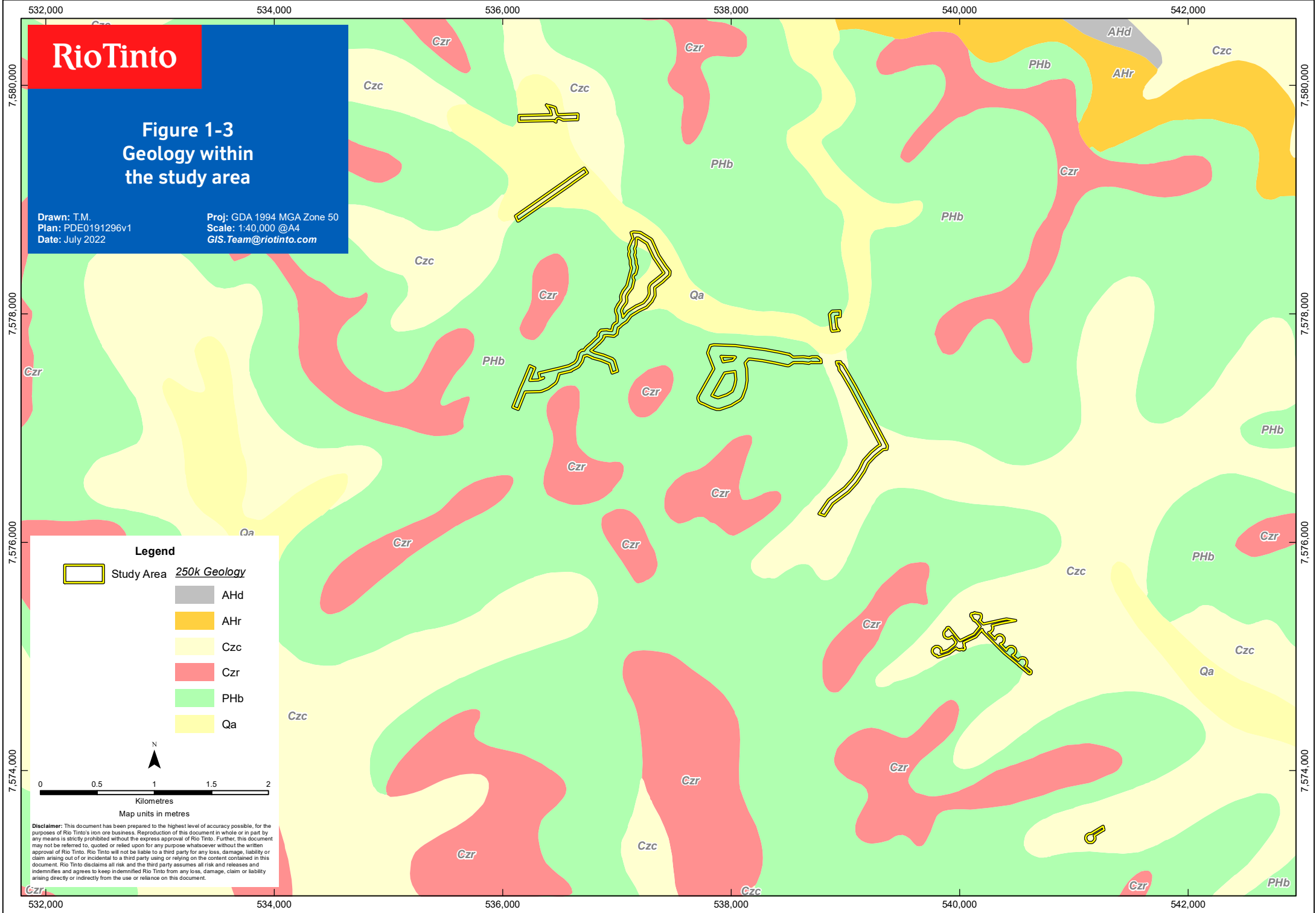
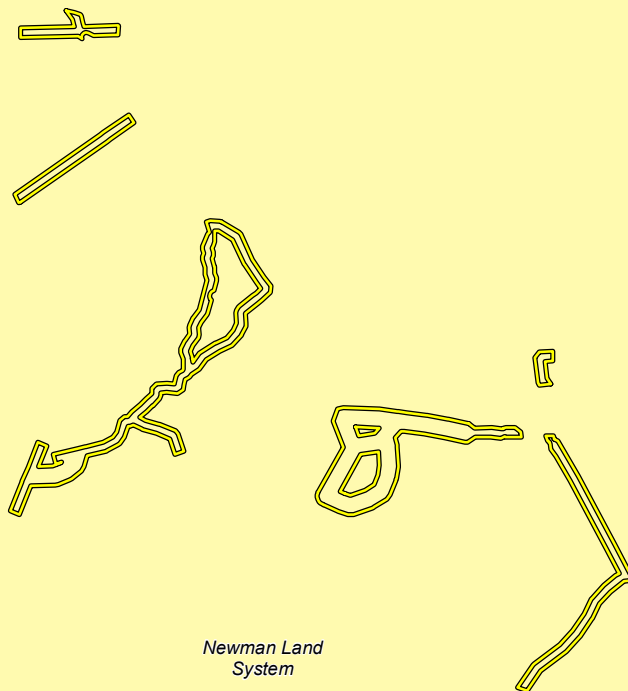


Figure 1-4 Land systems within the study area

Drawn: T.M.
Plan: PDE0191296v1
Date: July 2022

Proj: GDA 1994 MGA Zone 50
Scale: 1:40,000 @A4
GIS.Team@riotinto.com



Boolgeeda
Land System

Newman
Land System

Boolgeeda
Land System

Legend

Study Area

Rangelands Land systems

Boolgeeda Land System

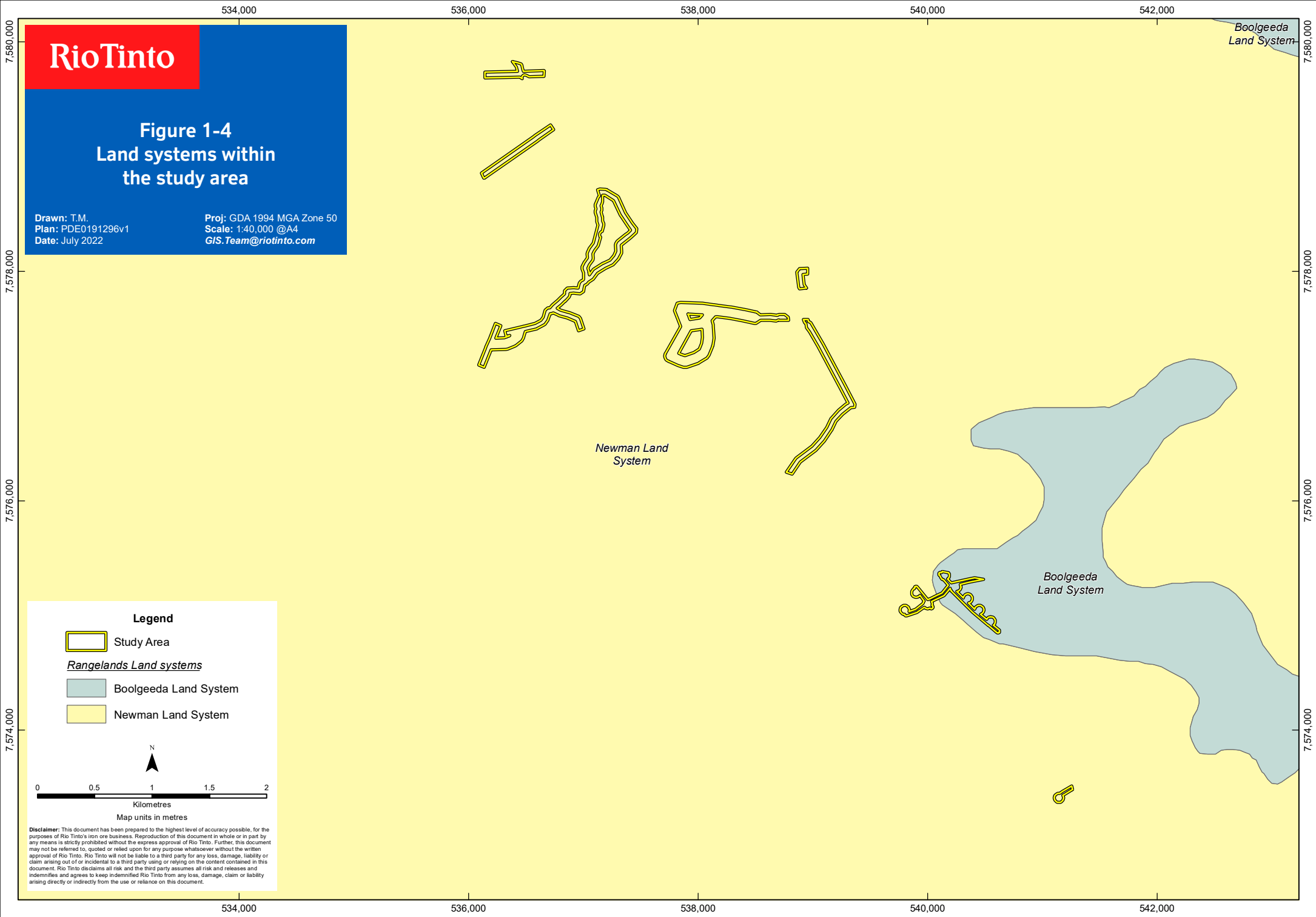
Newman Land System

N

0 0.5 1 1.5 2

Kilometres
Map units in metres

Disclaimer: This document has been prepared to the highest level of accuracy possible, for the purposes of Rio Tinto's iron ore business. Reproduction of this document in whole or in part by any means is strictly prohibited without the express approval of Rio Tinto. Further, this document may not be referred to, quoted or relied upon for any purpose whatsoever without the written approval of Rio Tinto. Rio Tinto will not be liable to a third party for any loss, damage, liability or claim arising out of or incidental to a third party using or relying on the content contained in this document. Rio Tinto disclaims all risk and the third party assumes all risk and releases and indemnifies and agrees to keep indemnified Rio Tinto from any loss, damage, claim or liability arising directly or indirectly from the use or reliance on this document.



1.4.4 Surface hydrology and groundwater

The study area lies across the Fortescue River catchment basin (Department of Water and Environment Regulation 2022).

No significant streams or tributaries as mapped by Department of Water (DoW 2014) occur in the study area. The survey area is also classed as having Moderate potential for groundwater interaction according to BoM Groundwater Dependent Ecosystems Atlas (BoM 2014b)

1.4.5 Regional biogeography

The Interim Biogeographic Regionalisation of Australia (IBRA7) recognises 89 bioregions (DAWE 2022a). The study area is located in the Pilbara (PIL) bioregion as defined by IBRA. The Pilbara bioregion has been further subdivided into four subregions: Chichester (PIL1); Fortescue Plains (PIL2); Hamersley (PIL3); and Roebourne (PIL4).

The study area falls within the PIL3 Hamersley sub-region and is described by Kendrick (2001) as:

- *'Mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by gorges (basalt, shale and dolerite). Mulga low woodland over bunch grasses on fine textured soils in valley floors, and Eucalyptus leucophloia over Triodia brizoides on skeletal soils of the ranges. The climate is Semi-desert tropical, average 300 mm rainfall, usually in summer cyclonic or thunderstorm events. Winter rain is not uncommon. Drainage into either the Fortescue (to the north), the Ashburton to the south, or the Robe to the west.'*

1.4.6 Beard's regional vegetation mapping

Beard (1975) mapped the vegetation of the Pilbara at a scale of 1:1,000,000. The study area lies within the Fortescue Botanical District of the Eremaean Botanical Province (Beard, 1990). The vegetation of this province is typically open, and frequently dominated by *Triodia* spp. (spinifex), *Acacia* spp. (wattles) and occasional Eucalypts. Of the four major physiographic units within the Fortescue District identified by Beard the survey area belongs to the Hamersley Plateau sub-region (generally equivalent to the Hamersley (PIL3) IBRA subregion) which is described by Van Vreeswyk, et al. (2004) as:

- *rounded hills and ranges, mainly of jaspilite and dolomite with some shale, siltstone and volcanics. and dominated by tree steppe with Eucalyptus leucophloia (snappy gum), Acacia aneura (Mulga) low woodland in valleys, ...and sparse shrub steppe with Acacia xiphophylla (snakewood) on drainage lines.*

Beard further delineated these broad units into vegetation associations. The study area intersects one vegetation association:

- Hamersley 82 (A1Li)- Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*

1.4.7 Pre-European vegetation extent

The pre-European and current extent of native vegetation associations in Western Australia has been interpreted by Shepherd *et al.* (2002) using data from Beard's (1975) regional vegetation mapping and other vegetation mapping, as well as satellite imagery and orthophoto interpretation.

Shepherd *et al.* (2002) identified the Pilbara bioregion as having largely intact native vegetation owing to the lack of intensive agricultural land use practices. Although the native vegetation remains widespread and largely intact, the floristic composition and structural characteristics have almost certainly changed since European settlement by grazing and altered fire regimes (Shepherd *et al.* 2002).

Table 1-3 presents the pre-European and current extent of the Hamersley 82 vegetation association across its range and within the study area and is mapped in Figure 1-5.

Table 1-3: Beard's mapping unit occurring within the study area, its current and pre-European extent within the Pilbara bioregion and its extent across the study area

Beard's mapping unit (Shepherd vegetation association)	Pre-European extent (ha)^	Current extent (ha)^	Percentage remaining (%)	Extent (ha) within study area / (Percentage of current extent)
Hammersley 82	2,563,583	2,550,888	99.50	64.4 (0.003 %)

^Government of Western Australia (2019)

As part of the Biodiversity Audit of WA (May & McKenzie, 2002) these vegetation associations were assessed according to their reservation status in IUCN Class I-IV Reserves, non-IUCN Reserves, and (the then) CALM managed pastoral leases, and their priority for acquisition and reservation ranked as low (L), medium (M) or high (H). Hamersley 82 vegetation association is considered to be of low reservation priority (L) (Kendrick 2001).

532,000 534,000 536,000 538,000 540,000 542,000

7,580,000

7,578,000

7,576,000

7,574,000

532,000 534,000 536,000 538,000 540,000 542,000

7,580,000

7,578,000

7,576,000

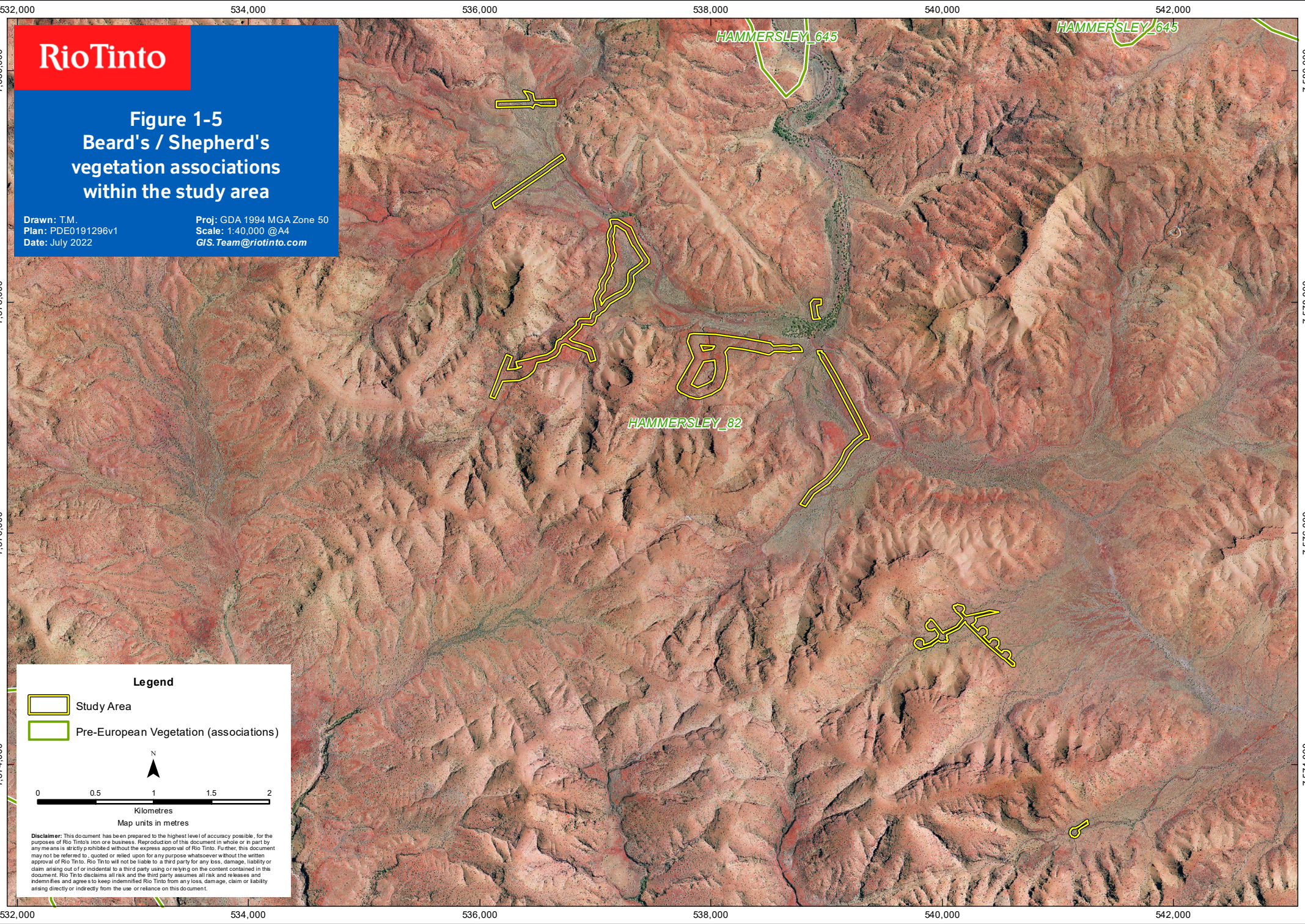
7,574,000





Figure 1-5
Beard's / Shepherd's
vegetation associations
within the study area

Drawn: T.M.
 Plan: PDE0191296v1
 Date: July 2022

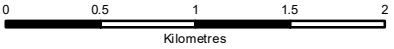
Proj: GDA 1994 MGA Zone 50
 Scale: 1:40,000 @A4
 GIS.Team@riotinto.com



Legend

-  Study Area
-  Pre-European Vegetation (associations)

N



Kilometres

Map units in metres

Disclaimer: This document has been prepared to the highest level of accuracy possible, for the purposes of Rio Tinto's iron ore business. Reproduction of this document in whole or in part by any means is strictly prohibited without the express approval of Rio Tinto. Further, this document may not be referred to, quoted or relied upon for any purpose whatsoever without the written approval of Rio Tinto. Rio Tinto will not be liable to a third party for any loss, damage, liability or claim arising out of or incidental to a third party using or relying on the content contained in this document. Rio Tinto disclaims all risk and the third party assumes all risk and releases and indemnifies and agrees to keep indemnified Rio Tinto from any loss, damage, claim or liability arising directly or indirectly from the use or reliance on this document.

1.4.8 Conservation areas and environmentally sensitive areas

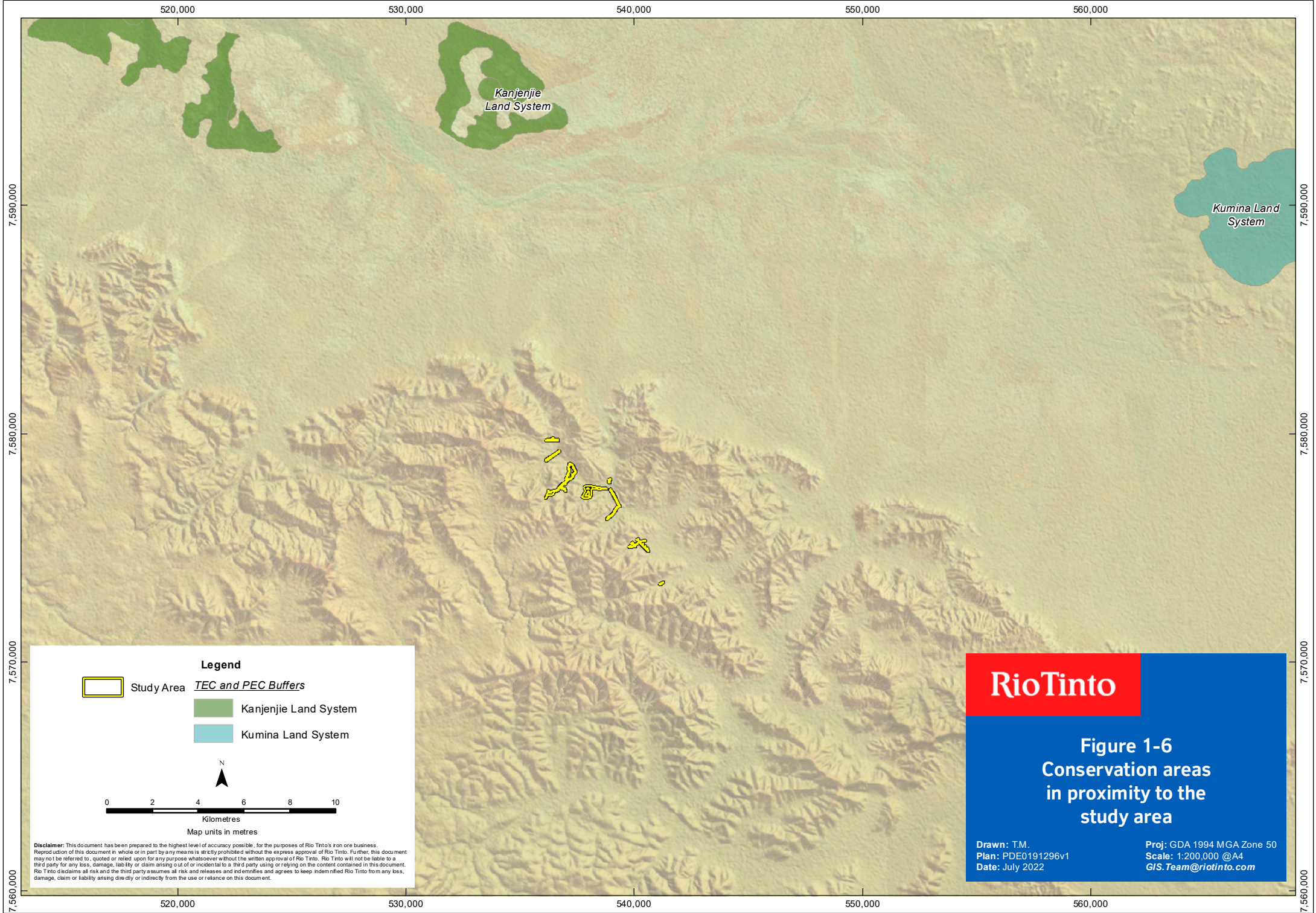
Environmentally Sensitive Areas (ESAs) are defined in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005* under section 51B of the WA State EP Act. ESAs include areas declared as: World Heritage; included on the Register of the National Estate; defined wetlands; vegetation containing rare (Threatened) flora; Threatened Ecological Communities (TEC); and Bush Forever sites.

