



West Angelas NVCP 1

Flora, Vegetation, and Fauna Desktop Assessment

Rio Tinto Iron Ore

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Executive Summary

In 2015 Rio Tinto Iron Ore submitted a regional purpose permit application requesting the amalgamation of several previous Native Vegetation Clearing Permits (NVCP) into one larger permit, covering current and future clearing areas of the West Angelas mining area. A replacement for NVCP 6545 is now required.

Rio Tinto Iron Ore (RTIO) (on behalf of Robe River Mining Company Pty Ltd) commissioned SLR Consulting Australia Pty Ltd (SLR Consulting) to undertake a flora, vegetation, and terrestrial vertebrate fauna desktop assessment for the proposed NVCP 1 Study Area, consolidating all previous studies of the area into one cohesive report.

Flora and Vegetation

Database searches and literature review identified 62 significant flora taxa occurring within 50 km of the Application Area. A likelihood of occurrence assessment was undertaken and determined that 22 taxa had previously been recorded within the Application Area, including:

- One Critically Endangered species: *Seringia exastia*
- Three Priority 2 species: *Aristida lazaridis*, *Eremophila pusilliflora* and *Hibiscus* sp. Gurinbiddy Range (M.E. Trudgen MET 15708).
- Fourteen Priority 3 species: *Acacia effusa*, *Acacia subtiliformis*, *Aristida jerichoensis* var. *subspinulifera*, *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479), *Eremophila naaykensis*, *Indigofera gilesii*, *Isotropis parviflora*, *Rhagodia* sp. Hamersley (M. Trudgen 17794), *Rostellularia adscendens* var. *latifolia*, *Sida* sp. Hamersley Range (K. Newbey 10692), *Solanum kentrocaule*, *Themeda* sp. Hamersley Station (M.E. Trudgen 11431), *Triodia* sp. Mt Ella (M.E. Trudgen 12739) and *Vittadinia* sp. Coondewanna Flats (S. van Leeuwen 4684); and
- Four Priority Four species: *Acacia bromilowiana*, *Eremophila magnifica* subsp. *magnifica*, *Lepidium catapycnon* and *Sida* sp. Barlee Range (S. van Leeuwen 1642).

Seringia exastia, which has been delisted from State legislation but remains listed under Commonwealth legislation, was recorded within the Application Area. This species has recently been incorporated into the common and widespread species, *Seringia elliptica*, and is no longer considered to be of conservation significance, despite retaining Critically Endangered status under the *Environment Protection and Biodiversity Conservation Act 1999* List of Threatened Flora.

No additional Threatened flora species pursuant to the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* and/or gazetted as Threatened Flora pursuant to the *Biodiversity and Conservation (BC) Act 2016* had been recorded from the Application Area, however *Thryptomene wittweri* was determined to have a 'medium' chance of occurrence through the likelihood assessment.

A total of two taxa were considered to have a high likelihood of occurrence, 22 taxa as having a medium likelihood of occurrence and 16 taxa as having a low likelihood of occurrence.

The RTIO flora database recorded a total of 517 native vascular flora from 177 genera and 52 families, within the Application Area.

Thirteen introduced species were recorded in the Application Area, from the RTIO Database. None of these species represent a Weed of National Significance, as listed by the Department of Energy and Environment, or a Declared Pest by the State Department of Primary Industries and Regional Development.

Thirty-nine natural vegetation types were described and mapped by Biologic (2021a) for the Application Area.

No State or Commonwealth listed Threatened Ecological Communities (TEC) were identified within the Application Area. One State listed Priority Ecological Community (PEC), West Angelas Cracking-



Clays (Priority 1), is known to occur within the Application Area. The P15 vegetation type was considered to be analogous to this PEC and represented 7.19 ha (0.11%) of the Application Area.

Fauna

Database searches identified 364 vertebrate fauna species potentially occurring within the Application Area, comprising:

- 172 bird species
- 48 mammal species
- 137 reptile species
- Seven amphibian species.

The likelihood of occurrence assessment identified 30 significant fauna species potentially occurring within the Application Area. Of these, five were previously recorded within the Application Area:

- Ghost Bat (*Macroderma gigas*), listed as Vulnerable under the BC Act and EPBC Act
- Pilbara Olive Python (*Liasis olivaceus barroni*), listed as Vulnerable under the BC Act and EPBC Act
- Gane's Blind Snake (*Anilius ganei*), listed as P1 by DBCA
- Pilbara Barking Gecko (*Underwoodisaurus seorsus*), listed as P2 by DBCA
- Western Pebble-mound Mouse (*Pseudomys chapmani*), listed as P4 by DBCA.

Three species have a high likelihood of occurrence within the Application Area:

- Northern Quoll (*Dasyurus hallucatus*) listed as Endangered under the BC Act and EPBC Act
- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*), listed as Vulnerable under the BC Act and EPBC Act
- Fork-tailed Swift (*Apus pacificus*), listed as Migratory and Marine under the EPBC Act and as Migratory under the BC Act.

Four species have a medium likelihood of occurrence within the Application Area:

- Grey Falcon (*Falco hypoleucos*), listed as Vulnerable under the BC Act and EPBC Act
- Peregrine Falcon (*Falco peregrinus*), listed as Other Specially Protected under the BC Act
- Unpatterned Robust Slider (*Lerista macropisthopus remota*), listed as P2 by DBCA
- Pilbara Grasswren (*Amytornis whitei whitei*), listed as P4 by DBCA (as *A. striatus striatus*).

A further 18 species were assessed as having a low likelihood of occurrence within the Application Area.

Two fauna habitats containing microhabitats that support significant fauna were identified within the Application Area:

- Gorge/Gully
- Major Drainage.



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Acronyms and Abbreviations

Abbreviation	Description
Application Area	NVCP 1 area for which the desktop assessment was conducted
BAM Act	Biosecurity and Agriculture Management Act 2007
BC Act	Biodiversity Conservation Act 2016
BoM	Bureau of Meteorology
°C	Degree Celsius
CD	Conservation Dependent Fauna
CR	Critically Endangered
DAFF	Department of Agriculture, Fisheries and Forestry
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
Desktop Study Area	A 50 km buffer around the Application Area which incorporates all of the database search results
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety
DP	Declared Pest
DWER	Department of Water and Environmental Regulation
EIA	Environmental Impact Assessment
EN	Endangered
EP Act	Environmental Protection Act 1986
EPA	Environmental Protection Authority
EPBC Act	Environment Protection Biodiversity and Conservation Act 1999
ESA	Environmentally Sensitive Area
GDE	Groundwater Dependent Ecosystem
GIS	Geographic Information System
Ha	Hectare
IBRA	Interim Biogeographic Regionalisation for Australia
ILUA	Indigenous Land Use Agreement
Km	Kilometres
M	Metres
Mm	Millimetres
MA	Marine
MI	Migratory
MNES	Matters of National Environmental Significance
NNTT	National Native Title Tribunal
NVCP	Native Vegetation Clearing Permit
NVIS	National Vegetation Information System



OS	Other Specially Protected Fauna
P	Priority
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
Rio Tinto	Rio Tinto Iron Ore
SLR Consulting	SLR Consulting Australia Pty Ltd
SRE	Short Range Endemic
T	Threatened
TEC	Threatened Ecological Community
TPFL	Threatened and Priority Flora Database
TPFRF	Threatened and Priority Flora Report Forms
VU	Vulnerable
WA	Western Australia
WAH	Western Australian Herbarium
WAM	Western Australian Museum
WoNS	Weeds of National Significance
WPP	Weed Prioritisation Process



1.0 Introduction

1.1 Project Background and Application Area Location

Rio Tinto submitted a regional purpose permit application to DEMIRS in 2015 requesting the amalgamation of several existing NVCPs into one larger permit, covering current clearing and future clearing areas under Part V of the EP Act 1986. The amalgamation aided in reducing the risk of non-compliance and/or reporting conditions that multiple permits across one area presented. A replacement for NVCP 6545 is now required. Due to varying levels of biological survey coverage and validity of survey data, the existing NVCP area is to be covered by three NVCPs to enable the application for areas with sufficient survey coverage to be expedited. The main purposes of the replacement NVCPs include mineral exploration and associated activities, hydrogeological, geotechnical, and environmental investigations, construction camp, and associated activities over mining tenements.

This report collates the previous surveys conducted within the NVCP 1 Application Area (herein referred to as the Application Area) to produce one cohesive report that will be presented as part of the NVCP application process. The Application Area is made up of polygons D – N (**Figure 1**), and previous survey efforts include flora, vegetation, and terrestrial vertebrate fauna surveys from multiple agencies. The Application Area is located within the Hammersley Range, 90 km west of Newman.

1.2 Scope of work

SLR Consulting was engaged to conduct a consolidation of previous biological data to determine the key flora, vegetation, fauna, and fauna habitat values of the Application Area.

The scope of works include:

- Undertake a desktop assessment including relevant database searches and a literature review to compile and summarise existing records of flora, vegetation, threatened and priority ecological communities, and terrestrial vertebrate fauna in the vicinity of the Application Area.
- A report documenting the findings of the desktop assessment and the consolidation of previous survey efforts to understand the total current knowledge of the Application Area.
- Supply a geospatial data package, prepared in accordance with Rio Tinto Data Standards, consolidating all previous survey efforts to produce one cohesive data package to be presented during the NVCP application process.
- A separate report against the 10 Clearing Principals.