No mapped conservation areas or ESAs intersect the study area. The nearest conservation area, Millstream Chichester National Park lies approximately 35 km northwest of the study area. Due to the separation, the proposed clearing is not expected to impact the environmental values of Millstream Chichester National Park (Figure 1-6).

No mapped Threatened Ecological Communities (TECs) occur within the study area. The nearest buffer boundary to the 'Themeda grasslands on cracking clays (Hamersley Station)' TEC is located approximately 47 km southeast of the study area (Figure 1-6). Due to the separation of this TEC, the proposed clearing is not expected to impact the environmental values of this TEC.

1.4.9 Priority ecological communities

No mapped Priority Ecological Communities (PECs) occur within the study area. The closest occurrence of a PEC is the buffer of the Priority 3 ecological community, Kanjenjie Land System, located approximately 13 km north of the study area. The proposed activities are unlikely to impact on this community.



RioTinto

**Figure 1-6
Conservation areas
in proximity to the
study area**

Drawn: T.M.
Plan: PDE0191296v1
Date: July 2022

Proj: GDA 1994 MGA Zone 50
Scale: 1:200,000 @A4
GIS.Team@riotinto.com

Legend

Study Area

Kanjenjie Land System

Kumina Land System

TEC and PEC Buffers

0 2 4 6 8 10
Kilometres
Map units in metres

Disclaimer: This document has been prepared to the highest level of accuracy possible, for the purposes of Rio Tinto's iron ore business. Reproduction of this document in whole or in part by any means is strictly prohibited without the express approval of Rio Tinto. Further, this document may not be referred to, quoted or relied upon for any purpose whatsoever without the written approval of Rio Tinto. Rio Tinto will not be liable to a third party for any loss, damage, liability or claim arising out of or incidental to a third party using or relying on the content contained in this document. Rio Tinto disclaims all risk and the third party assumes all risk and releases and indemnifies and agrees to keep indemnified Rio Tinto from any loss, damage, claim or liability arising directly or indirectly from the use or reliance on this document.

2. Methodology

2.1 Desktop assessment

Prior to the commencement of the field survey, a desktop assessment was undertaken to identify environmental information relevant to the study area. This desktop assessment included a review of:

- Overall site characteristics including:
 - A review of rainfall data from the closest reliable weather station (BoM 2022)
 - A review of major geological units based on 1:250,000 scale map sheet series (Martin *et al.* 2014)
 - Surface hydrology and groundwater
 - Land systems mapping adapted by van Vreeswyk *et al.* (2004).
 - Bioregional assessments (including IBRA bioregion, Beards regional vegetation mapping, Pre-European vegetation mapping)
 - Conservation areas and environmentally sensitive areas
- The Department of Agriculture, Water and the Environment Protected Matters Search Tool (PMST) to identify species and communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) potentially occurring within the study area (DAWE 2022b) (Appendix 1)
- The DBCA *NatureMap* database for flora and fauna species previously recorded within a 20 km radius of the study area (Appendix 1)
- Rio Tinto's database for flora and fauna species previously recorded within a 20 km radius of the study area.

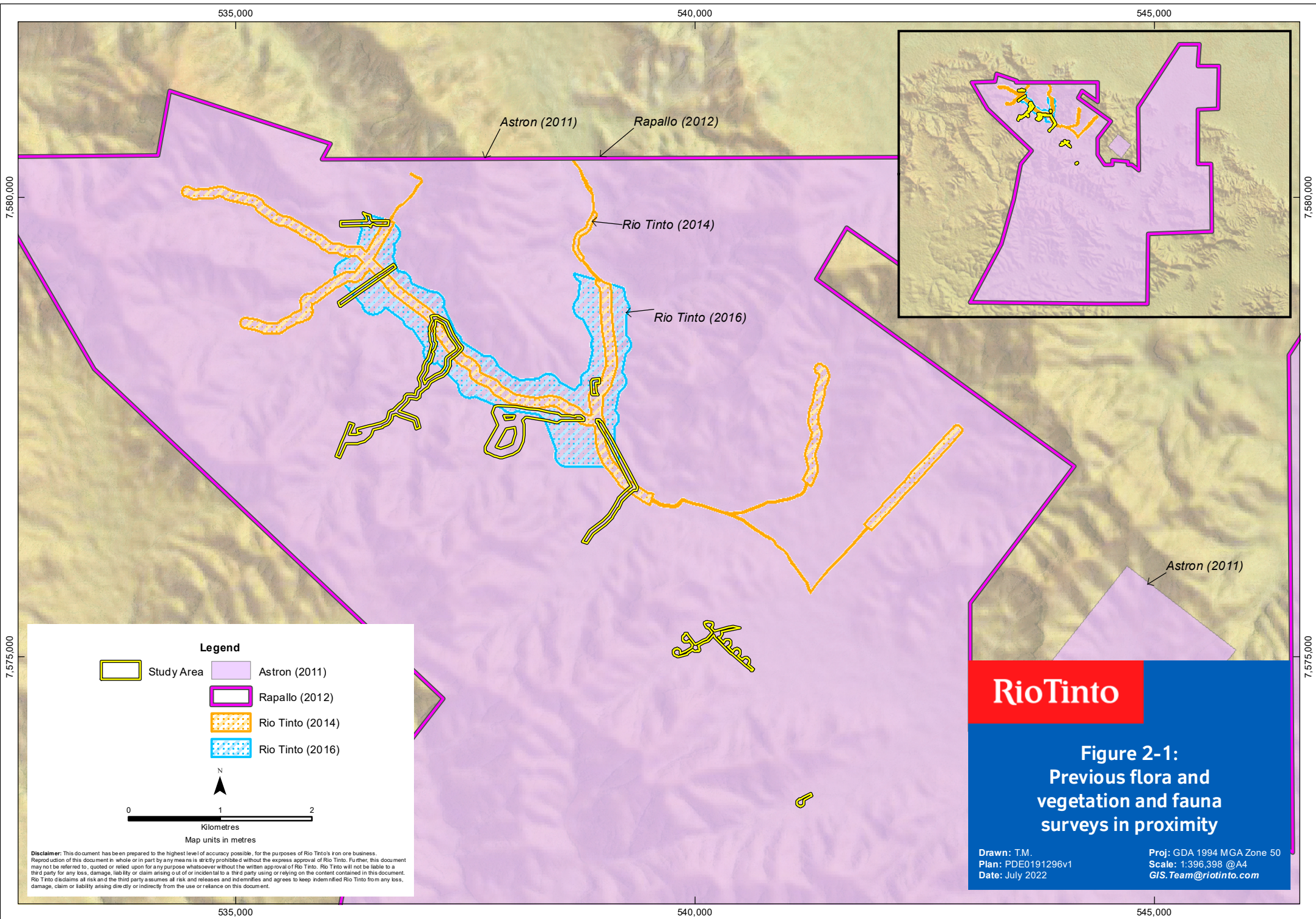
2.1.1 Literature review

Three previous flora and vegetation survey reports have been reviewed as part of the flora and vegetation desktop assessment: Astron (2011), Rio Tinto (2014) and Rio Tinto (2016). Two previous fauna survey reports have been reviewed as part of the fauna desktop assessment: Rapallo (2012) and Rio Tinto (2014).

These reports have been consulted as part of the literature review to determine conservation significant species that may occur within the study area, as well as flora, vegetation units, ecological communities and fauna habitats. A summary of the findings of each report utilised in the desktop review is presented in Table 2-1.

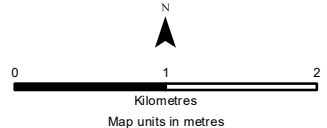
Table 2-1: Summary of previous flora and vegetation and fauna reports utilised for the desktop assessment

Report and level of survey	Size (ha)	Number of taxa	Conservation listed flora / fauna	Weeds	Vegetation / Fauna Habitat of significance
Astron (2011) Caliwingina Vegetation and Flora Survey Level 2 (Detailed) Survey	29,643.61	329 taxa from 152 genera representing 50 families	<i>Goodenia nuda</i> (Priority 4) <i>Rhynchosia bungarensis</i> (Priority 4) <i>Indigofera rivularis</i> (Priority 3)	18 taxa	Four vegetation associations representative of 'ecosystems at risk'
Rapallo (2012) Terrestrial Fauna Survey of the Caliwingina Project Area for Rio Tinto Iron Ore	29,643.61	18 native non-volant mammals 9 bats 2 introduced non-volant mammal 51 reptiles 69 Birds 3 Amphibian	Northern Quoll (EN, S2) Pilbara Olive Python (VU, S3) Ghost Bat (S3) Western Pebble-mound Mouse (P4) Rainbow Bea-eater (M, S5)	NA	None
Rio Tinto (2014) Flora, Vegetation and Fauna Survey for the Caliwingina area Native Vegetation Clearing Permit Supporting Report	143	130 flora taxa from 76 genera representing 33 families	Western Pebble-mound Mouse (P4)	4 taxa	None
Rio Tinto (2016) Desktop Flora, Vegetation and Fauna Habitat Assessment at Mt Pyrton. Native Vegetation Clearing Permit	182	NA	NA	NA	One vegetation association representative of 'ecosystems at risk'



Legend

- Study Area
- Astron (2011)
- Rapallo (2012)
- Rio Tinto (2014)
- Rio Tinto (2016)



Disclaimer: This document has been prepared to the highest level of accuracy possible, for the purposes of Rio Tinto's iron ore business. Reproduction of this document in whole or in part by any means is strictly prohibited without the express approval of Rio Tinto. Further, this document may not be referred to, quoted or relied upon for any purpose whatsoever without the written approval of Rio Tinto. Rio Tinto will not be liable to a third party for any loss, damage, liability or claim arising out of or incidental to a third party using or relying on the content contained in this document. Rio Tinto disclaims all risk and the third party assumes all risk and releases and indemnifies and agrees to keep indemnified Rio Tinto from any loss, damage, claim or liability arising directly or indirectly from the use or reliance on this document.

Rio Tinto

Figure 2-1:
Previous flora and
vegetation and fauna
surveys in proximity

Drawn: T.M.
 Plan: PDE0191296v1
 Date: July 2022

Proj: GDA 1994 MGA Zone 50
 Scale: 1:396,398 @A4
 GIS.Team@riotinto.com

2.1.2 Database searches

A desktop assessment was undertaken prior to the commencement of the field survey to identify known or potential environmental constraints within or pertaining to the study area and surrounds.

The Department of Biodiversity, Conservation and Attractions (DBCA) and WA Museum's (WAM) NatureMap database was reviewed for Threatened and Priority Flora and Threatened and Priority Fauna (EPBC Act and BC Act) that have the potential to utilise the habitats present within the study area. The Commonwealth Department of Agriculture, Water and the Environment (DAWE) administered EPBC Act Protected Matters Search Tool (PMST) was also reviewed for Matters of National Environmental Significance (MNES) listed under the EPBC Act including Threatened flora and fauna and TECs (DAWE 2022).

Spatial data for conservation significant flora and fauna held and maintained by Rio Tinto was also reviewed as part of the desktop study (Rio Tinto Fauna Database, Rio Tinto Flora Database). Any ESA, Reserves and/or conservation areas within or surrounding the study area were identified using relevant GIS layers held by Rio Tinto. The search coordinates used (117.363; -21.903) were at a central point within the study area. A buffer of 20 km was used for the NatureMap, Rio Tinto and Protected Matters search tool (PMST) database searches. Result outputs of NatureMap and PMST searches undertaken are presented in Appendix 2 and summarised in section 3.

2.2 Likelihood of occurrence assessment

2.2.1 Flora

The results of the database searches were used to compile a list of conservation significant flora previously recorded within, or with the potential to occur within, the study area. The likelihood of conservation significant flora species occurring within the study area was determined prior to the field survey based on proximity of known records and presence of potentially suitable habitat (Section 3.1.2). Each species' likelihood of occurrence was updated following the field survey based on presence / absence of the species and suitable habitat within the study area. Likelihood of occurrence rankings and their definitions are presented in Appendix 2.

2.2.2 Fauna

A likelihood of occurrence assessment was undertaken to identify habitats within the study area for which Threatened and Priority fauna listed under the current EPBC Act and BC Act may have specific dependence.

The likelihood of Threatened and Priority fauna species occurring within the study area was determined prior to the field survey based on the location of database records, availability of potentially suitable habitat and knowledge of the species ecology (Section 3.2.2). Each species' likelihood of occurrence was updated following the field survey based on species sightings and observation of suitable habitat within the study area. Marine fauna were excluded from the likelihood assessment as the study area does not contain marine habitat. Likelihood of occurrence rankings and their definitions are presented in Appendix 2.

2.3 Field Survey

The study area was surveyed by Rio Tinto ecologists Scott Reiffer, Dean Main and Carrie Gill on the 10-11th March 2022.

The study area was assessed in accordance with the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a) and *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016b). Fauna habitats were assessed in reference to *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020) and

Environmental Factor Guideline – Terrestrial Fauna (EPA 2016c). Habitats with potential to support species of conservation significance, identified by the database searches and desktop assessment, were the focus of targeted searches.

Relevé (unpegged) survey sites, typically 50 x 50 m in size (to represent an approximate 2,500 m²), were established in representative areas of vegetation associations within the study area. A botanical relevé is described as a vegetation sample that describes the structure and floristics and associated physical attributes, flora and opportunistic fauna sightings. A total of 16 relevés were surveyed in representative vegetation types. The layout and co-ordinates of each relevé sampled within the study area is presented in Figure 2-2 and Appendix 4. At each relevé, a location was recorded with a handheld GPS (GDA94, Z50) and photographs were taken. Data was collected on the flora species present including: percentage cover; average height of each vegetation stratum; aspect; topography; soil texture and colour; and landform type and habitat features.


Locations of flora of conservation significance, flora of special interest, unknown flora, weeds and other observations including opportunistic fauna sightings were recorded using a hand-held GPS (GDA94, Z50). Where populations of conservation significant flora were encountered; estimates of density or numbers of individuals, habitats and associated flora were recorded. Density or numbers of individuals of introduced flora species were also recorded.

535,000

540,000

7,580,000

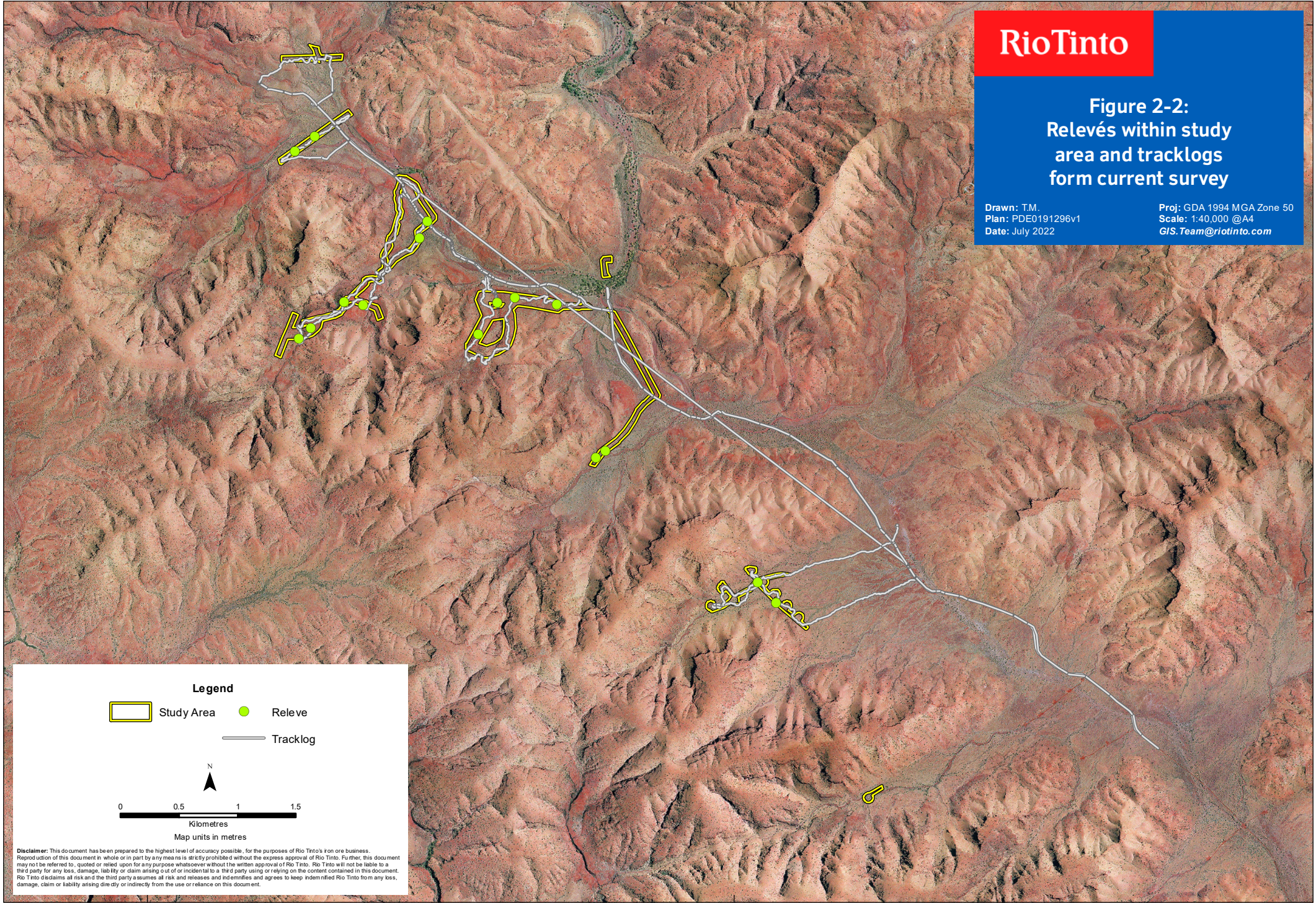
7,580,000



**Figure 2-2:
Relevés within study
area and tracklogs
form current survey**

Drawn: T.M.
Plan: PDE0191296v1
Date: July 2022



Proj: GDA 1994 MGA Zone 50
Scale: 1:40,000 @A4
GIS.Team@riotinto.com





7,575,000

7,575,000

Legend

 Study Area  Relevé

 Tracklog



0 0.5 1 1.5
Kilometres

Map units in metres

Disclaimer: This document has been prepared to the highest level of accuracy possible, for the purposes of Rio Tinto's iron ore business. Reproduction of this document in whole or in part by any means is strictly prohibited without the express approval of Rio Tinto. Further, this document may not be referred to, quoted or relied upon for any purpose whatsoever without the written approval of Rio Tinto. Rio Tinto will not be liable to a third party for any loss, damage, liability or claim arising out of or incidental to a third party using or relying on the content contained in this document. Rio Tinto disclaims all risk and the third party assumes all risk and releases and indemnifies and agrees to keep indemnified Rio Tinto from any loss, damage, claim or liability arising directly or indirectly from the use or reliance on this document.

535,000

540,000

2.3.1 **Vegetation descriptions condition assessment and mapping**

Vegetation community mapping was conducted using a combination of aerial photo-interpretation, regional and local vegetation mapping, on-ground confirmation and vegetation structure data. Vegetation types were described to Association (Level V) in accordance with the National Vegetation Information System (NVIS) (ESCAVI 2003) (Appendix 3).

Vegetation condition mapping was conducted using the recommended EPA (2016a) scale adapted from Keighery (1994) and Trudgen 1988 (Appendix 3).

The mapping notes gathered in the field were used to prepare a draft map of vegetation, utilising rectified colour digital aerial photography as the background. The vegetation boundaries were digitised on-screen using ArcMap 10.7.1. The resulting polygons were attributed with the relevant information including the vegetation association, description and condition. Point locations of each relevé recorded were also uploaded into ArcMap, and together with visual photographs were used to assist with the finalising of vegetation boundaries.

2.3.2 **Flora identification**

Voucher samples of unknown and potentially conservation significant flora were collected, pressed and dried in the field and assigned a unique reference identification sample number.

Flora samples collected in the field were taken to the Western Australian Herbarium (WAH) to be formally identified using relevant taxonomic publications and comparisons to collections at the WAH. Sample identifications were conducted by specialist taxonomist Steve Dillon. Voucher quality specimens will be lodged with the WAH in the future. Nomenclature was cross-checked using the FloraBase (WAH 2022) website and updated where required.

2.3.3 **Fauna habitat assessment**

The fauna habitat assessment aims to identify fauna habitat types (and their extent) represented within the study area. Habitat assessments incorporate information gathered through the desktop assessment and field survey. Fauna habitats are identified based on their unique combination of landforms, and soil and vegetation, which helps to determine whether they may support specific fauna assemblages or significant fauna species.

Significant habitats include rare or isolated habitats and habitat features, such as rock piles, caves, gullies, significant trees, drainage lines or waterholes, damplands and springs as well as those that are likely to provide special resources to fauna. Other important habitats include ecological linkages and migration pathways, refugia, islands, areas that support large or seasonal aggregations of fauna and areas that are important to significant fauna, for breeding, roosting or foraging.

Habitats were assessed for their potential to support species of conservation significance, taking into account relevant State and Commonwealth Guidelines to support identification of 'potential' habitat. Supporting evidence such as sightings, the presence of microhabitats including caves, water holes, tree hollows and burrows were recorded throughout the study area. Representative traverses were also completed throughout all habitats present within the study area.

Further assessment on the 'likelihood' of the study area supporting fauna of conservation significance was undertaken based on the quality of habitat for fauna. Data was collected opportunistically throughout the study area and habitats were rated based on the likelihood of supporting conservation significant fauna species as 'previously recorded', 'likely', 'potential' or 'unlikely' (Appendix 2).

Fauna habitats were assessed and mapped as per *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020) which was current at the time of the survey.

2.3.4 Other vegetation of significance

Vegetation not formally classified and protected under state or Commonwealth legislation may still be considered conservation significant. Vegetation that may fall under this category includes (but is not limited to) vegetation supporting elevated floristic diversity, habitats supporting numerous conservation-listed species, ecosystems at risk (Kendrick 2001), novel floristic associations, groundwater dependant ecosystems, uncommon vegetation and associations on novel landforms.

Vegetation associations or biological features assigned a significance classification are, for the purpose of this document, considered to be of elevated significance when compared to all other identified associations or features that are common or widespread and therefore well represented.

2.3.5 Environmentally significant areas

Rio Tinto manages all work, including clearing, through the Approvals Request Coordination System which ensures biological and heritage surveys are completed and all government regulatory approvals are in place prior to the commencement of works.

Environmentally significant features are uploaded into Rio Tinto's Geographic Information System (GIS) database which includes a description highlighting the significance of these areas. Individuals or small populations of conservation listed flora are protected as buffered point locations, while larger populations and significant habitat are protected as 'significant areas' The GIS database is used as part of the Approvals Request Coordination System when reviewing the Proposal, thereby ensuring appropriate management conditions are in place.

3. Desktop assessment results

3.1 Flora

3.1.1 Flora diversity

The DBCA NatureMap and Rio Tinto database search results cover all species detected previously within 20 km of the study area. The DBCA NatureMap database returned a total of 55 taxa from 39 genera and 19 families. The Rio Tinto database returned a total of 189 flora taxa from 111 genera and 45 families from within a 20 km radius of the study area (Table 3-1). The combined DBCA NatureMap and Rio Tinto databases returned a total of twelve conservation significant (Priority) flora species (Table 3-2). The PMST database search did not return any conservation significant flora species.

Table 3-1 presents a summary of flora species returned by the Rio Tinto database search.

Table 3-1: Summary of flora species returned from the NatureMap and Rio Tinto database searches

Flora group	Number of potential species within a 20 km radius of the study area	
	NatureMap database	Rio Tinto database
Families	19	45
Genera	39	111
Species	55	189
Conservation listed	4	10
Weeds	0	27

Astron (2011) recorded 329 vascular flora taxa from their study area of 29,643.61 ha while Rio Tinto (2014) recorded 130 taxa from their study area of 142.5 ha.

3.1.2 Conservation significant flora (pre-field likelihood)

Twelve conservation significant flora species were returned from the database searches (Appendix 1); ten Priority 3 species; and two Priority 4 flora species. None of these Priority species have been previously recorded within the study area, however three were considered 'likely', and three have the 'potential' to occur based on the criteria used to assess the pre-field likelihood of occurrence (Table 3-2, Appendix 2).

The likelihood rating of conservation listed flora was updated following the field survey based on presence / absence of the species and suitable habitat within the study area (section 4.6, Table 4-4), including a consideration of factors such as whether that species was likely to have been readily detected during the survey (based on size, life form, flowering status etc.), or if the species was unlikely to be present due to unsuitable survey timing and conditions.

Table 3-2: Conservation listed flora species returned by database searches, including pre-field likelihood of occurrence assessment and potential presence via habitat preference and proximity of previous recordings

Species	Status	NM	RT	EPBC	Habitat and discussion (pre-field)	Likelihood of occurrence (pre-field)	Distance to nearest record (km)
Priority 3							
<i>Acacia dawsoniana</i>	P3	X			Spreading shrub. Stony red loamy soils. Low rocky rises, along drainage lines (WAH 2022).	Likely Habitat suitable to support this species, stony red loamy soils on low rocky rises and along drainage lines, potentially present within the study area and relative proximity of known records means this taxon is likely to occur.	~10
<i>Gymnanthera cunninghamii</i>	P3		X		Erect shrub, 1-2 m high. Fl. cream-yellow-green, Jan to Dec. Sandy soils (WAH 2022).	Potential Habitat suitable to support this species, sandy spoils, are potentially present within the study area based on previous vegetation mapping.	25.6
<i>Indigofera rivularis</i>	P3	X	X		Erect perennial shrub, creek line, drainage line, gorge/gully (WAH 2022).	Likely Habitat suitable to support this species, creek lines and drainage lines, are potentially present within the study area based on previous vegetation mapping. Additionally, the close proximity to previous records of this species outside the study area.	4.0
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	P3		X		Herb or shrub, 0.1-0.3 m high. Fl. blue-purple-violet, Apr to May. Ironstone soils. Near creeks, rocky hills (WAH 2022).	Potential Habitat suitable to support this species, stony hills, are potentially present within the study area based on previous vegetation mapping.	5.5
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	P3		X		Spreading shrub, skeletal red soils pockets, steep slopes (WAH 2022).	Unlikely Suitable habitat is not likely to occur within the study area.	26.2

Species	Status	NM	RT	EPBC	Habitat and discussion (pre-field)	Likelihood of occurrence (pre-field)	Distance to nearest record (km)
<i>Sida</i> sp. Hamersley Range (K. Newbey 10692)	P3		X		Low spreading shrub, Base of breakaway, crevices in ironstone. Sides of ironstone breakaways. Gullies (WAH 2022).	Unlikely Suitable habitat is not likely to occur within the study area.	38.9
<i>Solanum albotellatum</i>	P3	X			Perennial herb. Heavy clays and cracking clays (WAH 2022).	Unlikely No heavy clays or cracking clays were not observed in the study area. Given the lack of suitable habitat present in the study area the taxon is considered unlikely to occur	~15
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3		X		Tussocky perennial grass-like or herb. Red clay, clay pan, grass plain. Cracking clays (WAH 2022).	Unlikely Suitable habitat is not likely to occur within the study area.	38.9
<i>Triodia basitricha</i> (Pilbara Curly Spinifex)	P3		X		Hummock forming grass. Brown clay-loam over ironstone. Stony plain. Rocky rise/flat/hill, Low rise (WAH 2022).	Likely Habitat suitable to support this species, stony plains, are potentially present within the study area based on previous vegetation mapping.	32.0
<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)	P3		X		Perennial hummock grass. Light orange-brown, pebbly loam. Amongst rocks & outcrops, gully slopes (WAH 2022).	Unlikely It is unlikely habitat suitable to support this species	31.8
Priority 4							
<i>Goodenia nuda</i>	P4	X	X		Erect to ascending herb. Drainage line, sandy floodplain, mixed alluvial plain. Valley floor (WAH 2022).	Potential Habitat suitable to support this species, mixed alluvial plain, are potentially present within the study area based on previous vegetation mapping.	3.1






Species	Status NM	RT	EPBC	Habitat and discussion (pre-field)	Likelihood of occurrence (pre-field)	Distance to nearest record (km)
<i>Rhynchosia bungarensis</i>	P4	X		Compact, prostrate shrub. Pebbly, shingly coarse sand amongst boulders. Banks of flow lines, gullies and valley walls (WAH 2022).	Potential Habitat suitable to support this species, drainage lines and gullies on stony hillslopes, is potentially present within the study area based on previous vegetation mapping.	3.3

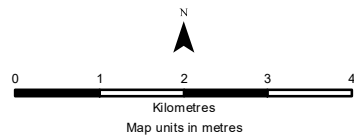
NM – NatureMap; **RT** –Rio Tinto Priority Flora Database; **EPBC** – EPBC Act Protected Matters Search Tool.

Figure 3-1:
Rio Tinto records for
conservation listed
flora recorded within
5 km of the study area

Drawn: T.M.
Plan: PDE0191296v1
Date: July 2022

Proj: GDA 1994 MGA Zone 50
Scale: 1:90,000 @A4
GIS.Team@riotinto.com

- Legend**
-  Study Area
 - Conservation listed flora**
 -  Goodenia nuda, P4
 -  Indigofera rivularis, P3
 -  Rhynchosia bungarensis, P4
 -  Rostellularia adscendens var. latifolia, P3



Disclaimer: This document has been prepared to the highest level of accuracy possible, for the purposes of Rio Tinto's iron ore business. Reproduction of this document in whole or in part by any means is strictly prohibited without the express approval of Rio Tinto. Further, this document may not be referred to, quoted or relied upon for any purpose whatsoever without the written approval of Rio Tinto. Rio Tinto will not be liable to a third party for any loss, damage, liability or claim arising out of or incidental to a third party using or relying on the content contained in this document. Rio Tinto disclaims all risk and the third party assumes all risk and releases and indemnifies and agrees to keep indemnified Rio Tinto from any loss, damage, claim or liability arising directly or indirectly from the use or reliance on this document.

3.2 Fauna

3.2.1 Fauna diversity

The NatureMap database search returned a total of 178 terrestrial vertebrate fauna species within 20 km of the study area. This comprises 94 bird species, 58 reptile species, 23 mammals and three amphibians, eight of which are conservation listed (Table 3-3). An additional eleven conservation significant fauna species not detected from the NatureMap search were detected in either the Rio Tinto database or the PMST search (Table 3-4).

Table 3-3: Summary of terrestrial vertebrate fauna species returned from the NatureMap search

Fauna group	Number of potential species within a 20 km radius of the study area
Amphibians	3
Reptiles	58
Avifauna	94
Mammals	23
Conservation listed	8
Total	178

3.2.2 Conservation listed fauna returned from the desktop study

Eighteen conservation significant fauna species were returned from the database searches (Table 3-4). Of these, two were listed as Critically Endangered (one of which was also listed as migratory), three as Endangered and four as Vulnerable. Nine species were also listed as Migratory under the EPBC Act. One species was listed as Priority 4 under the BC act.

One P4 vertebrate fauna species (Western Pebble-mound Mouse) was considered 'likely' to occur within the study area. Five species were considered to have 'potential' to occur within the study area (Table 3-4).

The likelihood rating of conservation listed fauna returned by the database search was later updated post field assessment (

Table 3-4: Conservation listed fauna species returned by database searches, including pre-field likelihood of occurrence assessment and potential presence via habitat preference and proximity of previous recordings**

Species	Common name	BC Act	EPBC Act	NM	RT	EPBC	Habitat and discussion (pre-field)	Distance to nearest record	Likelihood of occurrence (pre-field)
Birds									
<i>Actitis hypoleucos</i>	Common Sandpiper		MI			X	This species has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The species generally forages in shallow water and on bare soft mud at the edges of wetlands. They sometimes venture into grassy areas adjoining wetlands (Higgins & Davies 1996).	No previous records of this species occur within 20 km of the study area.	Unlikely The study area does not contain suitable habitat to support this species.
<i>Apus pacificus</i>	Fork-tailed Swift	MI	MI			X	The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over a wide range of habitats from inland plains, dry or open habitats, riparian woodland, tea-tree swamps, low scrub, heathland, saltmarsh, over cliffs, beaches, islands and well out to sea, above foothills or in coastal areas. They also occur over settled areas, including towns, urban areas and cities (DAWE 2021c).	NA	Unlikely This species is aerial within the Pilbara and does not utilise the terrestrial surface. This species may overfly the study area however will not be impacted by the Proposal.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	MI	MI			X	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, salt pans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgeland and other ephemeral wetlands, but leave when they dry (DAWE 2021c).	No previous records of this species occur within 20 km of the study area.	Unlikely The study area does not contain suitable habitat to support this species.
<i>Calidris ferruginea</i>	Curllew Sandpiper	CR	CR & MI			X	The Curllew Sandpiper prefers habitats such as tidal mudflats, saltmarsh, salt fields, fresh, brackish or saline wetlands and sewerage ponds (Pizzey & Knight 2012). It is also found at lagoons and mangroves, as well as beaches, rocky shores and around lakes, dams and floodwaters. The Curllew Sandpiper does not breed in Australia (Birdlife 2021).	No previous records of this species occur within 20 km of the study area.	Unlikely The study area does not contain suitable habitat to support this species.
<i>Calidris melanotos</i>	Pectoral Sandpiper		MI			X	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species can be found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. Although this species is usually found in coastal or near coastal habitat, it can occasionally be found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire (DAWE 2021c).	No previous records of this species occur within 20 km of the study area.	Unlikely The study area does not contain suitable habitat to support this species.
<i>Charadrius veredus</i>	Oriental Plover	MI	MI	X		X	Immediately after the Oriental Plover arrives in their non-breeding grounds in northern Australia, they spend a few weeks in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland. Thereafter they usually inhabit flat, open, semi-arid or arid grasslands, where the grass is short and sparse, and interspersed with hard, bare ground, such as claypans, dry paddocks, playing fields, lawns and cattle camps, or open areas that have been recently burnt (DAWE 2021c).	No previous records of this species occur within 20 km of the study area.	Unlikely The study area does not contain suitable habitat to support this species.
<i>Falco hypoleucos</i>	Grey Falcon	VU	VU	X		X	Grey Falcon is a wide roaming species and prefers habitats such as lightly treed inland plains, gibber deserts, sand ridges, pastoral lands, timbered watercourses. They are seldom in the driest deserts (Pizzey & Knight 2012).	No previous records of this species occur within 20 km of the study area.	Potential This species is wide ranging and may occur within the study area opportunistically to forage.
<i>Glareola maldivarum</i>	Oriental Pratincole		MI			X	Within Australia the Oriental Pratincole is widespread in northern areas, especially along the coasts of the Pilbara Region and the Kimberley Division in Western Australia, the Top End of the Northern Territory, and parts of the Gulf of Carpentaria. It is also widespread but scattered inland, mostly north of 20° S. There are occasional records in southern Australia, at sparsely scattered sites, with records in all states, including an unconfirmed report in Tasmania (Barrett et al. 2003; Blakers et al. 1984; Higgins & Davies 1996; Stewart et al. 2007). The species has also been recorded on various outlying islands, including Lord Howe Island, and, in the Indian Ocean, Christmas Island and Cocos-Keeling Islands (DAWE 2022b).	No previous records of this species occur within 20 km of the study area.	Unlikely The study area does not contain suitable habitat to support this species.

Species	Common name	BC Act	EPBC Act	NM	RT	EPBC	Habitat and discussion (pre-field)	Distance to nearest record	Likelihood of occurrence (pre-field)
<i>Hirundo rustica</i>	Barn Swallow	MI	MI			X	In Australia, the Barn Swallow is recorded in open country in coastal lowlands, often near water, towns and cities. Barn Swallows are often sighted perched on overhead wires and also in or over freshwater wetlands, paperbark <i>Melaleuca</i> woodland, mesophyll shrub thickets and tussock grassland (Schodde & Mason 1999; DAWE 2021c).	No previous records of this species occur within 20 km of the study area.	Unlikely The study area does not contain suitable habitat to support this species.
<i>Motacilla cinerea</i>	Grey Wagtail		MI			X	The Grey Wagtail can be found in Australia near running water and in disused quarries. It is also found in sandy, rocky streams in escarpments and rainforests, sewage ponds, ploughed fields and airfields (Pizzey & Knight 2012).	No previous records of this species occur within 20 km of the study area.	Unlikely The study area does not contain suitable habitat to support this species.
<i>Motacilla flava</i>	Yellow wagtail		MI			X	The Yellow Wagtail is mostly found in open country near water. Little information is available on this species.	No previous records of this species occur within 20 km of the study area.	Unlikely The study area does not contain suitable habitat to support this species.
<i>Pezoporus occidentalis</i>	Night Parrot	CR	EN			X	Night Parrot is a highly cryptic bird which was presumed extinct until its rediscovery in 2013. As such, habitat requirements are still being researched. At the time of this report Night Parrots are thought to roost and nest in clumps of dense vegetation, primarily old and large spinifex (<i>Triodia</i>) clumps, but sometimes other vegetation types are used (DBCA 2017). Little is known about foraging sites, but favoured sites are considered likely to vary across the range of the species. <i>Triodia</i> is also likely to provide a good food resource for night parrots, in times of mass flowering and seeding, but they also rely heavily on a range of other food species (DBCA 2017). <i>Sclerolaena</i> has been shown to be a source of food and moisture (DBCA 2017).	No previous records of this species occur within 20 km of the study area.	Unlikely The study area does not contain suitable habitat to support this species.
<i>Rostratula australis</i>	Australian Painted Snipe	EN	EN			X	The Australian Painted Snipe is usually found in shallow inland wetlands, either freshwater or brackish, that are either permanently or temporarily filled. Though some individuals are apparently resident in some areas, other individuals appear to be nomadic, temporarily occupying areas where suitable habitat exists (Department of the Environment and Heritage 2003).	No previous records of this species occur within 20 km of the study area.	Unlikely The study area does not contain suitable habitat to support this species.
Mammals									
<i>Dasyurus hallucatus</i>	Northern Quoll	EN	EN	X	X	X	Northern Quoll occupy a diverse range of habitats including rocky areas, eucalypt forest, woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert (Threatened Species Scientific Committee (TSSC) 2005a). Habitat generally encompasses some form of rocky area for denning purposes with surrounding vegetated habitats used for foraging and dispersal. Dens are made in rock crevices, tree holes or occasionally termite mounds (TSSC 2005a). In the Pilbara region, the species appears to prefer the Rocklea, Macroy and Robe land systems (Biota Environmental Services 2008). The Northern Quoll has also been recorded in other land systems which comprise sandstone and dolomite hills and ridges, shrublands, sandy plains, clay plans and tussock grasslands and coastal fringes including dunes islands and beaches (Biota Environmental Services 2008).	< 15 km	Potential The study area contains potential habitat to support this species.
<i>Macroderma gigas</i>	Ghost Bat	VU	VU	X	X	X	The Ghost Bat is patchily distributed across the northern half of Australia. This species requires undisturbed roost sites which are often complex and contain multiple entrances; it has been known to utilise old abandoned mine shafts (Menkhorst and Knight 2017).	< 15 km	Potential The species may occasionally visit the study area to forage however the study area does not contain core breeding habitat (caves) to support this species.

Species	Common name	BC Act	EPBC Act	NM	RT	EPBC	Habitat and discussion (pre-field)	Distance to nearest record	Likelihood of occurrence (pre-field)
<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	P4		X	X		This species is found on stony hillsides with hummock grassland (Menkhorst & Knight 2017). This species favors scree and stony plains habitat where it constructs conspicuous, extensive mounds of small stones. The pebble-mounds are found on gently sloping hills where the ground is stony with continuous small pebbles.	< 3 km	Likely Active and inactive mounds have been recorded close by. The study area contains potential habitat to support this species.
<i>Rhinonictis aurantia</i>	Pilbara Leaf-nosed Bat	VU	VU	X	X	X	The Pilbara leaf-nosed bat (PLNB) inhabits abandoned mine shafts, granite rock pile terrain of the east Pilbara and caves formed in gorges that dissect sedimentary geology in the west Pilbara (Van Dyck and Strahan 2008). This species is more influenced by the availability of suitable roost caves than by habitat type and high humidity is particularly important to this species (Churchill 1998).	~ 15 km	Potential The species may occasionally visit the study area to forage however the study area does not contain core breeding habitat (caves) to support this species.
Reptiles									
<i>Liasis olivaceus</i> subsp. <i>barroni</i>	Pilbara Olive Python	VU	VU	X	X	X	Pilbara Olive Python habitat includes escarpments, gorges and water holes in the ranges of the Pilbara region (Pearson 1993; Wilson & Swan 2003). Individuals are usually recorded in close proximity to water and rock outcrops that attract suitably sized prey species (Pearson 2003).	< 15 km	Potential Although suitable core habitat (rocky habitat adjacent to water sources) is absent within the study area; the Pilbara Olive Python may utilise the study area for dispersal at times.