1.3 Limitations

Table 1: Limitations and Constraints of the Desktop Assessment

Variable	Degree of Limitation	Potential Constraints on Survey Outcomes
Survey Scope	No limitation	The previous flora, vegetation, and terrestrial vertebrate fauna surveys were undertaken as per EPA guidelines (EPA, 2016b; EPA, 2020a). This was considered appropriate to support the NVCP application.
Availability of Data	No limitation	All data required to complete the scope of works including regional and local contextual information was available.
Experience	No limitation	The botanists and zoologists undertaking the desktop assessment were suitably qualified. The team is adequately experienced in conducting surveys and reporting throughout Western Australia and the bioregion.
Timing, weather, season	No limitation	The majority of the biological surveys were conducted within the recommended primary survey period for the Eremaean Province, as per the EPA Technical Guidance (March – June). All targeted fauna surveys were conducted within the appropriate timeframes outlined for the target species. Timing, weather, and season are not considered limitations for these surveys.
Mapping Reliability	No limitation	Vegetation types for the Application Area were consolidated and described by Biologic (2021b), based on quadrat and relevé data, mapping notes and a high-resolution aerial imagery. Fauna habitat mapping was consolidated by Biologic (2021b), based on fauna habitat assessments, previous records of fauna species, and was aligned with vegetation mapping of the area. There were no constraints on mapping reliability.
Completeness	No Limitation	The majority of the Application Area has been comprehensively surveyed for flora, vegetation, and fauna, to provide an adequate level of information for the NVCP application. Three of the 39 natural vegetation types were not represented by sampling sites within the Application Area, but had some level of survey effort within the broader West Angelas Development Envelop (D13, P1 and P4). These sites did not contain the minimum number of replicated sampling sites, as per EPA (2016c), however represented minor areas of mapped vegetation within the Application Area (<2%). One vegetation type (P16) did not contain any sampling effort within the Application Area or broader locality, however represented a restricted vegetation type within the Application Area (16.89 ha, 0.25%). Fauna sampling effort was uniform across most of the Application Area, except for polygons D and G which had no fauna sampling efforts conducted within, and polygon E which had three habitat assessments, one leaf/soil sieving, and two acoustic samples undertaken.



2.0 Background information

2.1 Statutory and regulatory framework

Western Australian flora, vegetation, and fauna is protected formally by the following legislative measures:

- Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
- WA Biodiversity Conservation Act 2016 (BC Act)
- WA Environmental Protection Act 1986 (EP Act)
- WA Biosecurity and Agriculture Management Act 2007 (BAM Act).

In addition to these legislative measures, the following non-legislative lists are considered on a case-by-case basis:

- WA Department of Biodiversity, Conservation and Attractions (DBCA) Priority lists for fauna, flora, and ecological communities.
- Weeds of National Significance (WoNS).
- Recognition of locally significant populations by DBCA.

The EIA process is supported by guidance documents published by the Environmental Protection Authority (EPA), DBCA, and the Department of Climate Change, Energy, the Environment and Water (DCCEEW):

- Matters of National Environmental Significance Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999 (DoE, 2013)
- Survey Guidelines for Australia's Threatened Birds (DEWHA, 2010)
- Survey Guidelines for Australia's Threatened Mammals (DSEWPaC, 2011a)
- Survey Guidelines for Australia's Threatened Reptiles (DSEWPaC, 2011b)
- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016c)
- Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (Environmental Protection Authority, 2020)
- Environmental Factor Guideline – Terrestrial Fauna (EPA, 2016b)
- Environmental Factor Guideline – Flora and vegetation (EPA, 2016a).

2.2 Existing Environment

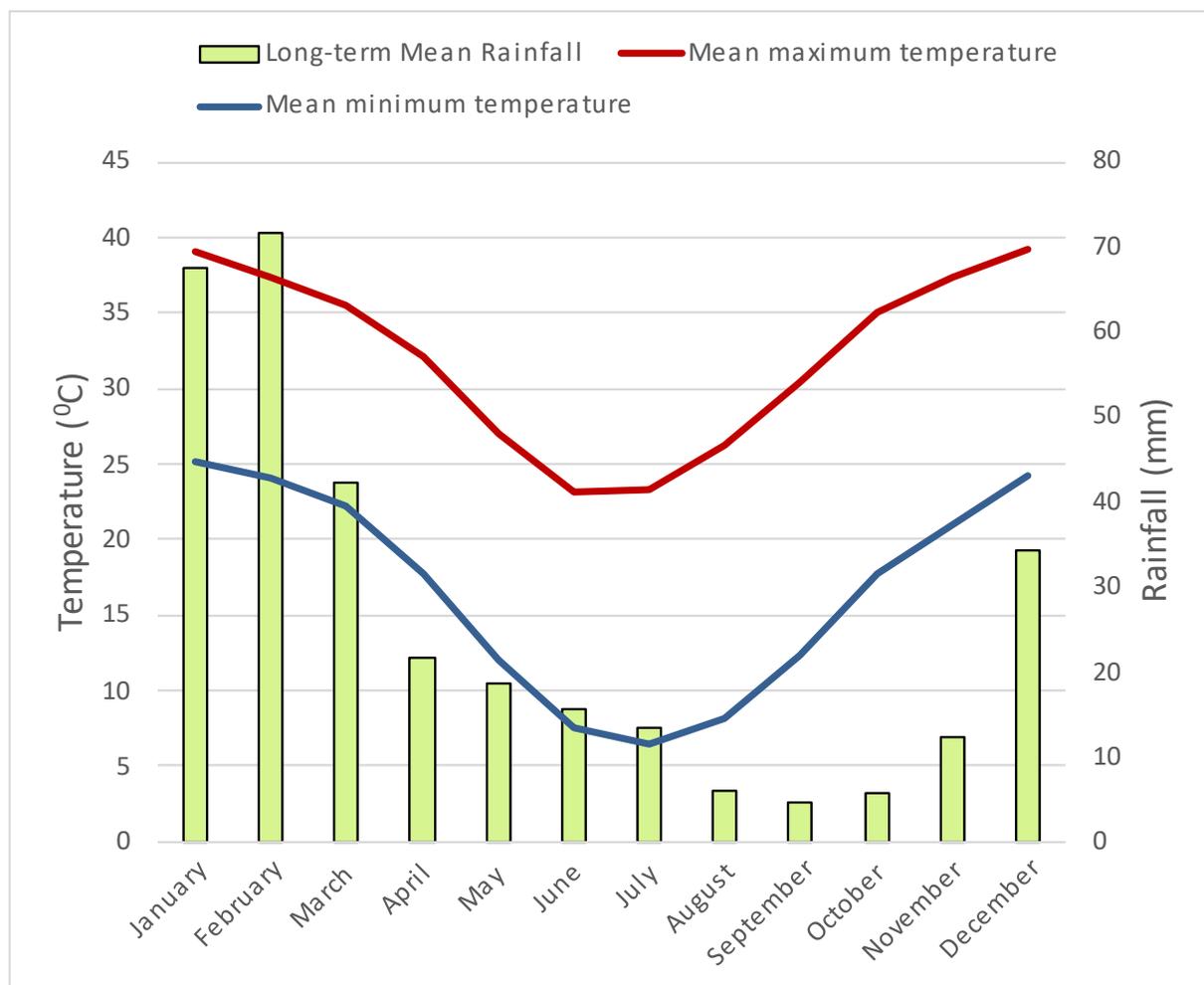
2.2.1 Climate

The closest long-term Bureau of Meteorology weather station with a complete dataset is Newman Aero Weather Station (007176), located approximately 117 km east of the Application Area. Climate statistics were calculated utilising data from the most current climate normal, which is defined as a 30-year interval (BoM, 2007), where possible. A climate normal is a period long enough to include year-to-year variations while avoiding the influence of longer-term changes in climate (BoM, 2007).

The long-term (1996 to 2023) mean minimum temperature for Newman Aero Weather Station ranges from 6.5 °C (July) to 25.1 °C (Jan) and the long-term mean maximum temperature ranges from 23.0 °C (June) to 39.3 °C (Dec) (**Graph 1**) (BoM, 2023). The Newman Aero Weather Station recorded the long-term average rainfall as 315.6 mm (BoM, 2023). Kendrick (2001) describes the broader Hamersley subregion climate as semi-desert tropical, with an average annual rainfall of



300mm, which usually falls during summer cyclonic or thunderstorm events, however, winter rain is not uncommon.



Graph 1: Long term and monthly total rainfall, maximum and minimum temperatures for Newman Aero Weather Station (007176) (BoM, 2023).

2.2.2 Interim biogeographic regionalisation of Australia

The Interim Biogeographic Regionalisation of Australia (IBRA) divides Australia into 89 bioregions based on major biological, geographical, and geological attributes. These bioregions are subdivided into 419 subregions as part of a refinement of the IBRA framework (DEE, 2016). The Application Area occurs within the Hamersley (PIL03) subregion of the Pilbara bioregion.