NM – NatureMap; **RT** –Rio Tinto Priority Fauna Database; **EPBC** – EPBC Act Protected Matters Search Tool.

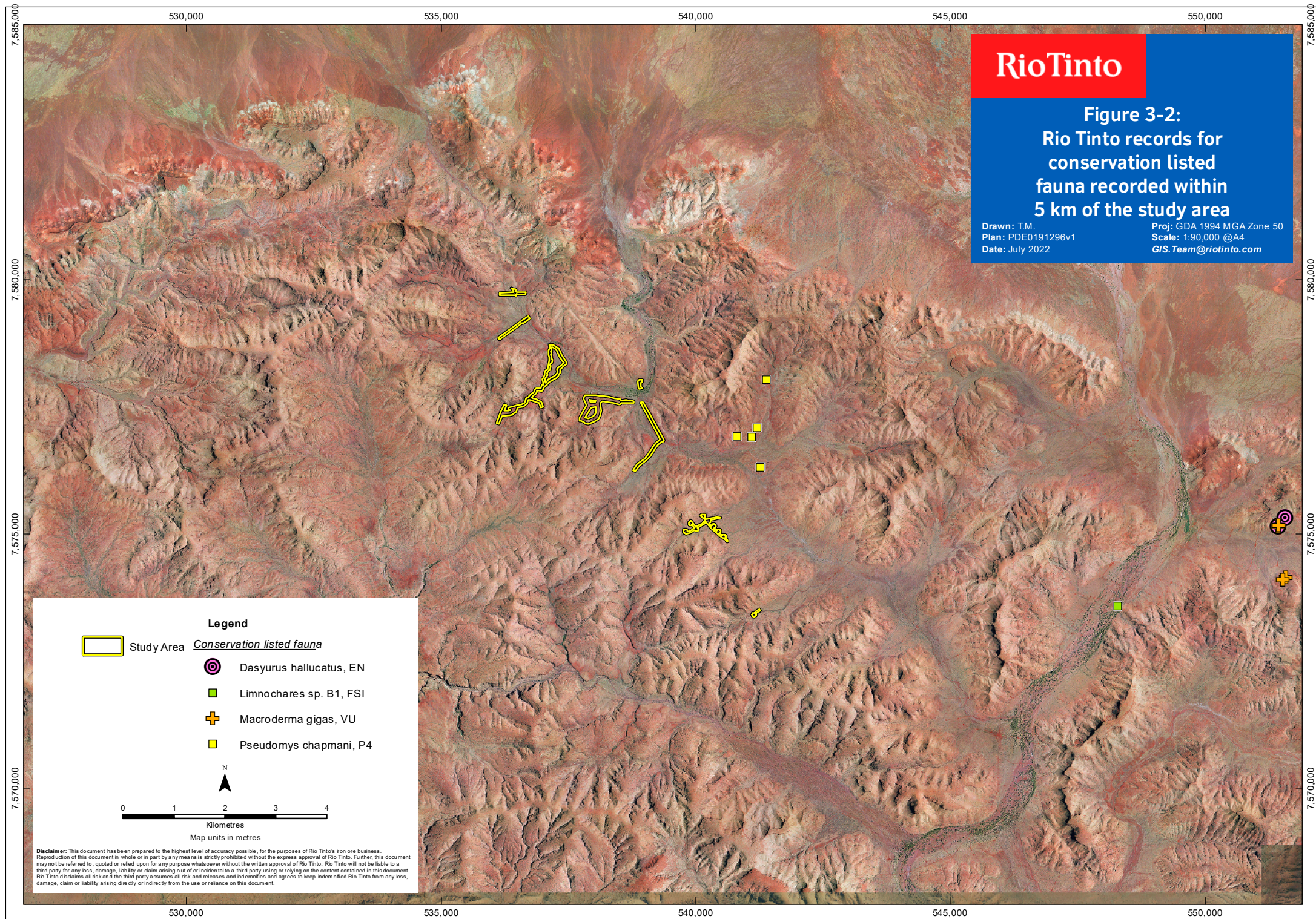


Figure 3-2:
Rio Tinto records for
conservation listed
fauna recorded within
5 km of the study area

Drawn: T.M.
 Plan: PDE0191296v1
 Date: July 2022

Proj: GDA 1994 MGA Zone 50
 Scale: 1:90,000 @A4
 GIS.Team@riotinto.com

Legend

Study Area

Conservation listed fauna

- Dasyurus hallucatus*, EN
- Limnochaeres* sp. B1, FSI
- Macroderma gigas*, VU
- Pseudomys chapmani*, P4

N

0 1 2 3 4
 Kilometres
 Map units in metres

Disclaimer: This document has been prepared to the highest level of accuracy possible, for the purposes of Rio Tinto's iron ore business. Reproduction of this document in whole or in part by any means is strictly prohibited without the express approval of Rio Tinto. Further, this document may not be referred to, quoted or relied upon for any purpose whatsoever without the written approval of Rio Tinto. Rio Tinto will not be liable to a third party for any loss, damage, liability or claim arising out of or incidental to a third party using or relying on the content contained in this document. Rio Tinto disclaims all risk and the third party assumes all risk and releases and indemnifies and agrees to keep indemnified Rio Tinto from any loss, damage, claim or liability arising directly or indirectly from the use or reliance on this document.

4. Field Results

4.1 Vegetation of the study area

Six vegetation types were identified across four major landforms within the study area. The vegetation types are summarised in Table 4-1 and are described in detail on the following pages, accompanied by vegetation mapping (Figure 4-1).

Three vegetation types were described from hillslopes, one from gorges and gullies, one from plains, and one from minor flowlines.

All vegetation types within the study area correlate relatively well with the vegetation types described by Astron (2011).

Table 4-1: Vegetation type summary

Unit	Vegetation Description	Extent within the study area (ha)	Proportion of study area
Vegetation of Hillslopes			
ChTe/TwTb	<i>Corymbia hamersleyana</i> isolated low trees over open hummock grassland of <i>Triodia epactia</i> (or <i>T. wiseana</i>) and <i>T. basitricha</i>	19.99	31.04
EIchTeTwTb	Low open woodland to isolated trees of <i>Eucalyptus leucophloia</i> and <i>Corymbia hamersleyana</i> over tall sparse shrubland of <i>Grevillea wickhamii</i> over hummock grassland of <i>Triodia basitricha</i> , <i>T. epactia</i> and <i>T. wiseana</i> .	22.22	34.50
EIchAiTeTw	Low open woodland to isolated trees of <i>Eucalyptus leucophloia</i> and <i>Corymbia hamersleyana</i> over tall sparse shrubland of <i>Acacia inaequilatera</i> and <i>Grevillea wickhamii</i> over hummock grassland of <i>Triodia epactia</i> and <i>T. wiseana</i>	9.19	14.27
Vegetation of Gorges/ Gullies			
CfFbCaEm	<i>Corymbia ferritcola</i> and <i>Ficus brachypoda</i> isolated low trees over tall sparse shrubland of <i>Acacia monticola</i> over grassland of <i>Triodia epactia</i> , <i>Eriachne mucronata</i> and <i>Cymbopogon ambiguus</i> .	1.22	1.89
Vegetation of Plains			
ChApAmTe	Low open woodland of <i>Corymbia hamersleyana</i> over tall sparse shrubland of <i>Acacia pyrifolia</i> and <i>A. monticola</i> over hummock grassland of <i>Triodia epactia</i> .	8.22	12.76
Vegetation of Minor Flowlines			
ChAtTe	Low open woodland to isolated trees of <i>Corymbia hamersleyana</i> over tall open to sparse shrubland of <i>Acacia tumida</i> subsp. <i>Pilbarensis</i> over sparse to open hummock grassland of <i>Triodia epactia</i> .	3.26	5.06
DISTURBED		0.31	0.49
Total		64.40	100.00

Vegetation of Hillslopes

ChTe/TwTb	<i>Corymbia hamersleyana</i> isolated low trees over open hummock grassland of <i>Triodia epactia</i> (or <i>T. wiseana</i>) and <i>T. basitricha</i>
Landform and soils	This vegetation type occurs on the lower hillslopes with loam and skeletal loam soils.
Distribution	This vegetation type is widespread throughout the study area on the footslopes and lower slopes and accounts for approximately 31 % of the study area.
Associated species	<u>Trees:</u> <i>Corymbia hamersleyana</i> <u>Tall shrubs:</u> <i>Grevillea wickhamii</i> , <i>Acacia inaequilatera</i> <u>Shrubs:</u> <i>Acacia pyrifolia</i> , <i>Acacia hilliana</i> , <i>Acacia adoxa</i> <u>Low shrubs:</u> <i>Indigofera monophylla</i> <u>Grasses:</u> <i>Triodia epactia</i> , <i>Triodia basitricha</i> , <i>Triodia wiseana</i> <u>Herbs:</u> -
Conservation listed flora	<i>Triodia basitricha</i>
Weeds	None recorded
Condition	Excellent
Sampling sites	Relevés: (MPRSR02, MPRS03, MPRS07)
Fire and disturbance	Moderate fire age between four to eight years.
Photo	Plate 1



Plate 1: Representative photo of vegetation type ChTe/TwTb at MPRS02

Vegetation of Hillslopes

EIchTeTwTb	Low open woodland to isolated trees of <i>Eucalyptus leucophloia</i> and <i>Corymbia hamersleyana</i> over tall sparse shrubland of <i>Grevillea wickhamii</i> over hummock grassland of <i>Triodia basitricha</i> , <i>T. epactia</i> and <i>T. wiseana</i> .
Landform and soils	This vegetation type occurs on the mid hillslopes on sandy clay loam and skeletal loam soils.
Distribution	This vegetation type is widespread throughout the study area on the mid slopes and accounts for approximately 35 % of the study area.
Associated species	<u>Trees:</u> <i>Eucalyptus leucophloia</i> , <i>Corymbia hamersleyana</i> <u>Tall shrubs:</u> <i>Grevillea wickhamii</i> , <i>Hakea lorea</i> <u>Shrubs:</u> <i>Acacia maitlandii</i> , <i>Acacia bivenosa</i> , <i>Senna glutinosa</i> subsp. <i>glutinosa</i> <u>Low shrubs:</u> <i>Dampiera candidans</i> <u>Grasses:</u> <i>Triodia epactia</i> , <i>Triodia basitricha</i> , <i>Triodia wiseana</i> <u>Herbs:</u> -
Conservation listed flora	<i>Triodia basitricha</i>
Weeds	None recorded
Condition	Excellent
Sampling sites	Relevés: (MPRCG01, MPRSR01)
Fire and disturbance	Old fire age between eight and twelve years.
Photo	Plate 3



Plate 2: Representative photo of vegetation type EIchTeTwTb at MPRCG01

Vegetation of Hillslopes

EiChAiTeTw	Low open woodland to isolated trees of <i>Eucalyptus leucophloia</i> and <i>Corymbia hamersleyana</i> over tall sparse shrubland of <i>Acacia inaequilatera</i> and <i>Grevillea wickhamii</i> over hummock grassland of <i>Triodia epactia</i> and <i>T. wiseana</i>
Landform and soils	This vegetation type occurs on the upper hillslopes on sandy clay loam soils.
Distribution	This vegetation type is restricted to the mid and upper hillslopes and accounts for approximately 15 % of the study area.
Associated species	<u>Trees:</u> <i>Eucalyptus leucophloia</i> , <i>Corymbia hamersleyana</i> <u>Tall shrubs:</u> <i>Grevillea wickhamii</i> , <i>Acacia inaequilatera</i> <u>Shrubs:</u> <i>Acacia acradenia</i> , <i>Acacia hilliana</i> <u>Low shrubs:</u> <i>Dampiera candidans</i> <u>Grasses:</u> <i>Triodia epactia</i> , <i>Triodia wiseana</i> , <i>Eriachne mucronata</i> <u>Herbs:</u> -
Conservation listed flora	None recorded
Weeds	None recorded
Condition	Excellent
Sampling sites	Relevés: (MPRCG02, MPRCG04)
Fire and disturbance	Old fire age between eight and twelve years.
Photo	Plate 3



Plate 3: Representative photo of vegetation type EiChAiTeTw at MPRCG02

Vegetation of Gorges/ Gullies

CfFbCaEm	<i>Corymbia ferritcola</i> and <i>Ficus brachypoda</i> isolated low trees over tall sparse shrubland of <i>Acacia monticola</i> over grassland of <i>Triodia epactia</i> , <i>Eriachne mucronata</i> and <i>Cymbopogon ambiguus</i> .
Landform and soils	This vegetation type occurs on the stony gullies and gorges on upper hillslopes on skeletal loam soils.
Distribution	This vegetation type is restricted to the stony gullies on upper hillslopes and accounts for less than 2 % of the study area.
Associated species	<u>Trees:</u> <i>Eucalyptus leucophloia</i> , <i>Corymbia ferritcola</i> , <i>Ficus brachypoda</i> <u>Tall shrubs:</u> <i>Acacia monticola</i> , <i>Acacia tumida</i> subsp. <i>pilbarensis</i> , <i>Clerodendrum floribundum</i> var. <i>angustifolium</i> , <i>Gossypium robinsonii</i> , <i>Grevillea pyramidalis</i> <u>Shrubs:</u> <i>Astrotricha hamptonii</i> , <i>Capparis spinosa</i> <u>Low shrubs:</u> <i>Corchorus lasiocarpus</i> subsp. <i>parvus</i> <u>Grasses:</u> <i>Cymbopogon ambiguus</i> , <i>Eriachne mucronata</i> , <i>Triodia epactia</i> <u>Herbs:</u> - <i>Arivella viscosa</i> , <i>Cyperus hesperius</i>
Conservation listed flora	<i>Rhynchosia bungarensis</i>
Weeds	None recorded
Condition	Excellent
Sampling sites	Relevés: (MPRCG03, MPRSR04)
Fire and disturbance	Very old fire age between greater than twelve years.
Photo	Plate 4



Plate 4: Representative photo of vegetation type CfFbCaEm at MPRCG03

Vegetation of Plains

ChApAmTe	Low open woodland of <i>Corymbia hamersleyana</i> over tall sparse shrubland of <i>Acacia pyrifolia</i> and <i>A. monticola</i> over hummock grassland of <i>Triodia epactia</i> .
Landform and soils	This vegetation type occurs on the terraces and broad wash plains on deep loam soils.
Distribution	This vegetation type is widespread and accounts for approximately 13 % of the study area.
Associated species	<u>Trees:</u> <i>Corymbia hamersleyana</i> <u>Tall shrubs:</u> <i>Acacia tumida</i> subsp. <i>pilbarensis</i> , <i>Acacia trachycarpa</i> , <i>Grevillea pyramidalis</i> <u>Shrubs:</u> <i>Acacia dictyophleba</i> , <i>Acacia pyrifolia</i> , <i>Gossypium australe</i> <u>Low shrubs:</u> <i>Indigofera monophylla</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i> <u>Grasses:</u> <i>Triodia epactia</i> , <i>Themeda triandra</i> , <i>Cymbopogon ambiguus</i> <u>Herbs:</u> -
Conservation listed flora	<i>Indigofera rivularis</i>
Weeds	None recorded
Condition	Excellent
Sampling sites	Relevés: (MPCRG05, MPCRG06, MPCRG07, MPCRG08, MPRSR05)
Fire and disturbance	Old fire age between eight and twelve years.
Photo	Plate 5



Plate 5: Representative photo of vegetation type ChApAmTe at MPCRG05

Vegetation of Minor Flowlines

ChAtTe Low open woodland to isolated trees of *Corymbia hamersleyana* over tall open to sparse shrubland of *Acacia tumida* subsp. *pilbarensis* over sparse to open hummock grassland of *Triodia epactia*.

Landform and soils This vegetation type occurs along the creeklines plains on loam soils.

Distribution This vegetation type accounts for approximately 5 % of the study area.

Associated species
Trees: *Corymbia hamersleyana*
Tall shrubs: *Acacia tumida* subsp. *pilbarensis*, *Gossypium robinsonii*
Shrubs: *Gossypium australe*
Low shrubs:
Grasses: *Chrysopogon fallax*, *Triodia epactia*, *Themeda triandra*
Herbs: -

Conservation listed flora None recorded

Weeds None recorded

Condition Excellent

Sampling sites Relevés: (MPRSR06)

Fire and disturbance Old fire age between eight and twelve years.

Photo Plate 5



Plate 6: Representative photo of vegetation type ChAtT at MPRS06)

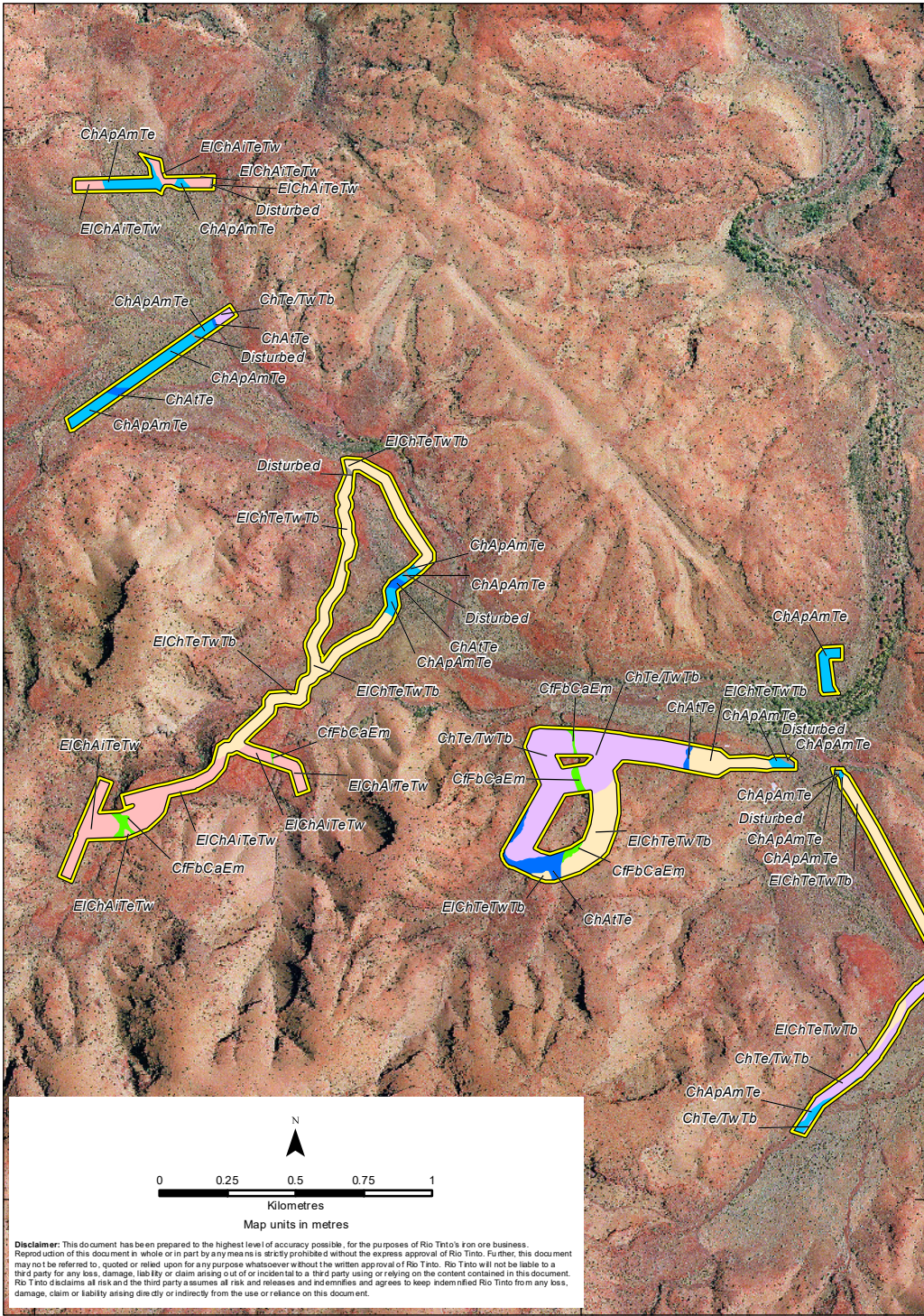
536,000

538,000

7,580,000

7,578,000

7,576,000



536,000

538,000

540,000

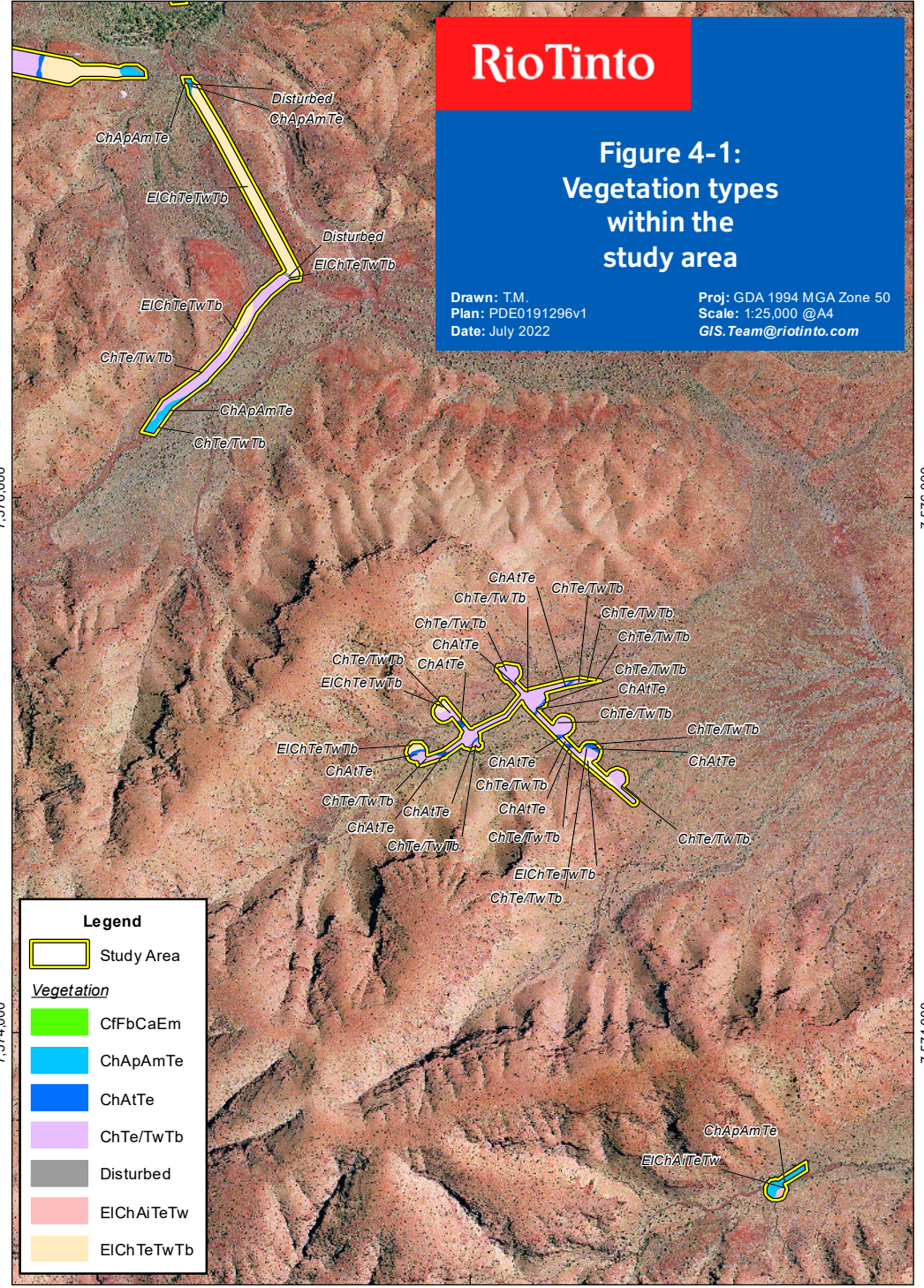
7,580,000

7,576,000

7,578,000

7,574,000

7,576,000



540,000

RioTinto

Figure 4-1: Vegetation types within the study area

Drawn: T.M.
Plan: PDE0191296v1
Date: July 2022

Proj: GDA 1994 MGA Zone 50
Scale: 1:25,000 @A4
GIS.Team@riotinto.com

Legend

- Study Area
- Vegetation**
- CFFbCaEm
- ChApAmTe
- ChAtTe
- ChTe/TwTb
- Disturbed
- EICHaITeTw
- EICHaITeTw

540,000

7,576,000

7,574,000

7,576,000

Disclaimer: This document has been prepared to the highest level of accuracy possible, for the purposes of Rio Tinto's iron ore business. Reproduction of this document in whole or in part by any means is strictly prohibited without the express approval of Rio Tinto. Further, this document may not be referred to, quoted or relied upon for any purpose whatsoever without the written approval of Rio Tinto. Rio Tinto will not be liable to a third party for any loss, damage, liability or claim arising out of or incidental to a third party using or relying on the content contained in this document. Rio Tinto disclaims all risk and the third party assumes all risk and releases and indemnifies and agrees to keep indemnified Rio Tinto from any loss, damage, claim or liability arising directly or indirectly from the use or reliance on this document.

4.2 Vegetation condition

The vegetation within the study area was predominantly rated as being in Excellent condition (97.3 %), with the remaining 2.7 % mapped as Completely Degraded, Poor or Good on previously cleared tracks, depending on age of regrowth.

Vegetation condition mapping is presented in Figure 4-2, and Table 4-2 presents the extent of vegetation condition mapped within the study area.

Table 4-2: Vegetation condition of the study area

Condition	Condition rank	Area (ha)	Proportion (%) of study area
Excellent	1.0	62.66	97.30
Very Good	0.8	0.00	0.00
Good	0.6	0.93	1.45
Poor	0.4	0.50	0.77
Degraded	0.2	0.00	0.00
Completely Degraded	0.0	0.31	0.49
Total		64.40	100

4.3 Vegetation of conservation significance

None of the vegetation associations occurring within the study area correspond to any ecosystems listed as Threatened under the EPBC Act or listed as TECs or PECs by the Department of Biodiversity, Conservation and Attractions (DBCA) (2018a, 2022).

The EIChAiTeTw vegetation unit, mapped and described for the upper hillslopes within the study area is considered to be of conservation significance as it represents 'hill-top floras, Hamersley Range' ecosystem at risk (Kendrick 2001). This ecosystem is considered to be of low reservation priority (L) (Kendrick 2001).

The mid to low hillslope and floodplain vegetation types are widespread in the Pilbara and the medium creeklines within the study area were not considered large enough to constitute major ephemeral water courses.

4.4 Native flora recorded during survey

A total of 90 taxa from 57 genera representing 30 families were recorded during the current survey (Table 4-3, Appendix 5).

The most specious families were Fabaceae (n = 24), Poaceae (n = 12) and Malvaceae (n = 10).

Table 4-3: Total recorded numbers of families, genera, taxa, priority species and weeds recorded for the survey

Flora group	Taxa within study area
Families	30
Genera	57
Taxa	90
Priority species	3
Weeds	0

4.5 Conservation listed flora recorded during survey

No threatened flora species were recorded during the survey. Two Priority 3 flora species, *Indigofera rivularis* and *Triodia basitricha*, and one Priority 4 flora species, *Rhynchosia bungarensis*, were recorded within the study area (Figure 4-3).

Indigofera rivularis

Indigofera rivularis (P3) is an erect perennial shrub growing to 2 m in height (WAH 2022). This species generally grows along creek lines, drainage lines, gorges and gullies and has been recorded in the Hamersley IBRA sub-region of the Pilbara. *Indigofera rivularis* has a range of approximately 207 km within the Pilbara region according to records on the Rio Tinto database and was previously recorded by Astron (2011) approximately 4 km to the east of the study area. No records of this species were returned from the NatureMap 20 km radial search.

This species was recorded at seven locations on the broad wash plains and creeklines within the study area. The Rio Tinto database currently contains the records of approximately 450 individuals at 23 locations within a 20 km radius of the study area (Appendix 6).

Triodia basitricha

Triodia basitricha (P3) is a tussock forming perennial non-resinous grass. The species occurs in the western and central Pilbara and in the Barlee Range Nature Reserve. It occurs on the slopes or crests of rocky hills, which may indicate a more 'refugial habitat' requirement (Barrett and Barrett 2015).

The species was widespread throughout the study area and occurred as a dominant on the stony lower slopes and stony floodplains. Approximately 43,000 individuals were recorded at 42 locations within the study area (Appendix 6). The species had not previously been recorded in the vicinity, with the nearest known records being 32 km away, according to the Rio Tinto database search results. Astron (2011) did not record this taxon during their survey of the area but recorded *Triodia melvillei*, another soft, resinous spinifex, as a dominant in the corresponding vegetation unit. It is likely that *Triodia basitricha* was misidentified in the field as *T. melvillei*. All collections recorded as potential *T. basitricha* for the current survey were submitted for identification to specialist taxonomist Steven Dillon at the WAH and all were determined to be *T. basitricha*. *T. melvillei* was not recorded for the current survey.

Rhynchosia bungarensis

Rhynchosia bungarensis (P4) is a compact, prostrate shrub growing to 0.5 m high with yellow flowers. This nearest record of this species was recorded approximately 3 km to the south east of the study

area by Astron (2011). *Rhynchosia bungarensis* is known from a variety of habitat including hill slopes, floodplains and creek beds across five IBRA subregions (WAH 2022).

The species was recorded at three locations in the gorge / gully vegetation within the study area. The Rio Tinto database currently contains the records of approximately 50 individuals at nine locations within a 20 km radius of the study area (Appendix 6).

536,000

538,000

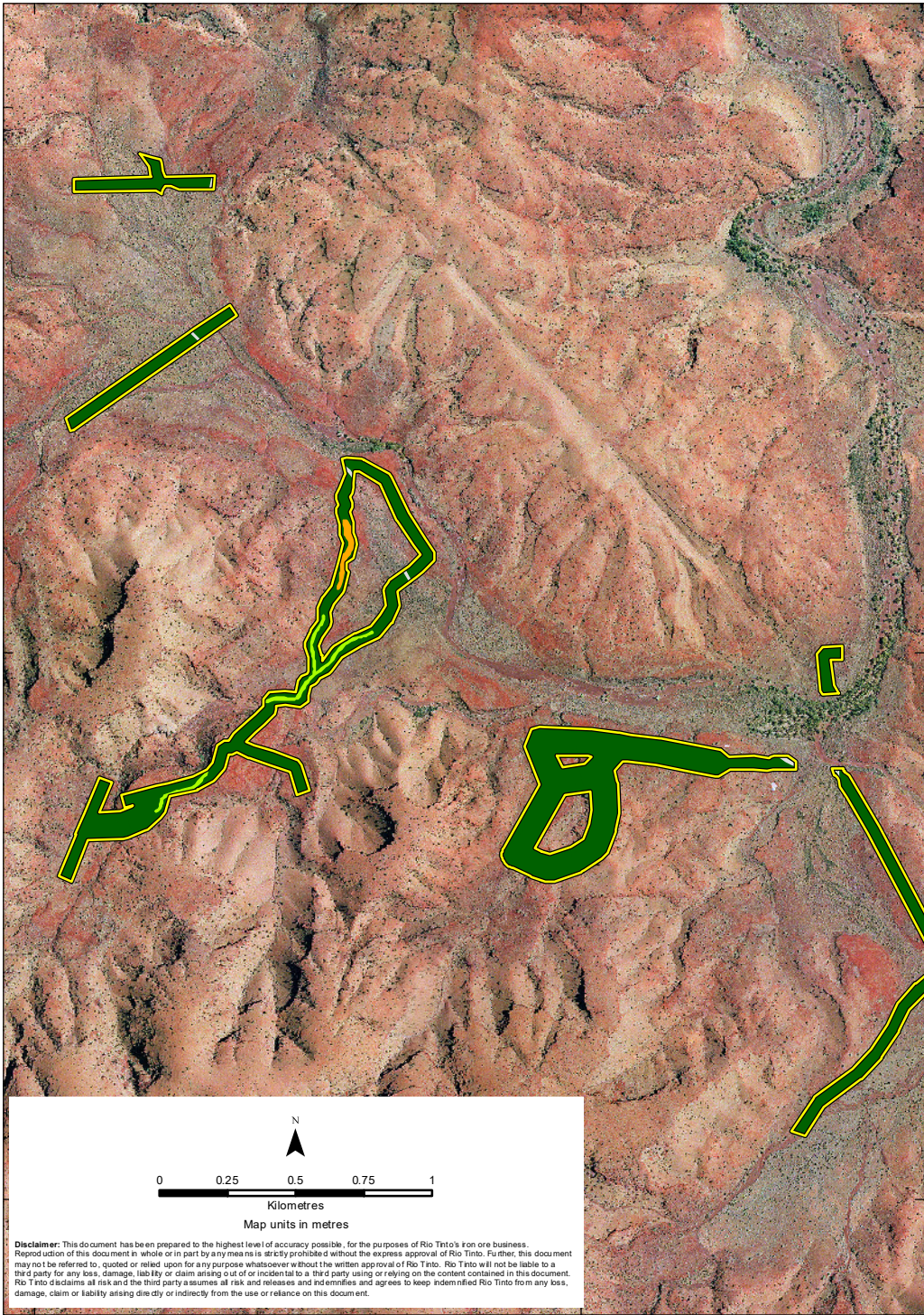
7,580,000

7,578,000

7,576,000

536,000

538,000



7,580,000

7,576,000

7,574,000

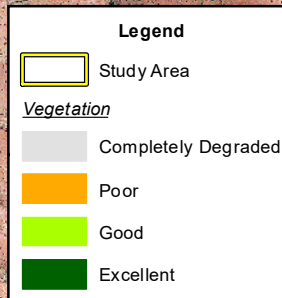
540,000

RioTinto

**Figure 4-2:
Vegetation
condition
within the
study area**

Drawn: T.M.
Plan: PDE0191296v1
Date: July 2022

Proj: GDA 1994 MGA Zone 50
Scale: 1:25,000 @A4
GIS.Team@riotinto.com



7,580,000

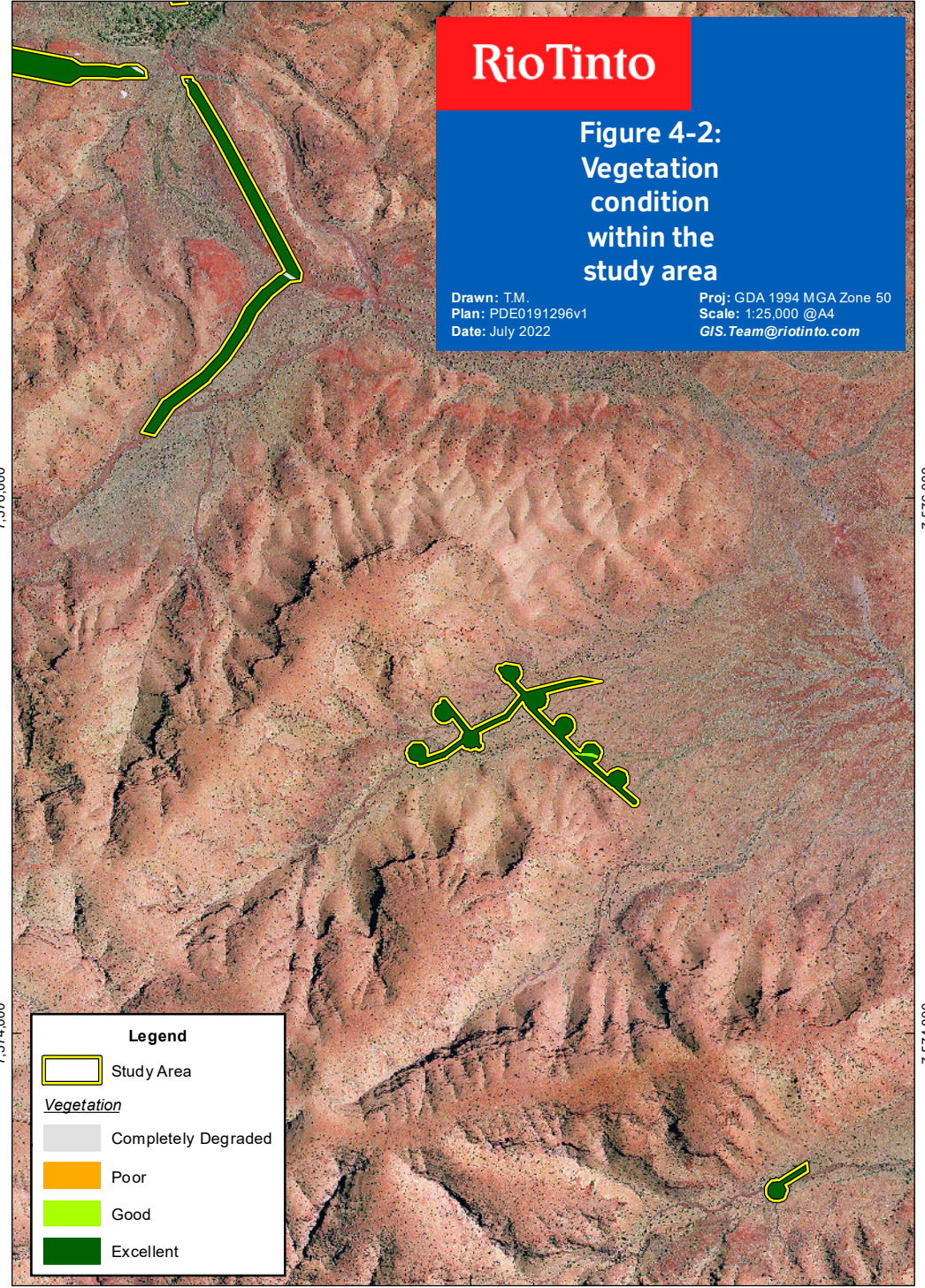
7,576,000

7,574,000

540,000

7,576,000

7,574,000




535,000

540,000

7,580,000

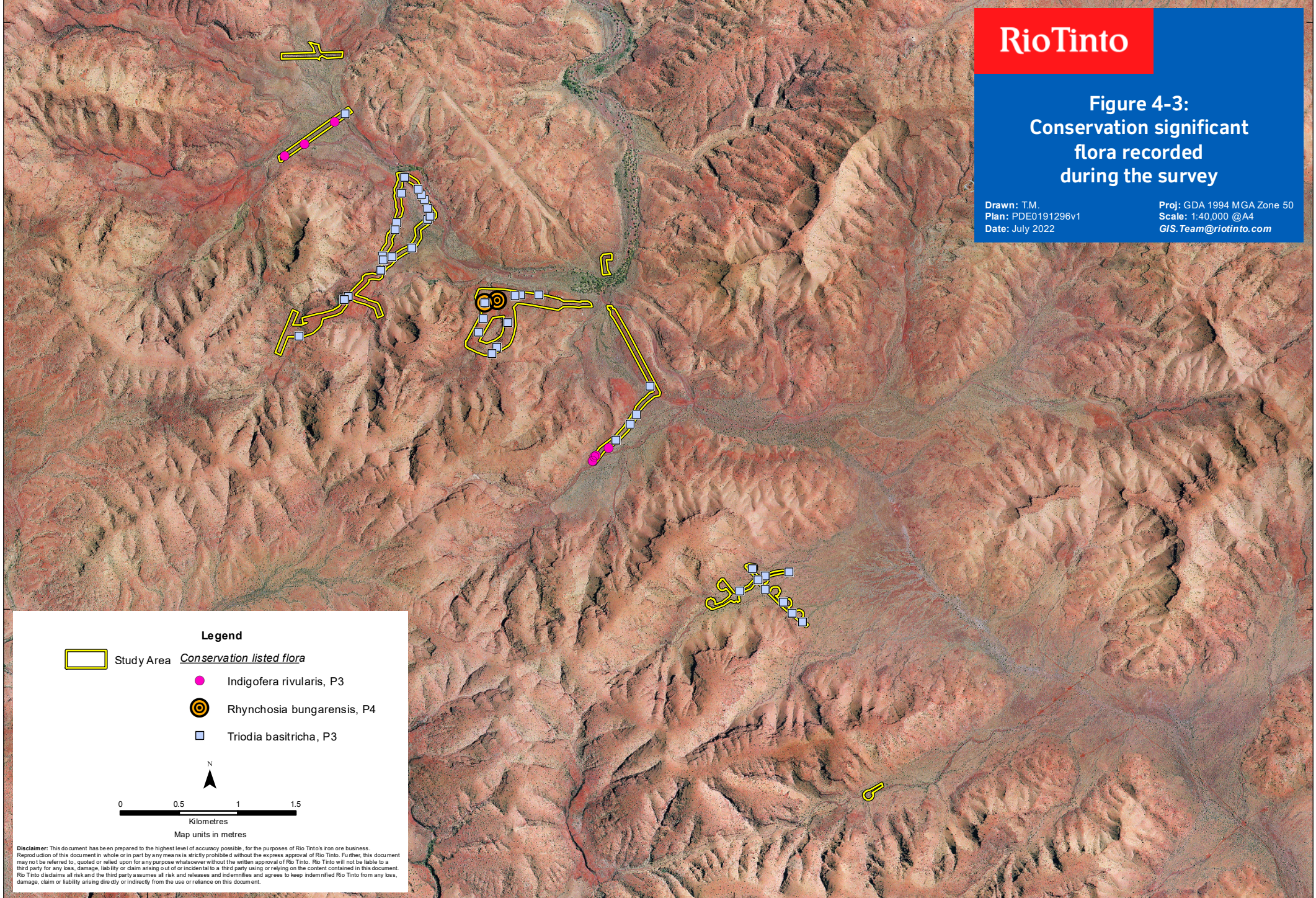
7,580,000



**Figure 4-3:
Conservation significant
flora recorded
during the survey**

Drawn: T.M.
Plan: PDE0191296v1
Date: July 2022





Proj: GDA 1994 MGA Zone 50
Scale: 1:40,000 @A4
GIS.Team@riotinto.com




7,575,000

7,575,000

Legend

-  Study Area
-  *Indigofera rivularis*, P3
-  *Rhynchosia bungarensis*, P4
-  *Triodia basitricha*, P3

Conservation listed flora

 N

0 0.5 1 1.5
Kilometres
Map units in metres

Disclaimer: This document has been prepared to the highest level of accuracy possible, for the purposes of Rio Tinto's iron ore business. Reproduction of this document in whole or in part by any means is strictly prohibited without the express approval of Rio Tinto. Further, this document may not be referred to, quoted or relied upon for any purpose whatsoever without the written approval of Rio Tinto. Rio Tinto will not be liable to a third party for any loss, damage, liability or claim arising out of or incidental to a third party using or relying on the content contained in this document. Rio Tinto disclaims all risk and the third party assumes all risk and releases and indemnifies and agrees to keep indemnified Rio Tinto from any loss, damage, claim or liability arising directly or indirectly from the use or reliance on this document.