The Hamersley (PIL03) subregion is the southern section of the Pilbara Craton. It is a mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by gorges (basalt, shale, and dolerite). The subregion is dominated by 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. Drainage occurs into either the Fortescue to the north, the Ashburton to the south, or the Robe to the west (Kendrick, 2001).

2.2.3 Soil landscape mapping

Soil landscape mapping of Western Australia consists of various surveys at different scales varying between 1:20,000 to 1:3,000,000 (DPIRD, 2022). Soil landscape mapping has been described below to the best level of detail available for the Application Area and surrounds.



The Application Area occurs within six land systems (**Table 2; Figure 2**).

Table 2: Land Systems within the Application Area

Land System		Description (DPIRD, 2022)	Extent and Proportion Within Application Area
Name	Code		
Boolgeeda System	285Bg	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.	2,287.88 ha 34.27%
Egerton System	285Eg	Highly dissected plains and slopes with sparse mulga shrublands or shrubby hard spinifex grasslands.	224.42 ha 3.36%
Newman System	285Ne	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.	2,751.02 ha 41.21%
Platform System	285PI	Dissected slopes and raised plains supporting shrubby hard spinifex grasslands.	607.06 ha 9.09%
Rocklea System	285Rk	Basalt hills, plateaux, lower slopes, and minor stony plains supporting hard spinifex and occasionally soft spinifex grasslands with scattered shrubs.	801.45 ha 12%
Wannamunna System	285Wn	Hardpan plains and internal drainage tracts supporting mulga shrublands and woodlands and occasionally eucalypt woodlands.	4.49 ha 0.01%

2.2.4 Hydrography

Hydrographic features intersecting and in the vicinity of the Application Area are described in **Table 3** and outlined in **Figure 3** (DWER, 2018).

Table 3: Hydrographical features in the vicinity of the Application Area

Hydrographical Feature	Description
Fortescue River	Mainstream 8.5 km south-east of the Application Area.
Turee Creek	A minor watercourse originating 20 km east of the Application Area, which flows in a westerly direction through the Application Area.
Pebble Mouse Creek	A minor watercourse located 3.2 km north of the Application Area.
Tunnel Creek	A minor river located 14.3 km south-east of the Application Area.
Angelo River	A minor river located 5.5 km south of the Application Area.
Indabiddy Creek	A minor watercourse located 7.6 km south of the Application Area.



2.2.5 Broad vegetation types

Mapping of pre-European vegetation in Western Australia was completed on a broad scale (1:1,000,000) by Beard (1976). These vegetation types were later refined by Shepherd et al. (2002) resulting in 819 vegetation associations.

Two broad vegetation associations are mapped over the Application Area (**Figure 4** and displayed below **Table 4**).

Table 4: System associations within the Application Area

System Association	Description (Beard, 1976)	Extent within the Application Area (ha, %)
Hamersley 18	Low woodland, open low woodland, or sparse woodland: Mulga <i>Acacia aneura</i> and associated species.	3417.38 ha 51.03%
Hamersley 82	Low tree-steppe: Hummock grassland with scattered bloodwoods and snappy gum. <i>Triodia</i> spp., <i>Corymbia dichromophloia</i> , <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> .	3280.06 ha 48.97%

Representation of the broad vegetation associations at a local, regional, and state level is shown in **Table 5**.

Table 5: Broad vegetation associations within the Application Area and their representation at the state, regional and local levels (Government of Western Australia, 2019).

Vegetation Association	Extent				
	Pre-European (ha)	Current (ha)	Remaining (%)	Current Extent Within Application Area (%)	Managed in DBCA Lands (%)*
Representation across Western Australia					
18	19,892,306	19,843,148	99.75	0.02	6.64
82	2,565,901	2,553,206	99.51	0.13	11.57
Representation across the Pilbara Bioregion					
18	676,557	671,843	99.30	0.51	25.35
82	2,563,583	2,550,888	99.50	0.13	11.58
Representation across the Hamersley (PIL03) Subregion					
18	581,246	576,542	99.19	0.59	29.54
82	2,177,574	2,165,224	99.43	0.15	13.57
Representation across the Shire of East Pilbara					
18	359,372	355,446	98.91	0.96	1.49
82	927,710	919,072	99.07	0.36	0.50
Representation across the Shire of Ashburton					
18	342,206	341,418	99.77	1.00	48.33
82	1,537,077	1,533,314	99.76	0.21	18.96



*as a portion of the current extent

2.2.6 Conservation areas and environmentally sensitive areas

Environmentally Sensitive Areas (ESAs) are declared by the Department of Water and Environmental Regulation (DWER) to prevent the degradation of important environmental values such as Threatened flora, TECs or significant wetlands.

The Application Area does not occur within a mapped ESA (**Figure 5**). The nearest ESAs are:

- Karijini National Park immediately adjacent to the west portion of the Application Area
- Five sites of Declared Rare Flora between 4 and 15 km north of the Application Area:
 - Two sites of *Thryptomene wittweri* – Threatened (BC & EPBC Act)
 - Three sites of *Lepidium catapycnon* - P4 (DBCA; previously listed as Threatened and de-listed in 2018) – these sites no longer meet the criteria for an ESA and are expected to be delisted from the DWER list of Environmentally Sensitive Areas.
- Fortescue Marsh 80km north of the Application Area
- Ethel Gorge Aquifer Stygobiont Community 87km east of the Application Area.

The Application Area does not occur within any conservation areas (**Figure 5**) (DBCA, 2023a). The nearest conservation area is:

- Karijini National Park (R 30082), a Class A reserve is immediately adjacent to the western portion of the Application Area and is vested under the Conservation Commission of WA.

2.2.7 Land use

The Application Area sits within the mining tenement for NVCP 1 (**Figure 5**) and does not contain any other land uses.

2.2.8 Indigenous land rights

The Application Area falls within the Yamatji Marlpa Aboriginal Corporation jurisdiction area (NNTT, 2017) and has two native title determinations over the area (Landgate, 2023a):

- Yinhawangka Aboriginal Corporation (NNTT no. WC2010/011 and WC2010/016)
- Ngarlawangga Aboriginal Corporation (NNTT no. WC2005/003).

There are two Indigenous Land Use Agreements (ILUAs) over the Application Area (Landgate, 2023b):

- Yinhawangka and BHP project agreement initial ILUA (NNTT no. WI2016/001)
- RTIO and Ngarlawangga People ILUA (NNTT no. WI2012/010).

3.0 Methodology

3.1 Literature review

The literature review considered a selection of biological reports detailing assessments undertaken in or within 50 km of the Application Area, that were either publicly available or provided by RTIO:

- Area C and Surrounds Flora and Vegetation Survey (Onshore, 2011)
- Greater West Angelas Vegetation and Flora Assessment (Ecologia Environment, 2013)
- Rio Tinto Greater West Angelas Terrestrial Fauna Assessment (Ecologia Environment, 2014)



- West Angelas – Deposit B and F Ghost Bat Assessment (Biologic Environmental Survey, 2014)
- Hope Downs 2 Proposal – Ghost Bat Cave Characteristics February/March 2020 (Astron Environmental Services, 2020a)
- Hope Downs 2 Proposal Fauna Survey (Astron Environmental Services, 2019a)
- Flora, Vegetation and Fauna Habitat Assessment at Juna Downs (Rio Tinto Iron Ore, 2016a)
- 2017 West Angelas Ghost Bat Monitoring (Biologic Environmental Survey, 2018)
- West Angelas Gas Pipeline Native Vegetation Clearing Permit (B-2018-007) (Biota Environmental Services, 2019)
- Hope Downs 2 Proposal Flora and Vegetation Survey (Astron Environmental Services, 2019b)
- Area C West to Yandi Flora and Vegetation Assessment (Astron Environmental Services, 2018)
- Rhodes Ridge Detailed Flora and Vegetation Survey (Astron Environmental Services, 2020b)
- Rhodes Ridge Targeted Flora Survey (Stantec, 2021)
- Rhodes Ridge Targeted Flora Survey (Astron Environmental Services, 2019c)
- West Angelas Deposit G – Basic and Targeted Fauna Survey 2022 (Biologic Environmental Survey, 2022f)
- West Angelas Beyond 2020 Level 2 Vertebrate Fauna, SRE Invertebrate and Fauna Assessment Phase 1 and 2 (Biologic Environmental Survey, 2019b)
- West Angelas Beyond 2020: Targeted Vertebrate Fauna Survey (Biologic Environmental Survey, 2020)
- West Angelas Managed Aquifer Targeted Flora and Fauna Survey (Biologic Environmental Survey, 2021c)
- West Angelas Beyond 2020 Infrastructure Corridors Reconnaissance and Targeted Survey (Biologic Environmental Survey, 2022c)
- West Angelas Beyond 2020 Mt Ella East and Dep J Detailed and Targeted Survey (Biologic Environmental Survey, 2022d)
- West Angelas Deposit F North and Deposit H Areas Fauna Survey (Biologic Environmental Survey, 2022e)
- Metadata Statement – Beyond 2020 Deposit F and Deposit H Additional Areas (Rio Tinto Iron Ore, 2022)
- Flora and Vegetation Surveys of Orebody A and Orebody B in the West Angelas Hill Area (M. Trudgen and Associates, 1998)
- West Angelas Beyond 2020 Detailed Flora and Vegetation Survey: Phases 1 and 2 (Biota Environmental Services, 2020).

3.2 Database searches

Database searches were undertaken to compile a list of flora, vegetation communities, and fauna known to occur in the surrounding area and identify significant flora, vegetation, and terrestrial vertebrate fauna species with potential to occur within the Application Area (**Table 6**). In addition, an EPBC Protected Matters Search (PMST) was undertaken to identify the potential for species or communities listed as Matters of National Environmental Significance (MNES) to occur within the Application Area (DCCEEW, 2022). The database search area buffer (up



to 50km) around the Application Area is herein referred to as the Desktop Study Area. The Application Area and Desktop Study Area together are considered to be the 'locality'.

Table 6: Database searches undertaken as part of the desktop assessment

Database Name	Date Received	Search Target	Buffer around the Application Area
RTIO Internal Database (Rio Tinto Iron Ore, 2023b)	29 September 2023	Inventory of flora and fauna species	20 km
DBCA Threatened and Priority Fauna database search (DBCA, 2023c)	13 October 2023	Threatened and Priority fauna	35 km
NatureMap (DBCA, 2023b)	17 October 2023	Inventory of potential flora and fauna	40 km
Protected Matters Search Tool (DAWE, 2023)	25 October 2023	Commonwealth listed Threatened flora and fauna and TECs (including SRE fauna)	50 km
DBCA Threatened and Priority Flora database search (DBCA, 2023d)	13 October 2023	Threatened and Priority Flora	35 km
DBCA TEC and PEC database search (Department of Biodiversity Conservation and Attractions, 2023)	13 October 2023	TEC and PEC	35 km



3.3 Previous surveys

A summary of spatial data supplied by RTIO relating to field sampling effort previously conducted within the Application Area is presented **Table 7** and previously surveyed areas shown in **Figure 6**. Data supplied included field site locations, flora, and fauna locations, tracklogs, survey boundaries, survey records, vegetation type mapping, and fauna habitat mapping. These data have been collated and used to inform the results of this report and produce a spatial data package as part of the NVCP application process.

Table 7: Summary of Survey Data provided by RTIO

FMDS_No	Source	Author
Flora and Vegetation		
RTIO-HSE-0015956	Flora and Vegetation Surveys of Orebody A and Orebody B in the West Angelas Hill Area	(M. Trudgen and Associates, 1998)
RTIO-HSE-0142330	Angelo River Flora and Vegetation Assessment	(ENV Australia, 2011)
RTIO-HSE-0185831	Greater West Angelas Vegetation and Flora Assessment	(Ecologia Environment, 2013)
RTIO-HSE-0336262	West Angelas Beyond 2020 Detailed Flora and Vegetation Survey: Phases 1 and 2	(Biota Environmental Services, 2020)
RTIO-HSE-0348947	West Angelas Desktop Mapping December 2020	(Astron Environmental Services, 2020c)
RTIO-HSE-0355391	West Angelas Development Envelope Consolidated Vegetation Mapping	(Biologic Environmental Survey, 2021b)
RTIO-HSE-0358574	Deposit J Riparian Flora and Vegetation Survey	(Biologic Environmental Survey, 2021a)
RTIO-HSE-0959550	West Angelas Development Envelope Consolidated Vegetation Mapping - Dep J MTEE	(Biologic Environmental Survey, 2022g)
RTIO-0959551	West Angelas Vegetation Condition Assessment	(Biologic Environmental Survey, 2022h)
RTIO-1011771	West Angelas Beyond 2020 Mt Ella East and Dep J Detailed and Targeted Survey	(Biologic Environmental Survey, 2022a)
RTIO-0959130	West Angelas Beyond 2020 Deposit G Reconnaissance and Targeted Survey	(Biologic Environmental Survey, 2022b)
RTIO-0981006	West Angelas Infrastructure Reconnaissance Flora and Vegetation Survey	(Biologic Environmental Survey, 2023a)



Fauna		
RTIO-HSE-0215896	Greater West Angelas Terrestrial Fauna Assessment	(Ecologia Environment, 2014)
RTIO-HSE-0331473	West Angelas Beyond 2020 Level 2 Vertebrate Fauna, SRE Invertebrate and Fauna Assessment Phase 1 and 2	(Biologic Environmental Survey, 2019a)
RTIO-HSE-0355392	West Angelas Development Envelope Fauna Habitat Mapping	(Biologic Environmental Survey, 2021c)
RTIO-HSE-0345168	West Angelas Beyond 2020 Targeted Vertebrate Fauna Survey	(Biologic Environmental Survey, 2020)
RTIO-0980461	West Angelas Beyond 2020 Infrastructure Corridors Reconnaissance and Targeted Survey	(Biologic Environmental Survey, 2022c)
RTIO-0982790	West Angelas Beyond 2020 Mt Ella East and Dep J Detailed and Targeted Survey	(Biologic Environmental Survey, 2022d)
RTIO-0980459	West Angelas Deposit F North and Deposit H Areas Fauna Survey	(Biologic Environmental Survey, 2022e)
Biological		
RTIO-HSE-0237243	West Angelas Deposit F Native Vegetation Clearing Permit Report	(Biota Environmental Sciences, 2014)
RTIO-HSE-0357297	West Angelas Managed Aquifer Targeted Flora and Fauna Survey	(Biologic Environmental Survey, 2023b)
RTIO-HSE-0254367	West Angelas NVCP Application Supporting Report	(Rio Tinto Iron Ore, 2015)
RTIO-HSE-0359919	Metadata Statement – Beyond 2020 Deposit F and Deposit H Additional Areas	(Rio Tinto Iron Ore, 2022)



An overview of the distribution of flora sampling effort within the Application Area using five datasets recommended by Rio is presented in **Figure 7** and summarised in **Table 8** below.

Table 8: Previous Flora and Vegetation survey effort for the Application Area

Sampling Method	RTIO-HSE-0142330	RTIO-HSE-0185831	RTIO-HSE-0237243	RTIO-HSE-0336262	RTIO-HSE-0358574	Total of Method
Quadrat	1	35	7	49	9	101
Relevé	-	-	5	21	1	27
Vegetation mapping note	-	-	-	111	-	111
Total	1	35	12	181	10	239

An overview of the distribution of fauna sampling effort within the Application Area and their associated datafile is shown in **Figure 7** and summarised below in **Table 9**.

Table 9: Previous fauna survey effort by sample type, dataset, and number of sites within the Application Area

Sampling Method	RTIO-HSE-0237243	RTIO-0980459	RTIO-0980461	RTIO-0982790	RTIO-HSE-0331473	RTIO-HSE-0357297	Total
Acoustic recording			4		10		14
Active foraging					38		38
Avifauna census					11		11
Cage trap					7		7
Echolocation recording	1	1		1	9	2	14
Elliott trap					7		7
Funnel trap					7		7
Habitat assessment		4	52	2	92	18	168
Leaf/soil sieving					31		31
Motion Camera (baited)		1			23		24
Pitfall trap (wet)					3		3
Pitfall trap (dry)					11		11
Targeted searches		3	9	1	10	1	24
Total of Dataset	1	9	61	4	249	21	345



3.4 Likelihood of occurrence assessment

Significant flora, vegetation, and fauna species identified from the desktop assessment were assessed for their likelihood of their occurrence within the Application Area. The assessment was completed based on the likelihood of occurrence criteria presented in **Table 10**.

For fauna, taxa listed as Marine only under the EPBC Act were not considered to be significant taxa because the Marine listing does not constitute MNES under the EPBC Act. Furthermore, taxa that are entirely dependent on marine habitats are unlikely to use terrestrial habitats within the Application Area such as Procellariiformes (tube-nosed seabirds) or Chelonioida (sea turtles) have also been excluded.

Table 10: Likelihood of occurrence criteria

Rank	Criteria
Previously Recorded	The taxon has been previously recorded in the Application Area according to database search or literature review results.
High (Likely to occur)	There are existing records of the taxon near the Application Area (within 10 km), suitable habitat is present, and, for fauna, the taxon has been recorded in the Desktop Study Area in the last 15 years. Previously level of survey effort was also considered.
Medium (May occur)	There are existing records of the taxon within the Desktop Study Area (up to 50km), however, the taxon does not meet the criterion for high likelihood, or suitable habitat within the Application Area is marginal or limited in extent, or, for fauna, the taxon has not been recorded in the Desktop Study Area in the last 15 years.
Low (Unlikely to occur)	Suitable habitat is not present within the Application Area, or the taxon is very infrequently recorded in the locality despite reasonable previous search effort, or the taxon is believed to be extinct or locally extinct.

3.5 Vegetation description and mapping consolidation

3.5.1 Vegetation type and condition mapping

Vegetation mapping has been previously conducted by multiple consultancies for the West Angelas locality, between 1998 and 2023 (see **Table 7**). This mapping was consolidated by Biologic Environmental Survey (Biologic) for Rio Tinto in 2021, in their *West Angelas Development Envelope Consolidated Vegetation Mapping* (Biologic Environmental Survey, 2021b). The vegetation types described and delineated by Biota Environmental Sciences (Biota) (2020), which were supported by floristic analysis, formed the basis of the consolidated mapping conducted by Biologic Environmental Survey (Biologic) (2021a).