535,000

540,000

4.6 Potential conservation listed flora occurring in the study area

The desktop study, utilising previous survey results, a NatureMap database search, an EPBC Protected Matters search, and searches of the Rio Tinto database, identified twelve conservation listed species as occurring within a 20 km radius of the study area (Section 3.1.2).

Three of the twelve conservation listed species identified by the database search were recorded within the study area for the current field survey (Section 4.5). An assessment of all twelve species and their post-field likelihood of occurrence within the study area, based on the results of the field survey, is detailed in Table 4-4.

Table 4-4: Revised likelihood of occurrence of conservation listed flora species within the study area

Species	Status	NM	RT	EPBC	Recorded during survey / notes on habitat, or lack of, within study area	Likelihood of occurrence (post-field)
<i>Acacia dawweana</i>	P3	X			Suitable habitat was present within the survey area however this easily detectable perennial shrub species was not observed during the survey and is therefore unlikely to be present	Unlikely
<i>Gymnanthera cunninghamii</i>	P3		X		Suitable habitat was present within the survey area however this easily detectable perennial shrub species was not observed during the survey and is therefore unlikely to be present	Unlikely
<i>Indigofera rivularis</i>	P3	X	X		Recorded during survey	Recorded
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	P3		X		Due to the small size of this species it may have been overlooked during previous surveys within the study area. Given its broad distribution, and the low impact nature of the Proposal the conservation status of this species is unlikely to be impacted.	Potential
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	P3		X		No suitable habitat recorded within the study area.	Unlikely
<i>Sida</i> sp. Hamersley Range (K. Newbey 10692)	P3		X		No suitable habitat recorded within the study area.	Unlikely
<i>Solanum albotellatum</i>	P3	X			No suitable habitat recorded within the study area.	Unlikely
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3		X		No suitable habitat recorded within the study area.	Unlikely
<i>Triodia basitricha</i> (Pilbara Curly Spinifex)	P3		X		Recorded during survey	Recorded
<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)	P3		X		No suitable habitat recorded within the study area.	Unlikely

Species	Status	NM	RT	EPBC	Recorded during survey / notes on habitat, or lack of, within study area	Likelihood of occurrence (post-field)
<i>Goodenia nuda</i>	P4	X	X		Due to the small size of this species it may have been overlooked during the current survey. Given its broad range of habitats and distribution, and the low impact nature of the Proposal the conservation status of this species is unlikely to be impacted.	Potential
<i>Rhynchosia bungarensis</i>	P4		X		Recorded during survey	Recorded

4.7 Introduced flora occurring within the study area

No weed species were recorded from within the study area during the current survey.

Strict weed hygiene protocols should be implemented during clearing of vegetation and subsequent earthworks to minimise the introduction and spread of weeds to or from the study area.

4.8 Fauna and Fauna habitats of the study area

4.8.1 Fauna habitats of the study area

Rapallo (2012) mapped three broad fauna habitat types: Scree/ Hillslope; Drainage; and Valley habitats within the study area (Figure 4-4; Table 4-5). These habitat types were verified, delineated, and mapped during the current field survey.

Table 4-5: List of habitat types within the study area including microhabitats and extent

Habitat	Fauna habitat description	Associated vegetation units	Extent (ha) within study area	Proportion (%) within study area
Scree/ Hillslope (Plate 7)	The Scree/ Hillslope habitat is described by Rapallo (2012) as hummock grasslands of <i>Triodia wiseana</i> and/or <i>T. epactia</i> with scattered low trees of <i>Eucalyptus leucophloia</i> . Micro habitats in this broad habitat type include rock outcroppings that provide potential habitat for small reptiles. Scree/ hill slopes are generally considered to have 'low' habitat value; however, they provide suitable habitat for the conservation significant Western Pebble-mound Mouse.	ChTe/TwTb EiChTeTwTb EiChAiTeTw	51.40	79.81
Drainage (Plate 8)	The Drainage habitat consisted of <i>Corymbia hamersleyana</i> (along the valley drainage lines) and <i>Corymbia ferritcola</i> (in the drainage lines and gullies on the upper hillslopes) over <i>Acacia tumida</i> subsp. <i>pilbarensis</i> and other <i>Acacia</i> spp., Fabaceae species over grasses including <i>Themeda triandra</i> , <i>Cymbopogon ambiguus</i> and <i>Triodia epactia</i> . Several micro habitats are associated with this habitat type and include large hollows in the <i>Corymbia</i> spp. Trees and areas with high leaf litter. Drainage areas are considered to have 'moderate' fauna habitat value and may provide suitable foraging habitat for conservation significant fauna species such as Australian Bustard, Bush Stone-curlew, Northern Quoll and the Pilbara Leaf-nosed Bat.	CfFbCaEm ChAtTe	4.48	6.95
Valley (Plate 9)	The Valley fauna habitat type occurs in the broad valleys between plateau peaks with minor drainage systems creating stony loamy soils. The vegetation comprises <i>Eucalyptus</i> and <i>Corymbia</i> spp. over an <i>Acacia</i> spp., and <i>Grevillea</i> spp. tall shrubland over <i>Triodia epactia</i> . Micro habitats include areas of loamy soils suitable for burrowing species. Valley areas are considered to have 'moderate' habitat value and may provide suitable habitat for conservation significant fauna species such as Ganes Blind Snake, Australian Bustard, Bush Stone-curlew and Western Pebble-mound Mouse.	ChApAmTe	8.22	12.76



Plate 7: Representative photo of Scree/ hillslope habitat type from the study area



Plate 8: Representative photo of Drainage habitat type from the study area



Plate 9: Representative photo of Valley habitat type from the study area

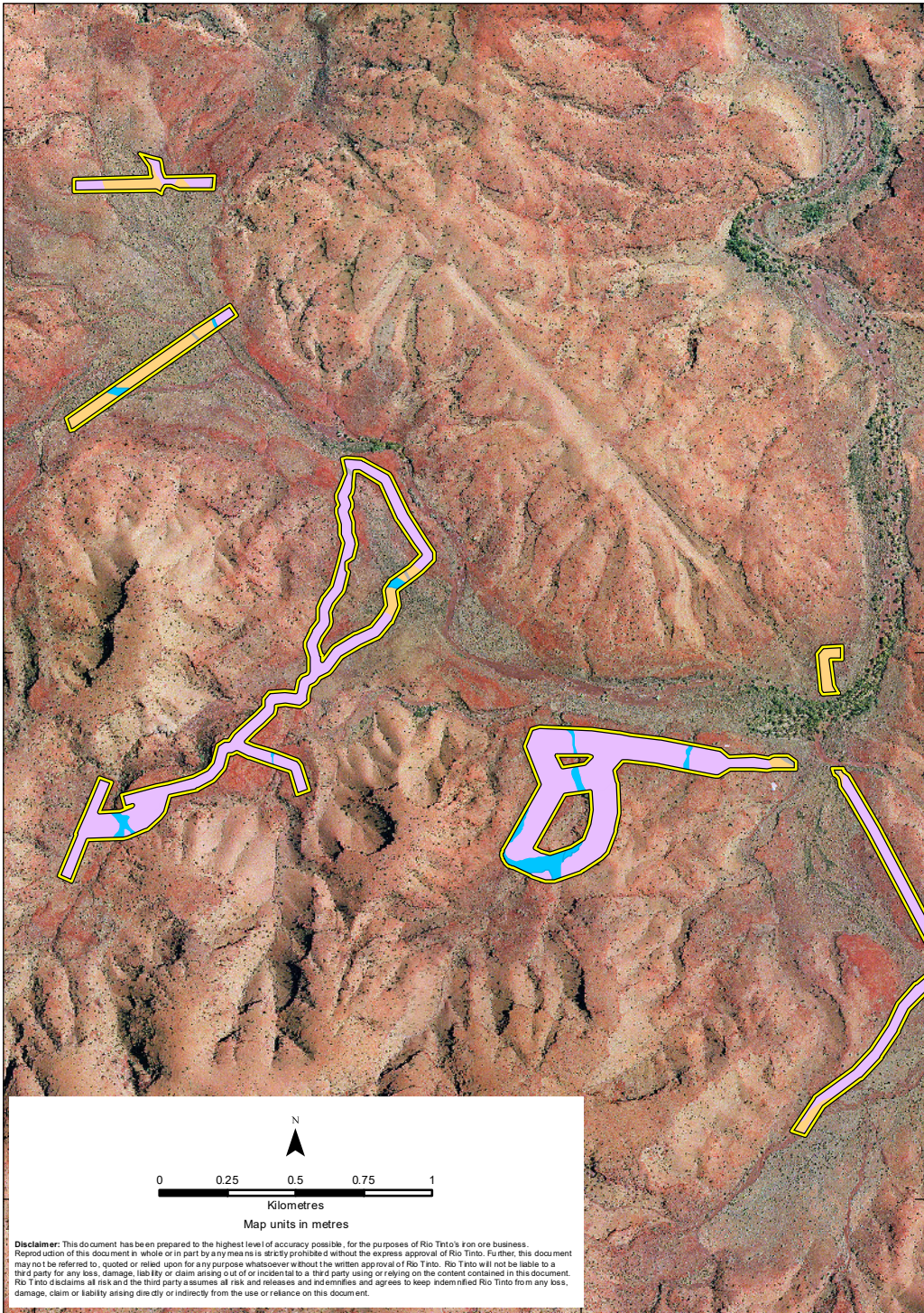
536,000

538,000

7,580,000

7,578,000

7,576,000



536,000

538,000

540,000

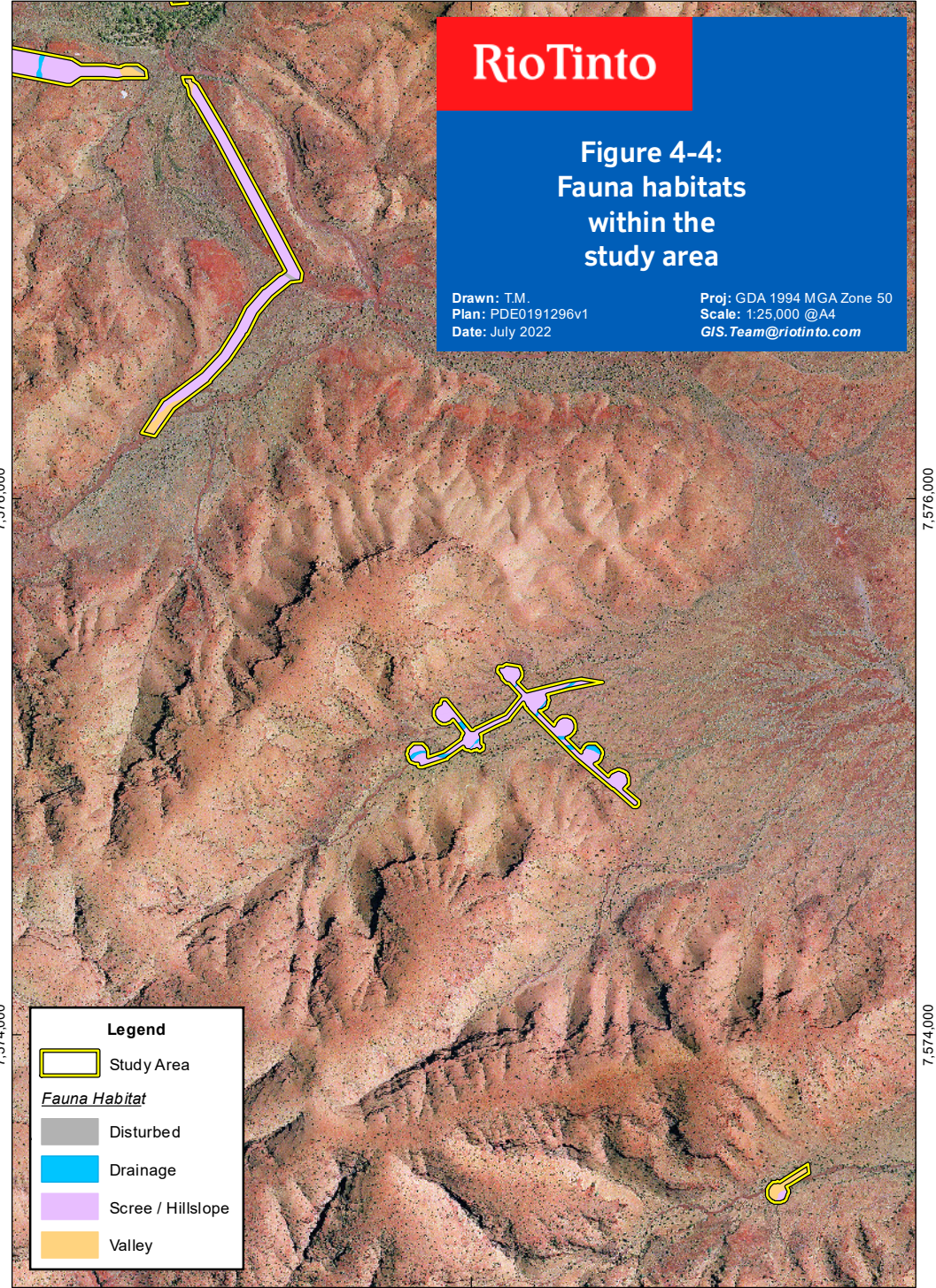
7,580,000

7,576,000

7,578,000

7,574,000

7,576,000



RioTinto

**Figure 4-4:
Fauna habitats
within the
study area**

Drawn: T.M.
Plan: PDE0191296v1
Date: July 2022

Proj: GDA 1994 MGA Zone 50
Scale: 1:25,000 @A4
GIS.Team@riotinto.com

Legend

- Study Area
- Fauna Habitat**
- Disturbed
- Drainage
- Scree / Hillslope
- Valley

540,000

7,576,000

7,574,000

Disclaimer: This document has been prepared to the highest level of accuracy possible, for the purposes of Rio Tinto's iron ore business. Reproduction of this document in whole or in part by any means is strictly prohibited without the express approval of Rio Tinto. Further, this document may not be referred to, quoted or relied upon for any purpose whatsoever without the written approval of Rio Tinto. Rio Tinto will not be liable to a third party for any loss, damage, liability or claim arising out of or incidental to a third party using or relying on the content contained in this document. Rio Tinto disclaims all risk and the third party assumes all risk and releases and indemnifies and agrees to keep indemnified Rio Tinto from any loss, damage, claim or liability arising directly or indirectly from the use or reliance on this document.

4.9 Fauna habitats of significance

None of the fauna habitats occurring within the study area correspond to any ecosystems listed as Threatened under the EPBC Act and none are consistent with ecosystems listed as TECs by DBCA (2018a).

None of the fauna habitats occurring within the study area are representative of listed PECs by DBCA (2022).

4.10 Other habitats of significance

None of the fauna habitats occurring within the study area were deemed to hold elevated conservation significance.

4.11 Conservation listed fauna recorded during survey

No threatened fauna were observed during the survey. Evidence of one Priority 4 species, the Western Pebble-mound Mouse, was recorded within the study area. One inactive mound was recorded within the study area at 540038 mE; 7575152mN in the Scree/ hillslope habitat type.

***Pseudomys chapmani* (Western Pebble-mound Mouse) (P4)**

The Western Pebble-mound Mouse (P4) is endemic to Western Australia with its current range extending from central to the eastern Pilbara, including Karijini National Park. It was formerly more widespread, being found in coastal areas, as well as further to the south (Lee 1995). They are now thought to be extinct over much of the Gascoyne, the Murchison and much of the Pilbara coast (Anstee et al. 1997).

This species is particularly common in the eastern and central regions of the Pilbara, with a range that extends from the Chichester to Hamersley subregions. The Western Pebble-mound Mouse' preferred habitat comprises of stony hillsides and rocky, hummock grassland with little or no soil and an overstorey of Acacia (Lee 1995; Ford and Johnson 2007; Menkhorst & Knight 2017). In suitable habitats, pebble mounds of this species can be found in large numbers, although not all of these mounds are occupied all of the time.

This species lives solitary or in small family groups in burrows below the mounds of pebbles (Anstee et al. 1997). Females can produce several litters of four young annually (Start 2008).

4.12 Potential conservation listed fauna occurring in the study area

Eighteen conservation significant fauna species were identified from the desktop study (Table 3-4) as occurring in the vicinity of the study area.

The pre-field likelihood rating was revised post field survey. Fourteen of the eighteen threatened fauna identified were deemed unlikely to occur within the study area, due to the absence of suitable habitat. Three species have the 'potential' to occur within the study area and one species was considered 'likely' to occur within the study area (Table 4-6).

Table 4-6: Revised likelihood of occurrence for conservation significant fauna within the study area

Species	Common name	BC Act	EPBC Act	Likelihood of occurrence (post-field)
Birds				
<i>Actitis hypoleucos</i>	Common Sandpiper		MI	Unlikely The study area does not contain suitable habitat to support this species.
<i>Apus pacificus</i>	Fork-tailed Swift	MI	MI	Unlikely This species is aerial within the Pilbara and does not utilise the terrestrial surface. This species may overfly the study area however will not be impacted by the Proposal.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	MI	MI	Unlikely The study area does not contain suitable habitat to support this species.
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	CR & MI	Unlikely The study area does not contain suitable habitat to support this species.
<i>Calidris melanotos</i>	Pectoral Sandpiper		MI	Unlikely The study area does not contain suitable habitat to support this species.
<i>Charadrius veredus</i>	Oriental Plover	MI	MI	Unlikely The study area does not contain suitable habitat to support this species.
<i>Falco hypoleucos</i>	Grey Falcon	VU	VU	Unlikely This species is wide ranging and may occur within the study area opportunistically to forage however, the study area does not contain habitat for which this species has a specific dependence.
<i>Glareola maldivarum</i>	Oriental Pratincole		MI	Unlikely The study area does not contain suitable habitat to support this species.
<i>Hirundo rustica</i>	Barn Swallow	MI	MI	Unlikely The study area does not contain suitable habitat to support this species.

Species	Common name	BC Act	EPBC Act	Likelihood of occurrence (post-field)
<i>Motacilla cinerea</i>	Grey Wagtail		MI	Unlikely The study area does not contain suitable habitat to support this species.
<i>Motacilla flava</i>	Yellow wagtail		MI	Unlikely The study area does not contain suitable habitat to support this species.
<i>Pezoporus occidentalis</i>	Night Parrot	CR	EN	Unlikely The study area does not contain suitable habitat to support this species.
<i>Rostratula australis</i>	Australian Painted Snipe	EN	EN	Unlikely The study area does not contain suitable habitat to support this species.
Mammals				
<i>Dasyurus hallocatus</i>	Northern Quoll	EN	EN	Potential The study area contains potential habitat to support this species.
<i>Macroderma gigas</i>	Ghost Bat	VU	VU	Potential The species may occasionally visit the study area to forage however the study area does not contain core breeding habitat (caves) to support this species.
<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	P4		Likely An inactive mound was recorded within the study area for the current field survey, however no active mounds were observed. The study area contains habitat to support this species.
<i>Rhinonictes aurantia</i>	Pilbara Leaf-nosed Bat	VU	VU	Unlikely This species is wide ranging and may occur within the study area opportunistically to forage however, the study area does not contain habitat for which this species has a specific dependence.
Reptiles				

Species	Common name	BC Act	EPBC Act	Likelihood of occurrence (post-field)
<i>Liasis olivaceus</i> subsp. <i>barroni</i>	Pilbara Olive Python	VU	VU	<p>Potential</p> <p>Although suitable core habitat (rocky habitat adjacent to water sources) is absent within the study area; the Pilbara Olive Python may utilise the study area for dispersal at times.</p>

EPBC – EPBC Act Protected Matters Search Tool.

5. Statement addressing the 10 clearing principles

Rio Tinto is proposing to undertake an RC exploration drilling program which will comprise 53 drill holes ranging from 40 to 250 m and 10.9 km of new tracks using blade up technique when grading. The Proposal will require the clearing of 7.34 ha of native vegetation.

Based on specialist assessment of the application area and discussion below, it is deemed that the Proposal is not considered to be at variance with any of the Ten Clearing Principles under Schedule 5 of the EP Act.

5.1 Comprises high level of biological diversity

Native vegetation should not be cleared if it comprises a high level of biological diversity.