Biologic’s consolidated vegetation mapping provided complete coverage over the Application Area, and no amendments to delineation of vegetation type boundaries were made. However, when compared to current aerial imagery, additional areas of disturbance were observed. The ‘Disturbed’ mapping unit was expanded by SLR (and natural vegetation extent subsequently reduced) to reflect major observed changes to areas of disturbance, including mining activity expansion, road widening and other infrastructure areas.

Finalised polygons were digitised and produced as electronic mapping data using GIS software. The Application Area was then clipped to SLR’s updated consolidated mapping.



Vegetation condition rankings are embedded within the consolidated vegetation mapping attributes. Polygons captured by Biologic (2021a) were assigned vegetation ranking codes as per the Rio Tinto Data Standards: Flora (2023) Version 11 (Rio Tinto Iron Ore, 2023a), which are in accordance with the Eremaean Botanical Provinces vegetation condition scale (EPA, 2016a). SLR did not update vegetation condition rankings assigned by Biologic.

3.5.2 Vegetation description

The vegetation description methods employed by Biologic (2021a) were adopted from Biota (2020) in their West Angelas Beyond 2020 Detailed Flora and Vegetation Survey: Phases 1 and 2 report are summarised below:

- 1 Vegetation descriptions were based on the height and estimated percent foliar cover of dominant species, consistent with the Rio Tinto data standards. Descriptions were collected during quadrat and relevé sampling, and mapping notes (brief notes recorded during the extensive foot traverses through the area).
- 2 Vegetation descriptions were compared and grouped by similarity of dominant perennial species with a similar range of percent foliar cover values, which were then used to generate broader, representative vegetation units. Results from floristic analysis were investigated as part of this process.
- 3 Field data and aerial imagery were reviewed to determine boundaries of vegetation types, which were then mapped to an appropriate scale. Each vegetation type mapped for this assessment was given two unique codes:
 - o A detailed alphabetic code represented the dominant flora species from the tallest to lowest stratum. Species names were abbreviated to capital letter(s) for the genus, followed by lower case letter(s) for species, with multiple letters used where necessary (eg *Eucalyptus leucophloia* = El; *Themeda triandra* = THt). As various species within Mulga (the *Acacia 'aneura'* species complex) were recorded, these were collectively designated as 'Aan'.
 - o A simple alphanumeric code as a unique precursor to the species-driven code. This was a short string comprising a character representing the broad landform group (ie 'D' for drainage lines, 'G' for gorges and gullies, 'P' for plains, and 'H' for hillslopes, hillcrests, and foothills), followed by a number sequence (Biota, 2020).

Defined vegetation units were compared against the most current published descriptions of TECs and PECs, in order to determine whether they align with listed communities.

3.6 Fauna habitat mapping consolidation

Fauna habitat studies have been previously conducted by multiple consultancies for the West Angelas locality, between 1998 and 2023 (see **Table 7**). This mapping was consolidated by Biologic for Rio Tinto in 2021, in their West Angelas Development Envelope Fauna Habitat Mapping (Biologic Environmental Survey, 2021c). The fauna habitat types outlined were then renamed and redescribed based on survey data available to reflect the RTIO Fauna Habitat Guidelines and Definitions V2 (Rio Tinto Iron Ore, 2023c).



Biologic's consolidated fauna habitat mapping provided complete coverage over the Application Area, and no amendments to delineation of fauna habitats were made. However, when compared to current aerial imagery, additional areas of disturbance were observed. The 'Disturbed' mapping unit was expanded by SLR to reflect major observed changes to areas of disturbance, including mining activity expansion, road widening and other infrastructure areas.

4.0 Results and discussion

4.1 Flora

4.1.1 Literature review

Nineteen previous flora and vegetation and biological reports, either publicly available or provided by RTIO, were reviewed as part of the desktop assessment. The key findings of these reports are summarised in **Table 11** below.

4.1.2 Floristic diversity

The supplied RTIO flora database contained 94,645 records, representing 1,433 individual entities.

The dataset required significant vetting to reflect current taxonomic nomenclature. The species list was compared against the most recent Pilbara vascular species list (January 2024) issued by DBCA. The following changes were made:

- Spelling errors were corrected
- Phrase names (PN) were amended to current names
- Unofficial forms were corrected to species name eg *Eriachne mucronata* (Typical form) amended to *Eriachne mucronata*
- Indeterminate species were removed eg *Tribulus* sp.
- Species not occurring in the Pilbara were removed eg *Alyxia buxifolia*
- Unrecognised hybrid species were removed eg *Acacia hilliana x hamersleyensis*
- Weeds were removed.

A list of omitted species is presented in **Table 2, Appendix B**. Once these changes were made to the dataset, a total of 883 native flora species, from 241 genera and 75 families were recorded within 20 km of the Application Area (**Table 1, Appendix B**). The dominant families are Fabaceae (143 species), Poaceae (123 species) and Malvaceae (80 species). The most dominant genera is *Acacia* (61 species).¹

Within the Application Area, a total of 517 native vascular flora species were recorded, representing approximately 58.6% of the floristic diversity of the complete Rio Tinto flora database supplied. These 517 taxa were represented by 177 genera and 52 families. The dominant families are Poaceae (90 species), Fabaceae (86 species), and Malvaceae (57 species). The most dominant genera is *Acacia* (40 species).

In addition, 13 introduced flora species from 13 genera and six families, were recorded from the Application Area (see **Section 4.1.5**).

¹ Naturemap data was not included in this calculation due to the unavailability of point data and the broad search area.



4.1.3 Database searches for significant flora

Database searches (DBCA and Rio Tinto internal) and the literature review identified 62 significant flora species occurring within 50 km of the Application Area (**Figure 8**), comprising:

- Two Federally listed species, one of which is also listed as Threatened by DBCA
- Six Priority 1 species
- 15 Priority 2 species
- 34 Priority 3 species, and
- Five Priority 4 species

A full list of taxa identified through databases and literature within 50 km of the Application is presented in **Appendix C**.

Table 11: Previous flora and vegetation surveys conducted within the Application Area

Report	Location	Survey Timing	Survey Type	Limitations	Significant Ecological Communities	Flora Composition	Significant Flora	Introduced Flora
Rio Tinto Greater West Angelas Vegetation and Flora Assessment (Ecologia Environment, 2013)	Overlaps Application Area	Jul 2012 Aug 2012	Multiple-phase detailed survey	<ul style="list-style-type: none"> • Sources of information and availability of contextual information • Proportion of flora collected and identified • Completeness • Further work which might be needed • Mapping reliability • Timing/weather/season 	Priority 1 'West Angelas cracking clays' Priority Ecological Community (PEC).	441 taxa	<ul style="list-style-type: none"> • <i>Aristida lazaridis</i> (P2) • <i>Eremophila pusilliflora</i> (P2) • <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3) • <i>Indigofera gilesii</i> (P3) • <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3) • <i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431) (P3) 	No WoNS or DP



				<ul style="list-style-type: none"> • Intensity • Access problems 			<ul style="list-style-type: none"> • <i>Triodia sp.</i> Mt Ella (M.E. Trudgen 12739) (P3) • <i>Lepidium catapycnon</i> (P4) • <i>Sida sp.</i> Barlee Range (S. van Leeuwen 1642) (P4) 	
Hope Downs 2 Proposal Flora and Vegetation Survey (Astron Environmental Services, 2019b)	25 km Northeast of Application Area	Nov 2017 May 2018 May 2019	Multiple-phase detailed survey	<ul style="list-style-type: none"> • Proportion of flora identified, recorded and/or collected – Minor • Completeness – Minor • Timing – Minor • Disturbance – Minor • Access – Minor 	None	411 taxa	<ul style="list-style-type: none"> • <i>Aristida lazaridis</i> (P2) • <i>Eremophila sp.</i> West Angelas (S. van Leeuwen 4068) (P2) • <i>Hibiscus sp.</i> Gurinbiddy Range (M.E. Trudgen MET 15708) (P2) • <i>Eremophila naaykensis</i> (P3) • <i>Grevillea saxicola</i> (P3) • <i>Rhagodia sp.</i> Hamersley (M. Trudgen 17794) (P3) • <i>Triodia sp.</i> Mt Ella (M.E. Trudgen 12739) (P3) • <i>Acacia bromilowiana</i> (P4) • <i>Eremophila magnifica subsp. magnifica</i> – (P4) • <i>Lepidium catapycnon</i> (P4) 	No WoNS or DP



							<ul style="list-style-type: none"> • <i>Ptilotus mollis</i> – (P4) 	
West Angelas Gas Pipeline Native Vegetation Clearing Permit (B-2018-007) (Biota Environmental Services, 2019)	30 km Northwest of Application Area	Oct 2016	Desktop assessment	<ul style="list-style-type: none"> • No Limitations 	Priority 1 'West Angelas cracking clays' Priority Ecological Community (PEC).	343 taxa	<ul style="list-style-type: none"> • <i>Aristida lazaridis</i> – (P2) • <i>Eremophila pusilliflora</i> (P2) • <i>Isotropis parviflora</i> (P3) • <i>Rhagodia sp.</i> Hamersley (M. Trudgen 17794) (P3) • <i>Themeda sp.</i> Hamersley Station (M.E. Trudgen 11431) (P3) 	No WoNS or DP
Area C and Surrounds Flora and Vegetation Survey (Onshore, 2011)	40 km Northeast of Application Area	Nov – Dec 2009 Feb 2010 June 2010	Detailed Flora and Vegetation survey	<ul style="list-style-type: none"> • Timing / weather / season / cycle – Minor • Disturbances, eg fire, flood – Minor • Completeness – Minor • Access problems – Minor 	Priority 1 'Weeli Wolli Spring Community' Priority Ecological Community (PEC).	479 taxa	<ul style="list-style-type: none"> • <i>Aristida lazaridis</i> (P2) • <i>Acacia subtiliformis</i> (P3) • <i>Aristida jerichoensis var. subspinulifera</i> (P3) • <i>Fimbristylis sieberiana</i> (P3) • <i>Goodenia sp.</i> East Pilbara (A.A. Mitchell PRP 727) (P3) • <i>Nicotiana umbratica</i> (P3) • <i>Rhagodia sp.</i> Hamersley (M. Trudgen 17794) (P3) 	No WoNS or DP



							<ul style="list-style-type: none"> • <i>Rostellularia adscendens</i> var. <i>latifolia</i> (P3) • <i>Stylidium weeliwoilli</i> (P3) • <i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwin 4684) (P3) • <i>Eremophila magnifica</i> subsp. <i>magnifica</i> (P4) • <i>Lepidium catapycnon</i> (P4) • <i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642) (P4) 	
Area C West to Yandi Flora and Vegetation Assessment (Astron Environmental Services, 2018)	60 km Northeast of Application Area	Nov 2018	Reconnaissance Survey	<ul style="list-style-type: none"> • Timing / weather / season / cycle – Moderate • Access problems – Minor • Disturbances - Minor 	None	102 taxa	<ul style="list-style-type: none"> • <i>Eremophila naaykensis</i> (P3) 	No WoNS or DP
Rhodes Ridge Detailed Flora and Vegetation Survey (Astron Environmental Services, 2020b)	45 km East of Application Area	July 2019	Targeted flora survey	<ul style="list-style-type: none"> • Timing / weather / season / cycle – Minor • Disturbances - Minor 	None	191	<ul style="list-style-type: none"> • <i>Aristida lazaridis</i> (P2) • <i>Grevillea saxicola</i> (P3) • <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3) 	No WoNS or DP



Rhodes Ridge Targeted Flora Survey (Stantec, 2021)	45 km East of Application Area	June 2021	Targeted flora survey	<ul style="list-style-type: none"> No Limitations 	None	N/A	<ul style="list-style-type: none"> <i>Rhagodia sp.</i> Hamersley (M. Trudgen 17794) (P3) 	No WoNS or DP
Rhodes Ridge Targeted Flora Survey (Astron Environmental Services, 2019c)	45 km East of Application Area	July – Aug 2019	Targeted flora survey	<ul style="list-style-type: none"> Timing / weather / season / cycle – Minor Access problems – Minor 	None	N/A	<ul style="list-style-type: none"> <i>Aristida lazaridis</i> (P2) <i>Oxalis sp.</i> Pilbara (M.E. Trudgen 12725)(P2) <i>Acacia subtiliformis</i> (P3) <i>Aristida jerichoensis var. subspinulifera</i> (P3) <i>Rhagodia sp.</i> Hamersley (M. Trudgen 17794) (P3) 	No WoNS or DP
Flora, Vegetation and Fauna Habitat Assessment at Juna Downs (Rio Tinto Iron Ore, 2016a)	35 km Northwest of Application Area	Oct 2014 Nov 2014 Apr 2015	Reconnaissance Survey	<ul style="list-style-type: none"> Resources – Minor 	None	186 taxa	<ul style="list-style-type: none"> <i>Tetradlea fordiana</i> (P2) <i>Eremophila naaykensis</i> (P3) <i>Rostellularia adscendens var. latifolia</i> (P3) <i>Solanum kentrocaule</i> (P3) <i>Triodia sp.</i> Mt Ella (M.E. Trudgen 12739) (P3) <i>Acacia bromilowiana</i> (P4) 	No WoNS or DP



							<ul style="list-style-type: none"> • <i>Eremophila magnifica subsp. magnifica</i> (P4) • <i>Sida sp.</i> Barlee Range (S. van Leeuwen 1642) (P4) 	
Flora and Vegetation Surveys of Orebody A and Orebody B in the West Angelas Hill Area (M. Trudgen and Associates, 1998)	1.3 km North of Application Area	Apr 1997 May – Jun 1997 Jun – Jul 1997 Sept 1997	Detailed Flora and Vegetation survey	<ul style="list-style-type: none"> • Mapping – Moderate 	None	635 taxa	<ul style="list-style-type: none"> • <i>Lepidium catapycnon</i> (P4) • <i>Olearia mucronate</i> (P3) • <i>Dampiera metallorum</i> (P3) • <i>Indigofera gilesii</i> (P3) 	No WoNS or DP
West Angelas Beyond 2020 Detailed Flora and Vegetation Survey: Phases 1 and 2 (Biota Environmental Services, 2020)	Overlaps Application Area	Aug - Sep 2018 Apr 2019	Detailed Flora and Vegetation survey	<ul style="list-style-type: none"> • No Limitations 	None	542 taxa	<ul style="list-style-type: none"> • <i>Aristida lazaridis</i> (P2) • <i>Eremophila pusilliflora</i> (P2) • <i>Hibiscus sp.</i> Gurinbiddy Range (M.E. Trudgen MET 15708) (P2) • <i>Isotropis parviflora</i> (P3) • <i>Oxalis sp.</i> Pilbara (M.E. Trudgen 12725) (P2) • <i>Aristida jerichoensis var. subspinulifera</i> (P3) 	No WoNS or DP



							<ul style="list-style-type: none"> • <i>Eremophila naaykensis</i> (P3) • <i>Grevillea saxicola</i> (P3) • <i>Indigofera gilesii</i> (P3) • <i>Pilbara trudgenii</i> (P3) • <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3) • <i>Rostellularia adscendens</i> var. <i>latifolia</i> (P3) • <i>Solanum kentrocaule</i> (P3) • <i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739) – (P3) • <i>Acacia bromilowiana</i> (P4) • <i>Lepidium catapycnon</i> (P4) • <i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642) (P4) 	
West Angelas Desktop Mapping December 2020 (Astron Environmental Services, 2020)	Overlaps Application Area	Dec 2020	Desktop Mapping	<ul style="list-style-type: none"> • Disturbances – Minor • Sources of information and availability of contextual information - Minor 	None	N/A	<ul style="list-style-type: none"> • N/A 	N/A



West Angelas Development Envelope Consolidated Vegetation Mapping (Biologic Environmental Survey, 2021b)	Overlaps Application Area	Aug 2021	Desktop Mapping	<ul style="list-style-type: none"> Sources of information and availability of contextual information – Minor Mapping reliability - Minor 	Priority 1 'West Angelas cracking clays' Priority Ecological Community (PEC).	N/A	<ul style="list-style-type: none"> N/A 	N/A
West Angelas Vegetation Condition Assessment (Biologic Environmental Survey, 2022)	Overlaps Application Area	Oct 2022	Desktop Mapping	<ul style="list-style-type: none"> Sources of information and availability of contextual information – Minor 	N/A	N/A	<ul style="list-style-type: none"> N/A 	N/A
West Angelas Beyond 2020 Mt Ella East and Dep J Detailed and Targeted Survey (Biologic Environmental Survey, 2022d)	Overlaps Application Area	May 2022 Aug 2022	Reconnaissance and targeted flora and vegetation survey	<ul style="list-style-type: none"> Access problems - Significant 	None	239 taxa	<ul style="list-style-type: none"> <i>Eremophila sp.</i> West Angelas (S. van Leeuwen 4068) (P2) <i>Hibiscus sp.</i> Gurinbiddy Range (M.E. Trudgen MET 15708) (P2) <i>Oxalis sp.</i> Pilbara (M. E. Trudgen 12725) (P2) <i>Acacia subtiliformis</i> (P3) <i>Eremophila magnifica subsp. velutina</i> (P3) <i>Eremophila naaykensis</i> (P3) <i>Indigofera gilesii</i> (P3) 	No WoNS or DP