The Pilbara is one of Australia's 15 National Biodiversity Hotspots (Department of the Environment and Energy, DotEE 2018) and is a secondary centre of endemism and species richness for *Acacia*, *Triodia*, *Corymbia* and *Sida* in Western Australia (Maslin 2001, Kendrick 2001 and Maslin and van Leeuwen 2008). The Hamersley sub-region of the Pilbara has been identified by the Threatened Species Scientific Committee for the Australian Government Biodiversity Hotspots as it provides habitat for a number of threatened, endemic and fire-sensitive species and communities.

The study area occurs within the Hamersley sub-region of the Pilbara bioregion. The Hamersley sub region is described as: 'Mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by gorges (basalt, shale and dolerite). Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges' (Kendrick 2001).

Special values of the Hamersley sub-region short range endemics, centres of endemism (including calcrete deposits), refugia such as permanent spring systems, hill tops and gorges, and the *Themeda* grasslands TEC (Kendrick 2001).

The application area represents one regional vegetation association as defined and mapped by Beard (1975) – 'Hamersley 82 (A1Li)- Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*' still has 99.5 % of its pre-European extent remaining and is considered to be of low reservation priority (L) (Kendrick 2001). The potential clearing of 7.34 ha of vegetation is unlikely to have a significant impact on this vegetation association.

Six vegetation units were described from four major landforms within application area for the current survey: hillslopes; gorges and gullies; floodplains and terraces; and medium creeklines. None of the vegetation units occurring within the application area are listed as TECs under the EPBC Act or under the BC Act. None of the units represent PECs under the State listing maintained by the DBCA.

The EICHAiTeTw vegetation unit, mapped and described for the upper hillslopes within the application area is considered to be of conservation significance as it represents 'hill-top floras, Hamersley Range' ecosystem at risk (Kendrick 2001). This vegetation unit is mapped over 9.19 ha which represents 14.27 % of the application area. This ecosystem is considered to be of low reservation priority (L) (Kendrick 2001).

A total of 90 taxa from 57 genera representing 30 families were recorded during the current survey which is likely to reflect a small proportion of the total number of species occurring in the wider study area (Astron [2011] recorded 329 taxa from 152 genera representing 50 families in their detailed survey) however the current survey was conducted following above average seasonal conditions so any significant species that may be present are likely to have been detected during the survey.

No threatened flora species were recorded for the current survey however, two Priority 3 species, *Indigofera rivularis* and *Triodia basitricha*, and one Priority 4 flora species, *Rhynchosia bungarensis*, were recorded within the study area. The proposed clearing within the application area is unlikely to have a significant impact on these species due to the prevalence of suitable habitat for all three of these species outside of the application area and their documented broad ranges across the Pilbara bioregion.

Three broad fauna habitat types were recorded within the study area: Scree/ Hillslope; Drainage; and Valley. These fauna habitats are not considered to be restricted at a local or regional level.

One conservation significant fauna species, Western Pebble-mound Mouse (P4), in the form of an old inactive mound was recorded from within the study area.

The Proposal is not considered to be at variance with this Principle.

5.2 Potential impact to any significant habitat for fauna indigenous to Western Australia

Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Three habitat types: Scree/ Hillslope; Drainage; and Valley, are represented within the study area. The majority of the application area (79.81 %) is Scree / Hillslope with a condition rating of Excellent.

One Priority 4 listed fauna species, *Pseudomys chapmani* (Western pebble mound mouse), was considered 'likely' to occur within the application area based on the presence of an inactive mound of the. The mound was deemed to be inactive (i.e. a mound that had significantly lost their dome formation) and considered unlikely to have been inhabited in recent years.

Two threatened fauna species, *Macroderma gigas* (Ghost bat) and *Dasyurus hallocatus* (Northern Quoll) were considered 'Potential' occurrences within the study area however, due to the small size of the application area, it is considered unlikely the Proposal will negatively impact these conservation significant species, on a local or regional scale.

The Proposal is not considered to be at variance with this Principle.

5.3 Potential impact to any rare flora

Native vegetation should not be cleared if it includes or is necessary for the continued existence of rare flora.

No threatened flora species were recorded for the current survey however, two Priority 3 species, *Indigofera rivularis* and *Triodia basitricha*, and one Priority 4 flora species, *Rhynchosia bungarensis*, were recorded within the study area. The proposed clearing within the application area is unlikely to have a significant impact on these species due to the prevalence of suitable habitat for all three of these species outside of the application area and their documented broad ranges across the Pilbara bioregion.

The Proposal is not considered to be at variance with this Principle.

5.4 Presence of any threatened ecological communities

Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of a threatened ecological community (TEC).

There are no State or Commonwealth listed TECs within or adjacent to the application area.

The Proposal is not considered to be at variance with this Principle.

5.5 Significance as a remnant of native vegetation in the area that has been extensively cleared

Native vegetation should not be cleared if it is significant as remnant vegetation in an area that has been extensively cleared.

The majority of the Pilbara region has not been extensively cleared. However, grazing, inappropriate fire regimes and weed invasion have greatly altered the vegetation in some areas. The application area lies within one of Beard's mapping units – Hammersley 82.

The current extent of the Beard (1975) mapping unit Hammersley 82 within the Hamersley IBRA sub-region has been estimated to be 99.50 % of the pre-European extent.

The Proposal is not considered to be at variance with this Principle.

5.6 Impact on any watercourse and / or wetlands

Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Several minor ephemeral drainage lines transect the application area that flow after significant rainfall events transect the study area. These flow lines are not considered to be significant watercourses or wetlands.

The Proposal is not considered to be at variance with this Principle.

5.7 Potential to cause appreciable land degradation

Native vegetation should not be cleared if the clearing of vegetation is likely to cause appreciable land degradation.

The study area intersects two land systems - Boolgeeda Land System and the Newman Land System. The Boolgeeda Land System comprises stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands. The Newman Land System comprises rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.

The Proposal is not expected to result in soil erosion, nutrient export, water-logging/flooding, acidification, salinization or deep subsoil compaction. Potential impacts to land degradation in the longer term as a result of the proposed clearing may be minimised by the implementation of rehabilitation.

The Proposal is not considered to be at variance with this Principle.

5.8 Potential to impact on the environmental values of adjacent or nearby conservation areas

Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

No mapped conservation areas or ESAs intersect the application area. The nearest conservation area, Millstream Chichester National Park, lies approximately 35 km northwest of the application area. Due

to the separation, the proposed clearing is not expected to impact the environmental values of Millstream Chichester National Park.

The Proposal is not considered to be at variance with this Principle.

5.9 Potential deterioration in the quality of surface or underground water

Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

No permanent or semi-permanent water features occur in or adjacent to the application area. Given the small scale of the Proposal, it is unlikely that the Proposal would affect groundwater quality in the region.

The Proposal is not considered to be at variance with this Principle.

5.10 Potential of clearing to cause, or exacerbate, the incidence or intensity of flooding

Native vegetation should not be cleared if the clearing of vegetation is likely to cause, or exacerbate, the incidence of flooding.

Local flooding occurs seasonally in the Pilbara region as a result of sporadic cyclone thunderstorm activity. The small scale of clearing proposed is not expected to exacerbate the incidence or intensity of flooding in the area.

The Proposal is not considered to be at variance with this Principle.

6. Conclusions

Rio Tinto's Proposal is to undertake an exploration drilling program. The proposed drill program will comprise 53 drill holes ranging from 40 to 250 m and 10.9 km of new track using blade up technique when grading and will require the clearing of 7.34 ha of native vegetation.

The survey conducted in March 2022 was undertaken in good seasonal conditions and met the requirements for a reconnaissance level survey in order to support a Native Vegetation Clearing Permit (NVCP). No TECs or PECs were recorded within the application area nor does the application area intersect any ESAs.

Six vegetation types were identified across four major landforms within the application area. Three vegetation types were described from hillslopes, one from gorges and gullies, one from floodplains and terraces, and one from creeklines. None of the vegetation associations occurring within the study area correspond to any ecosystems listed as Threatened under the EPBC Act or listed as TECs or PECs by the DBCA however, one vegetation unit, EChAiTeTw, mapped and described for the upper hillslopes within the application area is considered to be of conservation significance as it represents 'hill-top floras, Hamersley Range' ecosystem at risk (Kendrick 2001). This ecosystem is considered to be of low reservation priority (L) (Kendrick 2001) and is widespread throughout the Hamersley sub-region.

The landforms, vegetation, and fauna habitats are well represented within the broader Hamersley sub-region.

A total of 90 taxa from 57 genera representing 30 families were recorded during the current survey. The number of taxa recorded by the current study appears consistent than what was expected when compared with smaller sized previous surveys within the Greater Brockman region. Three Priority-listed species were recorded during the survey: two Priority 3 species, *Indigofera rivularis* and *Triodia*

basitricha, and one Priority 4 flora species, *Rhynchosia bungarensis*. The proposed clearing within the application area is unlikely to have a significant impact on these species due to the prevalence of suitable habitat for all three of these species outside of the application area and their documented broad ranges across the Pilbara bioregion.

No weed species were recorded from within the study area during the current survey.

Three broad fauna habitat types were recorded within the study area: Scree/ Hillslope; Drainage; and Valley habitats within the study area. These fauna habitats are not considered to be restricted at a local or regional level.

One mound belonging to the Western Pebble Mound Mouse was recorded during the survey. This mound was deemed to be inactive. This mound was considered unlikely to have supported the Western Pebble Mound Mouse in recent years.

The Proposal is unlikely to be at variance with any of the 10 Clearing Principles under Schedule 5 of the EP Act.

7. References

- Aplin, T.E.H. (1979). The Flora, Chapter 3. In: O'Brien, B.J. (ed.) Environment and Science. University of Western Australia Press, Nedlands.
- Anstee, S., Start, T., and Morris, K. (1997). Mound builders of the Pilbara. Landscape, vol 12, number 3. Department of Conservation and Land Management. Western Australia.
- Astron (2011). Caliwingina Vegetation and Flora Survey, Unpublished report for Rio Tinto.
- Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003) The new atlas of Australian birds. Melbourne: Birds Australia.
- Beard, J.S. (1975). Pilbara. Explanatory notes to Sheet 4, 1:1,000,000 series vegetation survey of Western Australia. University of Western Australia Press, Nedlands.
- Beard, J.S. (1990). Plant Life of Western Australia. Kangaroo Press Pty Ltd, Kenthurst NSW.
- Biota Environmental Services (2008). Hope Downs Northern Quoll Position Paper. Prepared for Rio Tinto Iron Ore on behalf of Hammersley HMS.
- Birdlife Australia (2022). Curlew Sandpiper *Calidris ferruginea*. Available from <https://birdlife.org.au/bird-profile/curlew-sandpiper#:~:text=The%20Curlew%20Sandpiper%20is%20found,around%20lakes%2C%20dams%20and%20floodwaters>
- Blakers, M., Davies, S.J.J.F. and Reilly, P.N. (1984). The atlas of Australian birds. Melbourne: Melbourne University Press.
- Bureau of Meteorology (BoM) (2022). Climate Data Online. Available: <http://www.bom.gov.au/climate/data/index.shtml>.
- Christian, C.S. and Stewart, G.A. (1953). General report on survey of Katherine-Darwin region, 1946. Land Research Series No. 1. CSIRO, Melbourne.
- Churchill, S.K. (1998), Australian bats. Reed New Holland, Frenchs Forest, NSW.
- Department of Agriculture, Water and the Environment (DAWE) (2022a), Australia's bioregions (IBRA). Available: <http://www.environment.gov.au/land/nrs/science/ibra>.
- Department of Agriculture, Water and the Environment (DAWE) (2022b), EPBC Protected Matters Search Tool. Available: <http://www.environment.gov.au/epbc/protected-matters-search-tool>
- Department of Biodiversity, Conservation and Attractions (2017), Night Parrot. Available from: <https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals/night-parrot> [Accessed 16/06/22]
- Department of Biodiversity, Conservation and Attractions (DBCA) (2018a), List of Threatened Ecological Communities (TECs) endorsed by the Western Australian Minister for Environment. Species and Communities Branch of the Department of Biodiversity, Conservation and Attractions, 28 June 2018.
- Department of Biodiversity, Conservation and Attractions (DBCA) (2018b), Wildlife Conservation (Rare Flora) Notice 2018. Government of Western Australia, Government Gazette WA, 11 September 2018. Available: https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatenedspecies/Listings/flora_notice.pdf
- Department of Biodiversity, Conservation and Attractions (DBCA) (2018c), Wildlife Conservation (Specially Protected Fauna) Notice 2018. Government of Western Australia, Government Gazette WA, 11 September 2018. Available: https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatenedspecies/Listings/fauna_notice.pdf

- Department of Biodiversity, Conservation and Attractions (DBCA) (2022), Priority Ecological Communities for Western Australia version 32. Species and Communities Program, Department of Biodiversity, Conservation and Attractions, 1 June 2022.
- Department of Water and Environmental Regulation (2022), WRIMS – Groundwater subareas (DWER-083) dataset. Department of Water, Western Australia. Available: https://services.slip.wa.gov.au/public/services/SLIP_Public_Services/Water/MapServer/WMSServer.
- Environmental Protection Authority (2016a), Technical Guidance – Flora and vegetation surveys for environmental impact assessment. Perth, Western Australia.
- Environmental Protection Authority (2016b), Environmental Factor Guideline – Flora and vegetation. Perth, Western Australia.
- Environmental Protection Authority (2016c), Environmental Factor Guideline – Terrestrial fauna. Perth, Western Australia.
- Environmental Protection Authority (2020), Technical Guidance – Terrestrial fauna surveys for environmental impact assessment. Perth, Western Australia.
- Ford, F. and Johnson, C. (2007). Eroding abodes and vanished bridges: historical biogeography of the substrate specialist pebble-mound mice (*Pseudomys*). *Journal of Biogeography* 34: 514-523.
- Higgins, P.J. & S.J.J.F. Davies, eds (1996), Handbook of Australian, New Zealand and Antarctic Birds. Volume Three - Snipe to Pigeons. Melbourne, Victoria: Oxford University Press.
- Keighery, B.J. 1994, Bushland Plant Survey: A Guide to Plant Community Survey for the Community, Wildflower Society of WA (Inc.), Nedlands, WA.
- Kendrick, P. (2001) Pilbara 3 (PIL3 - Hamersley subregion). In: J. May and N. McKenzie (eds) A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Department of Conservation and Land Management, Kensington, Western Australia, pp 568-580.
- Lee, A.K. (1995). The Action Plan for Australian Rodents. Australian Department of the Environment and Heritage, Canberra, Australia.
- Martin, D.McB., Hocking, R.M., Riganti, A., and Tyler, I.M. (2014), 1:500,000 State interpreted bedrock geology of Western Australia. Digital data layer: Geological Survey of Western Australia.
- Menkhorst, P. and Knight, F. (2017), A field guide to the mammals of Australia. Oxford University Press, Melbourne.
- Pearson, D.J. (1993), Distribution, status and conservation of pythons in Western Australia. In: Lunney, D. & D. Ayers, eds. *Herpetology in Australia: a Diverse Discipline*. Page(s) 383-395. Royal Zoological Society of NSW, Sydney.
- Pizzey G. and Knight F. (2012). The field guide to the birds of Australia. HarperCollins Publishers, Australia.
- Rapallo. (2012). Terrestrial Fauna Survey of the Caliwingina Project Area. (Unpublished report) prepared for Rio Tinto Iron Ore.
- Rio Tinto. (2016). Desktop Flora, Vegetation and Fauna Habitat Assessment at Mt Pyrton. Native Vegetation Clearing Permit – Supporting Report. May 2016.
- Rio Tinto. (2014). Flora, Vegetation and Fauna Survey for the Caliwingina area. Native Vegetation Clearing Permit Supporting Report. Unpublished report for Rio Tinto. July 2014.
- Shepherd, D.P., Beeston, G.R., and Hopkins, A.J.M. (2002), Native vegetation in Western Australia – extent, type and status. Resource Management Technical Report No. 249. Department of Agriculture, Western Australia.

- Specht, R.L. (1970). *Vegetation, The Australian Environment*, 4th edition, pp 44-67. CSIRO & Melbourne University Press, Melbourne.
- Start, A. N. (2008). Western Pebble-mouse, *Pseudomys chapmani*. In: S. Van Dyck and R. Strahan (eds), *The mammals of Australia*. Third Edition, pp. 621-622. Reed New Holland, Sydney, Australia.
- Threatened Species Scientific Committee (2005a), NON-APPROVED Conservation Advice on Northern Quoll (*Dasyurus hallucatus*). Available from: <http://www.environment.gov.au/biodiversity/threatened/species/dasyurus-hallucatus.html#conservation>.
- Tille, P.J. (2006). *Soil-landscapes of Western Australia's rangelands and arid interior*. Department of Primary Industries and Regional Development, Western Australia, Perth. Report 313.
- Trudgen, M.E. (1988), *A report on the flora and vegetation of the Port Kennedy area*. Unpublished report prepared for Bowman Bishaw and Associates, West Perth.
- Van Dyck, S. and Strahan, R. (ed.) (2008), *The mammals of Australia*. New Holland Publishers (Australia) Pty Ltd., Sydney, New South Wales.
- Van Vreeswyk, A.M.E., Payne, A.L., Leighton, K.A. and Hennig, P. (2004), *An inventory and condition survey of the Pilbara region, Western Australia*. Technical Bulletin No. 92. Department of Agriculture.
- Western Australian Herbarium (WAH) (2021). *FloraBase—the Western Australian Flora*. Department of Biodiversity, Conservations and Attractions. <http://florabase.dpaw.wa.gov.au/>.
- Wilson, S. & G. Swan (2003), *A Complete Guide to Reptiles of Australia*. Page(s) 480. Sydney: Reed New Holland.

8. Appendices

Appendix 1: Results of NatureMap and EPBC Protected Matters database searches



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 09/06/22 18:07:30

[Summary](#)

[Details](#)

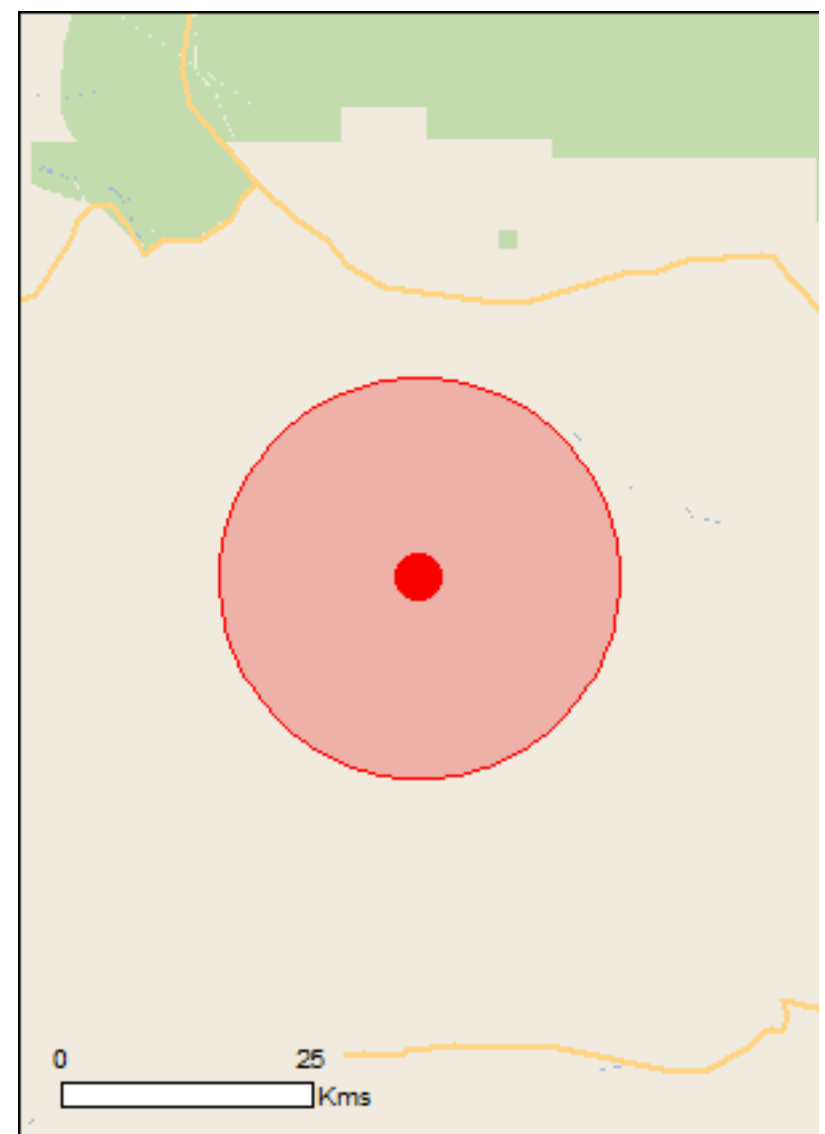
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

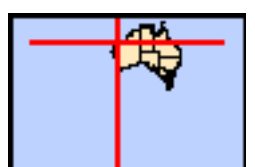
[Acknowledgements](#)



This map may contain data which are
©Commonwealth of Australia
(Geoscience Australia), ©PSMA 2015

[Coordinates](#)

Buffer: 20.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	8
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	11
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species [\[Resource Information \]](#)

Name	Status	Type of Presence
------	--------	------------------

Birds

Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
---	-----------------------	--

Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
---	------------	--

Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
--	------------	--

Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
--	------------	--

Mammals

Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
---	------------	---

Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat known to occur within area
---	------------	---

Rhinonictes aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat likely to occur within area
---	------------	--

Reptiles

Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat likely to occur within area
---	------------	--

Listed Migratory Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
------	------------	------------------

Migratory Marine Birds

Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
---	--	--

Migratory Terrestrial Species

Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
---	--	--

Name	Threatened	Type of Presence
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species	[Resource Information]	
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area

Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-21.90288 117.36303

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

© Commonwealth of Australia

Department of Agriculture Water and the Environment

GPO Box 858

Canberra City ACT 2601 Australia

+61 2 6274 1111

Appendix 2: Likelihood of occurrence criteria for flora and fauna species

Likelihood of occurrence criteria for flora and fauna species:

- **Likelihood: Previously recorded**

- The species has previously been recorded within study area from DEC database search results and/or from previous surveys of the study area, and/or the species has been confirmed through a current vouchered specimen at WA Herbarium.