							<ul style="list-style-type: none"> • <i>Pilbara trudgenii</i> (P3) • <i>Rhagodia sp.</i> Hamersley (M. Trudgen 17794) (P3) • <i>Solanum kentrocaule</i> (P3) • <i>Triodia sp.</i> Mt Ella (M.E. Trudgen 12739) (P3) • <i>Acacia bromilowiana</i> (P4) • <i>Eremophila magnifica subsp. magnifica</i> (P4) 	
West Angelas Beyond 2020 Deposit G Reconnaissance and Targeted Survey (Biologic Environmental Survey, 2022b)	Overlaps Application Area	Feb 2022	Targeted flora and vegetation survey	<ul style="list-style-type: none"> • No Limitations 	None	N/A	<ul style="list-style-type: none"> • None 	No WoNS or DP
West Angelas Infrastructure Reconnaissance Flora and Vegetation Survey (Biologic Environmental Survey, 2023a)	Overlaps Application Area	Feb 2022	Reconnaissance and targeted flora and vegetation survey	<ul style="list-style-type: none"> • No Limitations 	None	147 taxa	<ul style="list-style-type: none"> • <i>Eremophila pusilliflora</i> (P2) • <i>Indigofera gilesii</i> (P3) • <i>Triodia sp.</i> Mt Ella (M.E. Trudgen 12739) (P3) 	No WoNS or DP



West Angelas Managed Aquifer Targeted Flora and Fauna Survey (Biologic Environmental Survey, 2023b)	Overlaps Application Area	Feb - 2021	Targeted flora survey	<ul style="list-style-type: none"> No Limitations 	N/A	5 taxa	<ul style="list-style-type: none"> <i>Eremophila pusilliflora</i> (P2) <i>Eremophila naaykensis</i> (P3) <i>Indigofera gilesii</i> (P3) <i>Rhagodia sp.</i> Hamersley (M. Trudgen 17794) (P3) <i>Triodia sp.</i> Mt Ella (M.E. Trudgen 12739) (P3) 	No WoNS or DP
Metadata Statement – Beyond 2020 Deposit F and Deposit H Additional Areas (Rio Tinto Iron Ore, 2022)	Overlaps Application Area	Nov - 2021	Detailed flora and vegetation survey	<ul style="list-style-type: none"> Timing, weather, season, cycle - Minor 	None	116 taxa	<ul style="list-style-type: none"> <i>Aristida jerichoensis var. subspinulifera</i> (P3) 	No WoNS or DP



4.1.4 Significant flora

A total of 62 significant flora species were identified as occurring within 50 km of the Application Area. Of these, 22 significant flora species were recorded as occurring within the Application Area. These 62 species, their conservation status, and a count of locations recorded within the Application Area and Desktop Assessment area are presented in **Table 12**. Species that were tentatively identified eg *Acacia ?effusa* were treated as the same confirmed species eg *Acacia effusa*.

A classification of regional significance was applied to species that were endemic to the Hamersley (PILO3) IBRA subregion. Where the number of locations within the Application Area were ten or less, taxa were considered to represent local significance.

It should be noted that whilst *Seringia exastia* retains a status of Critically Endangered at the Federal level, it has been delisted at the State level due to taxonomic incorporation with *Seringia elliptica*, a widespread and common species of no conservation significance (Binks et al., 2020). It is expected that *Seringia exastia* will eventually be delisted from the EPBC Act List of Threatened Flora, however the species has been retained for the purpose of this report and data as a precaution.

Table 12: Significant flora recorded within the Application Area.

Status	Taxon	Application Area # locations	Desktop Study Area # locations (within 50km)
T	<i>Thryptomene wittweri</i>	-	12
CE	<i>Seringia exastia</i>	74	368
P1	<i>Dicrastylis mitchellii</i>	-	2
P1	<i>Eremophila tenella</i>	-	1
P1	Hibiscus sp. Mt Brockman (E. Thoma ET 1354)	-	1
P1	<i>Isotropis forrestii</i>	-	3
P1	<i>Rhodanthe ascendens</i>	-	4
P1	<i>Sida</i> sp. Turee Creek (P.-L.de Kock PLDK1116)	-	4
P2	<i>Aristida lazaridis</i>	30	694
P2	<i>Arthropodium vanleeuwenii</i>	-	1
P2	<i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109)	-	15
P2	<i>Eremophila pusilliflora</i>	7	1647
P2	<i>Eremophila</i> sp. West Angelas (S. van Leeuwen 4068)	-	298
P2	<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	-	12
P2	<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i>	-	2
P2	<i>Hibiscus</i> sp. Gurinbidy Range (M.E. Trudgen MET 15708)	27	583
P2	<i>Ipomoea racemigera</i>	-	86
P2	<i>Neptunia longipila</i>	-	2
P2	<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	-	126
P2	<i>Pentalepis trichodesmoides</i> subsp. <i>hispida</i>	-	1
P2	<i>Tetradlea fordiana</i>	-	204
P2	<i>Teucrium pilbaranum</i>	-	1
P2	<i>Triodia karijini</i>	-	18
P3	<i>Acacia daweara</i>	-	5



P3	<i>Acacia effusa</i>	12	257
P3	<i>Acacia subtiliformis</i>	4	74
P3	<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	16	314
P3	<i>Dampiera metallorum</i>	-	104
P3	<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	1	69
P3	<i>Eremophila magnifica</i> subsp. <i>velutina</i>	-	15
P3	<i>Eremophila naaykensis</i>	1	1900
P3	<i>Eremophila rigida</i>	-	2
P3	<i>Euphorbia clementii</i>	-	2
P3	<i>Euphorbia stevenii</i>	-	2
P3	<i>Fimbristylis sieberiana</i>	-	1
P3	<i>Geijera salicifolia</i>	-	1
P3	<i>Goodenia lyrata</i>	-	23
P3	<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	-	537
P3	<i>Grevillea saxicola</i>	-	918
P3	<i>Gymnanthera cunninghamii</i>	-	1
P3	<i>Indigofera gilesii</i>	133	553
P3	<i>Isotropis parviflora</i>	5	267
P3	<i>Nicotiana umbratica</i>	-	1
P3	<i>Olearia mucronata</i>	-	18
P3	<i>Pilbara trudgenii</i>	-	300
P3	<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	36	5891
P3	<i>Rostellularia adscendens</i> var. <i>latifolia</i>	3	52
P3	<i>Sida</i> sp. Hamersley Range (K. Newbey 10692)	2	3
P3	<i>Solanum kentrocaule</i>	14	774
P3	<i>Stackhousia clementii</i>	-	2
P3	<i>Streptoglossa</i> sp. Cracking clays (S. van Leeuwen et al. PBS 7353)	-	14
P3	<i>Stylidium weeliwolli</i>	-	4
P3	<i>Swainsona thompsoniana</i>	-	59
P3	<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	5	92
P3	<i>Triodia basitricha</i>	-	2
P3	<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)	185	2075
P3	<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)	1	53
P4	<i>Acacia bromilowiana</i>	21	117
P4	<i>Acacia subtiliformis</i>	-	1
P4	<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	1	132
P4	<i>Lepidium catapycnon</i>	3	87
P4	<i>Ptilotus mollis</i>	-	45
P4	<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	22	71



The likelihood of occurrence assessment identified 24 flora species as having some potential to occur within the Application Area.

Two species were ranked as having a 'high' likelihood of occurrence, comprising:

- One Priority 2 species: *Oxalis* sp. Pilbara (M.E. Trudgen 12725)
- One Priority 3 species: *Euphorbia clementii*

Twenty-two species are considered have a 'medium' likelihood of occurrence within the Application Area, comprising:

- One Threatened species: *Thryptomene wittweri*
- Four Priority 1 species: *Hibiscus* sp. Mt Brockman (E. Thoma ET 1354), *Isotropis forrestii*, *Rhodanthe ascendens* and *Sida* sp. Turee Creek (P.-L.de Kock PLDK1116)
- Six Priority 2 species: *Eragrostis* sp. Mt Robinson (S. van Leeuwen 4109), *Eremophila* sp. West Angelas (S. van Leeuwen 4068), *Euphorbia inappendiculata* var. *inappendiculata*, *Ipomoea racemigera*, *Neptunia longipila* and *Tetratheca fordiana*
- 10 Priority 3 species: *Acacia dawweana*, *Dampiera metallorum*, *Eremophila magnifica* subsp. *velutina*, *Euphorbia stevenii*, *Geijera salicifolia*, *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727), *Grevillea saxicola*, *Olearia mucronata*, *Pilbara trudgenii* and *Streptoglossa* sp. Cracking clays (S. van Leeuwen et al. PBS 7353); and
- One Priority 4 species: *Ptilotus mollis*

A further 16 species were assessed as having a low likelihood of occurrence within the Application Area. An assessment of all 62 species and their likelihood of occurrence within the Application Area is detailed in **Table 13** below.

4.1.5 Introduced flora

A total of 32 introduced flora species were identified from within 50km of the Application Area by the Rio Tinto Database, DBCA NatureMap, and results from the literature review. Of these, 13 introduced taxa were recorded from within the Application Area.

None of these species are listed as either Declared Pests under the BAM Act (Department of Primary Industries and Regional Development, 2021), or as WoNS (Department of Agriculture Water and the Environment, 2021). A list of species and the number of individuals identified within the Application Area compared to the Desktop Study Area is presented in **Table 14**.

Introduced species are allocated an 'Ecological Impact' and an 'Invasiveness' ranking under the DBCA Weed Prioritisation Process (WPP) for Pilbara Region (DBCA, 2016). Of the 32 introduced species encountered in the survey area, 11 species are ranked High for Ecological Impact and Rapid for Invasiveness (**Table 14**).