- **Likelihood: Likely**

- The species has not previously been recorded from within the study area. However:
The species has been recorded in proximity (<10 km) to the study area and occurs in similar habitat to that which occurs within the study area.

Core habitat and suitable landforms for the species occurs within the study area either year-round or seasonally. In relation to fauna species, this could be that a host plant is seasonally present on site, or habitat features such as caves are present that may be used during particular times during its life cycle e.g. for breeding. In relation to both flora and fauna species, it may be there are seasonal wetlands present.

There is a medium to high probability that a species uses the study area.

- **Likelihood: Potential**

- The species has not previously been recorded from within the study area. However:
Targeted surveys may locate the species based on records occurring in proximity to the study area (10-20 km) and suitable habitat occurring in the study area.

The study area has been assessed as having potentially suitable habitat through habitat modelling.

The species is known to be cryptic and may not have been detected despite extensive surveys.

The species is highly mobile and has an extensive foraging range so may not have been detected during previous surveys.

- The species has been recorded in the study area by a previous consultant survey or there is historic evidence of species occurrence within the study area. However:

Doubt remains over taxonomic identification, or the majority of habitat does not appear suitable (although presence cannot be ruled out due to factors such as species ecology or distribution).

Coordinates are doubtful.

- **Likelihood: Unlikely**

- The species has been recorded locally through DBCA database searches. However, it has not been recorded within the study area and:

It is unlikely to occur due to the site lacking critical habitat, having at best marginally suitable habitat, and/or being severely degraded.

It is unlikely to occur due to few historic record/s and no other current collections in the local area.

- The species has been recorded within the bioregion based on literature review but has not been recorded locally or within the study area through DBCA database searches.
- The species has not been recorded in the study area despite adequate survey efforts, such as a standardised methodology or targeted searching within potentially suitable habitat.

Appendix 3: Vegetation structural classification and condition rating scale

Vegetation structural classification[^]

Stratum	70 - 100%	30 – 70%	10 – 30%	2 – 10%	< 2%
Trees over 30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland	Scattered tall trees
Trees 10-30 m	Closed forest	Open forest	Woodland	Open woodland	Scattered trees
Trees under 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland	Scattered low trees
Shrubs over 2 m	Tall closed scrub	Tall open scrub	Tall shrubland	Tall open shrubland	Scattered tall shrubs
Shrubs 1-2 m	Closed heath	Open heath	Shrubland	Open shrubland	Scattered shrubs
Shrubs under 1 m	Low closed heath	Low open heath	Low shrubland	Low open shrubland	Scattered low shrubs
Hummock grasses	Closed hummock grassland	Hummock grassland	Open hummock grassland	Very open hummock grassland	Scattered hummock grasses
Grasses, Sedges, Herbs	Closed tussock grassland / sedgeland / herbland	Tussock grassland / sedgeland / herbland	Open tussock grassland / sedgeland / herbland	Very open tussock grassland / sedgeland / herbland	Scattered tussock grasses / sedges / herbs

[^]Based on Muir (1977) and Aplin's (1979) modification of the vegetation classification system of Specht (1970).

Vegetation condition scale rating for use on Pilbara surveys[^]

Rating	Description
Excellent	Pristine or nearly so; no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activities since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of activities of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

[^]Based on Trudgen (1998) as presented in EPA Technical Guidance (EPA 2016a).

Appendix 4: GPS coordinates of relevés recorded within the study area

Site	Type	Easting (mE)	Northing (mN)
MPRCG01	Relevé	536677	7577634
MPRCG02	Relevé	536395	7577414
MPRCG03	Relevé	536289	7577327
MPRCG04	Relevé	536837	7577607
MPRCG05	Relevé	537319	7578181
MPRCG06	Relevé	537386	7578321
MPRCG07	Relevé	538821	7576312
MPRCG08	Relevé	538904	7576364
MPRSR01	Relevé	538489	7577615
MPRSR02	Relevé	538134	7577668
MPRSR03	Relevé	537822	7577357
MPRSR04	Relevé	537982	7577632
MPRSR05	Relevé	536256	7578925
MPRSR06	Relevé	536427	7579046
MPRSR07	Relevé	540202	7575250
MPRSR08	Relevé	540361	7575070

Appendix 5: Flora species recorded within the study area

Taxon	CGR01	CGR02	CGR03	CGR04	CGR05	CGR06	CGR07	CGR08	SRR01	SRR02	SRR03	SRR04	SRR05	SRR06	SRR07	SRR08	Opportunistic
<i>Abutilon fraseri</i>																	
<i>Abutilon</i> sp. (indet.)																	
<i>Abutilon</i> sp. Dioicum (A.A. Mitchell PRP 1266)																	
<i>Acacia acradenia</i>	x	x	x	x													
<i>Acacia adoxa</i> var. <i>adoxo</i>																	
<i>Acacia bivenosa</i>																	
<i>Acacia cowleana</i>																	
<i>Acacia dictyophleba</i>																	
<i>Acacia hilliana</i>																	
<i>Acacia inaequilatera</i>																	
<i>Acacia maitlandii</i>	x																
<i>Acacia monticola</i>																	
<i>Acacia pyrifolia</i>																	
<i>Acacia trachycarpa</i>																	
<i>Acacia tumida</i> subsp. <i>pilbarensis</i>																	
<i>Afrohybanthus aurantiacus</i>																	
<i>Aristida contorta</i>	x																
<i>Aristida holathera</i> var. <i>holathera</i>																	
<i>Aristida burbridgeae</i>																	
<i>Arivella viscosa</i>																	
<i>Astrotricha hamptonii</i>																	

Taxon	CGR01	CGR02	CGR03	CGR04	CGR05	CGR06	CGR07	CGR08	SRR01	SRR02	SRR03	SRR04	SRR05	SRR06	SRR07	SRR08	Opportunistic
<i>Boerhavia coccinea</i>														X			
<i>Bonamia erecta</i>		X						X									
<i>Brachychiton acuminatus</i>			X														
<i>Bulbostylis barbata</i>									X	X	X						
<i>Cajanus cinereus</i>													X				
<i>Calytrix carinata</i>									X								
<i>Capparis spinosa</i>								X				X					
<i>Cheilanthes brownii</i>	X			X													
<i>Chrysopogon fallax</i>														X			
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>			X									X					
<i>Codonocarpus cotinifolius</i>						X				X							
<i>Corchorus ? tectus</i>													X	X		X	
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	X		X		X	X	X										
<i>Corymbia ferriticola</i>			X	X								X					
<i>Corymbia hamersleyana</i>	X	X	X		X	X	X	X	X	X	X		X	X	X	X	
<i>Cucumis variabilis</i>							X	X									
<i>Cymbopogon ambiguus</i>		X	X				X					X	X			X	
<i>Cyperus hesperius</i>			X	X								X					
<i>Dampiera candidans</i>		X		X					X	X							
<i>Ehretia saligna</i> var. <i>saligna</i>				X													
<i>Enneapogon lindleyanus</i>													X				
<i>Eriachne ciliata</i>				X													
<i>Eriachne mucronata</i>		X	X	X								X	X				

Taxon	CGR01	CGR02	CGR03	CGR04	CGR05	CGR06	CGR07	CGR08	SRR01	SRR02	SRR03	SRR04	SRR05	SRR06	SRR07	SRR08	Opportunistic
<i>Eucalyptus leucophloia</i>	x	x	x	x					x		x	x					
<i>Euphorbia</i> sp. (indet.)												x					
<i>Euphorbia trigonosperma</i>			x					x									
<i>Ficus brachypoda</i>		x										x					
<i>Ficus virens</i>												x					
<i>Goodenia stobbsiana</i>				x						x	x						
<i>Gossypium australe</i>					x	x	x	x									x
<i>Gossypium robinsonii</i>			x						x			x	x	x			
<i>Grevillea berryana</i>	x																
<i>Grevillea pyramidalis</i>	x		x		x	x		x				x	x				
<i>Grevillea wickhamii</i>	x	x		x		x			x	x	x		x	x	x	x	
<i>Hakea chordophylla</i>											x						
<i>Hakea lorea</i> subsp. <i>lorea</i>	x				x	x							x				
<i>Hibiscus coatesii</i>													x				
<i>Indigofera monophylla</i>						x							x		x		
<i>Indigofera rivularis</i>							x										
<i>Jasminum didymum</i> subsp. <i>lineare</i>	x	x	x	x	x		x	x		x			x	x	x	x	
<i>Melhania oblongifolia</i>													x				
<i>Mirbelia viminalis</i>				x													
<i>Petalostylis labicheoides</i>						x											
<i>Phyllanthus baccatus</i>												x					
<i>Phyllanthus maderaspatensis</i>				x								x					
<i>Pluchea dentex</i>												x					

Taxon	CGR01	CGR02	CGR03	CGR04	CGR05	CGR06	CGR07	CGR08	SRR01	SRR02	SRR03	SRR04	SRR05	SRR06	SRR07	SRR08	Opportunistic
<i>Polycarpaea longifolia</i>	x	x	x				x				x						
<i>Psydrax latifolia</i>	x																
<i>Pterocaulon sphaeranthoides</i>								x									
<i>Ptilotus astrolasius</i>					x	x		x									
<i>Ptilotus calostachyus</i>	x	x							x	x	x						
<i>Ptilotus exaltatus</i>															x		
<i>Rhynchosia bungarensis</i>												x					
<i>Rhynchosia minima</i>								x							x	x	
<i>Scaevola</i> sp. Mt Bruce (M.E. Trudgen 1333)/Mt Nameless (P.A.S. Wurm 1443)		x															
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>					x		x	x					x		x	x	
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>		x	x	x					x						x		
<i>Senna</i> sp. (indet. possible hybrid)					x												
<i>Senna artemisioides</i> subsp. <i>helmsii</i>															x		
<i>Solanum diversiflorum</i>								x									
<i>Streptoglossa ?bubakii</i>												x					
<i>Stylobasium spathulata</i>												x					
<i>Tephrosia rosea</i>				x				x									
<i>Themeda triandra</i>			x		x								x	x			
<i>Tinospora smilacina</i>												x					
<i>Trichodesma zeylanicum</i>							x						x				
<i>Trigastrotheca molluginea</i>						x							x				
<i>Triodia basitricha</i>	x									x	x				x		

Taxon	CGR01	CGR02	CGR03	CGR04	CGR05	CGR06	CGR07	CGR08	SRR01	SRR02	SRR03	SRR04	SRR05	SRR06	SRR07	SRR08	Opportunistic
<i>Triodia epactia</i>	x	x	x	x	x	x	x	x	x	x			x	x	x	x	
<i>Triodia wiseana</i>	x	x							x		x						

Appendix 6: Conservation listed flora recorded for the current survey

Species	Status	Population Size (approximate)	Easting (mE)	Northing (mN)
<i>Indigofera rivularis</i>	P3	5	538821	7576312
<i>Indigofera rivularis</i>	P3	1	538809	7576299
<i>Indigofera rivularis</i>	P3	1	538796	7576263
<i>Indigofera rivularis</i>	P3	1	538932	7576369
<i>Indigofera rivularis</i>	P3	10	536166	7578859
<i>Indigofera rivularis</i>	P3	5	536335	7578965
<i>Indigofera rivularis</i>	P3	10	536597	7579155
<i>Triodia basitricha</i>	P3	500	536677	7577634
<i>Triodia basitricha</i>	P3	200	538134	7577668
<i>Triodia basitricha</i>	P3	500	537822	7577357
<i>Triodia basitricha</i>	P3	50	540202	7575250
<i>Triodia basitricha</i>	P3	500	537164	7578541
<i>Triodia basitricha</i>	P3	200	537121	7578290
<i>Triodia basitricha</i>	P3	500	537111	7578229
<i>Triodia basitricha</i>	P3	500	536999	7578008
<i>Triodia basitricha</i>	P3	1000	537010	7577972
<i>Triodia basitricha</i>	P3	1000	536987	7577887
<i>Triodia basitricha</i>	P3	500	536709	7577667
<i>Triodia basitricha</i>	P3	600	536677	7577634
<i>Triodia basitricha</i>	P3	400	536289	7577327
<i>Triodia basitricha</i>	P3	1000	537084	7578001
<i>Triodia basitricha</i>	P3	1000	537249	7578075
<i>Triodia basitricha</i>	P3	800	537386	7578321
<i>Triodia basitricha</i>	P3	500	537386	7578321
<i>Triodia basitricha</i>	P3	1000	537386	7578321
<i>Triodia basitricha</i>	P3	600	539165	7576654
<i>Triodia basitricha</i>	P3	400	539114	7576577
<i>Triodia basitricha</i>	P3	200	538988	7576441
<i>Triodia basitricha</i>	P3	1000	539283	7576896
<i>Triodia basitricha</i>	P3	600	537409	7578345
<i>Triodia basitricha</i>	P3	1000	537390	7578418
<i>Triodia basitricha</i>	P3	1000	537358	7578488
<i>Triodia basitricha</i>	P3	1000	537333	7578533
<i>Triodia basitricha</i>	P3	1000	538338	7577674

<i>Triodia basitricha</i>	P3	500	538179	7577674
<i>Triodia basitricha</i>	P3	5000	538134	7577668
<i>Triodia basitricha</i>	P3	100	538074	7577439
<i>Triodia basitricha</i>	P3	50	537976	7577233
<i>Triodia basitricha</i>	P3	5000	537935	7577176
<i>Triodia basitricha</i>	P3	500	537822	7577357
<i>Triodia basitricha</i>	P3	2000	537862	7577473
<i>Triodia basitricha</i>	P3	2000	537874	7577611
<i>Triodia basitricha</i>	P3	1000	536686	7579217
<i>Triodia basitricha</i>	P3	1000	540470	7575314
<i>Triodia basitricha</i>	P3	1000	540267	7575282
<i>Triodia basitricha</i>	P3	1000	540156	7575344
<i>Triodia basitricha</i>	P3	500	540202	7575250
<i>Triodia basitricha</i>	P3	1000	540046	7575153
<i>Triodia basitricha</i>	P3	1000	540264	7575166
<i>Triodia basitricha</i>	P3	1000	540416	7575055
<i>Triodia basitricha</i>	P3	1000	540495	7574964
<i>Triodia basitricha</i>	P3	1000	540581	7574888
<i>Triodia basitricha</i>	P3	1000	537192	7578678
<i>Triodia basitricha</i>	P3	1000	537307	7578577
<i>Rhynchosia bungarensis</i>	P4	1	537982	7577632
<i>Rhynchosia bungarensis</i>	P4	2	537874	7577611
<i>Rhynchosia bungarensis</i>	P4	5	537982	7577632

Appendix 7: Relevant legislation

Legislative Framework for Conservation Significant Flora and Fauna under the *Environment Protection and Biodiversity Conservation Act 1999*

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) affords protection to species, populations and ecological communities threatened at a national level or to species listed as migratory under various international agreements (e.g. CAMBA, JAMBA RoKAMBA, Bonn Convention). Threatened flora and fauna may be listed under Section 178 of the EPBC Act in any one of the following categories:

- Extinct
- Extinct in the wild
- Critically endangered
- Endangered
- Vulnerable
- Conservation dependent

Under the EPBC Act, a proposal which is likely to have a significant impact on threatened species, populations or ecological communities or migratory species must be referred to the Commonwealth Minister for the Environment. A significant impact is determined through application of Significant Impact Criteria (Department of the Environment 2013).

State Environmental Protection Act 1986

The *Environmental Protection Act 1986* (EP Act) is the primary legislative Act dealing with the protection of the environment in Western Australia. The Act allows the Environmental Protection Authority (EPA), to prevent, control and abate pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing.

Part IV of the EP Act is administered by the EPA and makes provisions for the EPA to undertake environmental impact assessment of significant proposals, strategic proposals and land use planning schemes. The Department of Environment Regulation (DER) is responsible for administering the clearing provisions of the EP Act (Part V). Clearing of native vegetation in Western Australia requires a permit from the DER, unless exemptions apply. Applications for clearing permits are assessed by the Department and decisions are made to grant or refuse the application in accordance with the Act. When making a decision the assessment considers clearing against the ten clearing principles as specified in Schedule 5 of the EP Act:

- a) Native vegetation should not be cleared if it comprises a high level of biodiversity.
- b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significance habitat for fauna indigenous to Western Australia.
- c) Native vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora.

- d) Native vegetation should not be cleared if it comprises the whole or part of native vegetation in an area that has been extensively cleared.
- e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.
- f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.
- g) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.
- h) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation. GHD | 613523400 Water Corporation
- i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.
- j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

Exemptions for clearing include clearing that is a requirement of a written law or authorised under certain statutory processes (listed in Schedule 6 of the EP Act) and exemptions for prescribed low impact day-to-day activities (prescribed in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004); these exemptions do not apply in environmentally sensitive areas (ESAs).

State Biodiversity and Conservation Act 2016 and Biodiversity Conservation Regulations 2018

On 1 January 2019, the Biodiversity Conservation Act 2016 and Biodiversity Conservation Regulations 2018 replaced both the Wildlife Conservation Act 1950 and the Sandalwood Act 1929 and their associated regulations. The BC Act is administered by the Department of Biodiversity Conservation and Attractions (DBCA).

The Biodiversity Conservation Act 2016 (BC Act) provides for the conservation and protection of biodiversity and biodiversity components, as well as the promotion of the ecologically sustainable use of biodiversity components in Western Australia. To reach the objectives of the BC Act, principles of ecological sustainable development have been established as follows:

- Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- The conservation of biodiversity and ecological integrity should be a fundamental consideration in decision-making

- Improved valuation, pricing and incentive mechanisms should be promoted.

State Biosecurity and Agriculture Management Act 2007

The Biosecurity and Agriculture Management Act 2007 (BAM Act) and associated regulations are administered by the Department of Agriculture and Food Western Australia (DAFWA) and replace the repealed Agriculture and Related Resources Protection Act 1976. The main purposes of the BAM Act and its regulations are to:

- Prevent new animal and plant pests (vermin and weeds) and diseases from entering WA
- Manage the impact and spread of those pests already present in the state
- Safely manage the use of agricultural and veterinary chemicals
- Increased control over the sale of agricultural products that contain violative chemical residues

The Western Australian Organism List (WAOL) is a database providing the status of organisms which have been categorised under the BAM Act 2007. A Declared Pest is a prohibited organism or an organism for which a declaration under Section 22(2) of the Act is in force. Declared Pests may be assigned a control category as follows: C1 (exclusion), C2 (eradication) and C3 (management). The category may apply to part or all of Western Australia, and all landholders are obliged to comply with the specific category of control. Categories of control are defined below.

DAGWA Categories for Declared Pests under the BAM Act 2007

Control class code	Description
C1 (Exclusion)	Organisms which should be excluded from part or all of Western Australia.
C2 (Eradication)	Organisms which should be eradicated from part or all of Western Australia.
C3 (Management)	Organisms that should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism or prevent or contain the spread of the organism.
Unassigned	Declared pests that are recognised as having a harmful impact under certain circumstances, where their subsequent control requirements are determined by a Plan or other legislative arrangements under the Act.

Appendix 8: Government and Rio Tinto internal operational controls for environmental management

Operational Controls for Environmental Management

The manner in which the clearing of native vegetation is regulated, undertaken and rehabilitated is under various Government and internal RTIO operational controls. These operational controls are discussed below.

Environmental Protection Authority Guidance Statements

Biological survey methodology for NVCP supporting applications require consideration of key 'land' factors of flora, vegetation and terrestrial fauna in its assessment. Relevant technical guides include:

- *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016a);
- *Technical Guidance – Sampling methods for terrestrial vertebrate fauna* (EPA 2016b);
- *Environmental Factor Guideline – Terrestrial fauna* (EPA 2016c); and
- *Technical Guidance – Terrestrial fauna surveys* (EPA 2020).

Rio Tinto Iron Ore Operational Controls

Rio Tinto is part of the Rio Tinto group of companies and is obliged through its integrated Health Safety Environment and Quality Management System (HSEQ), to comply with five global environmental standards. RTIO has developed and implemented numerous management plans and work practices to control environmental issues relating to mining and exploration. A number of these work practices are of direct relevance in managing and controlling land clearing activities, and include:

- Approvals Permit Guidelines and Procedure;
- HSEQ Ground Disturbance, Re-entering a Rehabilitated Area and Track maintenance Standard Work Practice;
- HSEQ Iron Ore (WA) – Equipment Hygiene Inspection Work Practice;
- HSEQ Operational Control Procedure 6: Drilling; and

HSEQ Closure, Rehabilitation and Monitoring Standard Work Practice.