Table 13: Assessment of the likelihood of occurrence of threatened and priority flora as per desktop assessment database searches surrounding the Application Area

Species	Conservation Status		Source					Distance to Nearest Record	Flowering Period	Preferred Habitat	Habitat Occurs in Application Area	Likelihood of Occurrence
	State	Federal	NM	PMST	DBCA	RTIO	Literature					
<i>Seringia exastia</i>	-	CR	X			X	X	N/A	Apr - Dec	Pindan plain, orange sand. ²	Yes	Previously Recorded.
<i>Thryptomene wittweri</i>	T	VU	X	X	X			14.04 km	Apr - Jul or Aug	Skeletal red stony soils on hills, breakaways. ²	Yes	Medium. Some suitable habitat available, and limited survey effort conducted in suitable habitat.
<i>Dicrastylis mitchellii</i>	P1		X		X			29.48 km	Unknown	Sand or clay soils. Around dunes. ²	No	Low. No suitable habitat.
<i>Eremophila tenella</i>	P1		X					Within 50 km	May or Aug - Sep	Stony slopes and hills. ²	Yes	Low. Limited records from with 50km of Application Area.
<i>Hibiscus sp.</i> Mt Brockman (E. Thoma ET 1354)	P1					X	X	13.71 km	May - Nov	Red-brown skeletal soil, red - brown sand, banded ironstone with ironstone gravel.	Yes	Medium. Nearest records are greater than 10km
<i>Isotropis forrestii</i>	P1					X	X	3.53 km	Apr - Sep or Dec	Stony clay loam, sandy alluvium. Along drainage lines.	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Rhodanthe ascendens</i>	P1		X		X			2.85 km	Aug	Clay. Roadside verge. ²	Yes	Medium. Records within 10km of Application Area, however suitable habitat is limited.
<i>Sida sp.</i> Turee Creek (P.-L.de Kock PLDK1116)	P1		X		X			6.07 km	Jul	Clay loam. Mulga plains with ironstone gravel, pebbles and cobbles. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Aristida lazaridis</i>	P2		X		X	X	X	N/A	Apr	Sand or loam. ²	Yes	Previously Recorded.
<i>Arthropodium vanleeuwenii</i>	P2		X		X			32.75 km	Sep	Moderately steep, south-facing slope of banded iron formation with dark orange-brown loam soil. ²	Yes	Low. Limited records within 50km of Application Area.
<i>Eragrostis sp.</i> Mt Robinson (S. van Leeuwen 4109)	P2		X		X	X	X	8.86 km	Sep	Red-brown skeletal soils, ironstone. Steep slopes, summits. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Eremophila pusilliflora</i>	P2		X		X	X	X	N/A	Aug - Sep	Red brown loam over ironstone. ²	Yes	Previously Recorded.
<i>Eremophila sp.</i> West Angelas (S. van Leeuwen 4068)	P2		X		X	X	X	1.19 km	Aug - Sep	Steep rock slopes and scree, skeletal brown-red soils. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	P2					X	X	750 m	May, Aug	Red, brown clay or loam. Plains. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i>	P2		X		X			22.59 km	Oct	Plains, cracking clays. ²	Yes	Low. Records present within 50km however limited suitable available.
<i>Hibiscus sp.</i> Gurinbidy Range (M.E. Trudgen MET 15708)	P2		X		X	X	X	N/A	Apr -Jun or Aug - Oct	Drainage lines, gullies. ²	Yes	Previously Recorded.



<i>Ipomoea racemigera</i>	P2				X	X	9.99 km	Apr - Aug	Sandy loam gravel, river bank, red-brown clay loam	Yes	Medium. Records just within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Neptunia longipila</i>	P2		X	X			2.19 km	Sep	Plain. Stony sandy-clay. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	P2		X	X	X	X	100 m	May	Gorges with sandy loam soil, creeklines. ²	Yes	High. Suitable habitat present and records directly adjacent survey area. Species is annual and would not be detectable every season.
<i>Pentalepis trichodesmoides</i> subsp. <i>hispida</i>	P2				X	X	15.76 km	Jul - Sep	Red brown clay loam, stony brown clayey sand. Hillslopes. ²	Yes	Low. Nearest records 15km from Application Area, however reasonable effort has been applied in suitable habitat.
<i>Tetratheca fordiana</i>	P2		X	X	X	X	1.31 km	Apr	Cliff wall, breakaway. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Teucrium pilbaranum</i>	P2		X				50 km	May or Sep	Clay. Crab hole plain in a river floodplain, margin of calcrete table. ²	No	Low. No suitable habitat.
<i>Triodia karijini</i>	P2		X	X			8.1 km	Unknown	Hillcrest with sandy loam soil. ²	Yes	Low. Records within 10km however limited suitable habitat within Application Area.
<i>Acacia daweara</i>	P3		X	X	X	X	9.35 km	Jul - Sep	Stony red loamy soils. Low rocky rises, along drainage lines. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Acacia effusa</i>	P3		X	X	X	X	N/A	May - Aug	Stony red loam. Scree slopes of low ranges. ²	Yes	Previously Recorded.
<i>Acacia subtiliformis</i>	P3		X	X	X	X	N/A	Jun	On rocky calcrete plateau. ²	Yes	Previously Recorded.
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	P3		X	X	X	X	N/A	Unknown	Hardpan plains. ²	Yes	Previously Recorded.
<i>Dampiera metallorum</i>	P3		X	X	X	X	780 m	Apr or Jun - Oct	Skeletal red-brown gravelly soil over banded ironstone. Steep slopes, summits of hills.	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3			X	X	X	N/A	May - Jul or Sep	Brown sandy clay, or medium clay. Claypans, drainage lines, cracking clays, crabhole plains. ²	Yes	Previously Recorded.
<i>Eremophila magnifica</i> subsp. <i>velutina</i>	P3		X	X	X	X	1.59 km	Aug - Sep	Skeletal soils over ironstone. Summits. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Eremophila naaykensis</i>	P3		X	X	X	X	N/A	Aug - Sep	Red clay loam on rocky hill slopes, hill crests and upper hill slopes. Ironstone gorges. ²	Yes	Previously Recorded.
<i>Eremophila rigida</i>	P3		X	X			35.05 km	Oct	Red sand alluvium. Hardpan plains, stony clay depressions. ²	Unknown	Low. Limited suitable habitat and records more that 35km from Application Area.
<i>Euphorbia clementii</i>	P3		X		X	X	360 m	May - Jul	Gravelly hillsides, stony grounds	Yes	High. No search effort within 4km of known record, and suitable habitat present with Application Area.
<i>Euphorbia stevenii</i>	P3		X	X			2.19 km	Unknown	Clay, sandy soils. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Fimbristylis sieberiana</i>	P3					X	approx. 40km	May - Jun	Mud, skeletal soil pockets. Pool edges, sandstone cliffs. ²	No	Low. Recorded from literature only and no suitable habitat available.



<i>Geijera salicifolia</i>	P3				X	X	800 m	Sep	Skeletal soils, stony soils. Massive rock scree, gorges.	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Goodenia lyrata</i>	P3		X		X	X	9.75 km	Aug	Red sandy loam. Near claypan. ²	Yes	Low. Records 9.75km away however minimal suitable habitat available.
<i>Goodenia sp.</i> East Pilbara (A.A. Mitchell PRP 727)	P3		X		X	X	2.92 km	July	Red-brown clay soil, calcrete pebbles. Low undulating plain, swampy plains. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Grevillea saxicola</i>	P3		X		X	X	280 m	Mar	Gully system in rocky valley, loamy soils. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Gymnanthera cunninghamii</i>	P3				X	X	13.71 km	Jan - Dec	Sandy soils. Drainage lines. ²	Yes	Low. Nearest records 15km from Application Area, however reasonable effort has been applied in suitable habitat.
<i>Indigofera gilesii</i>	P3		X		X	X	N/A	May or Aug	Pebbly loam. Amongst boulders and outcrops, hills. ²	Yes	Previously Recorded.
<i>Isotropis parviflora</i>	P3		X		X	X	N/A	Mar	Valley slope of ironstone plateau. ²	Yes	Previously Recorded.
<i>Nicotiana umbratica</i>	P3					X	approx. 40km	Apr - Jun	Shallow soils. Rocky outcrops. ²	Yes	Low. Limited records recorded and nearest recorded approx. 40km from Application Area.
<i>Olearia mucronata</i>	P3		X		X	X	720 m	Aug - Dec or Jan	Schistose hills, along drainage channels. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Pilbara trudgenii</i>	P3		X		X	X	140 m	Sep	Skeletal, red stony soil over ironstone. Hill summits, steep slopes, screes, cliff faces. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Rhagodia sp.</i> Hamersley (M. Trudgen 17794)	P3		X		X	X	N/A	Unknown	Red sandy loam over gravelly ironstone. Plains. ²	Yes	Previously Recorded.
<i>Rostellularia adscendens var. latifolia</i>	P3		X		X	X	N/A	Apr - May	Ironstone soils. Near creeks, rocky hills. ²	Yes	Previously Recorded.
<i>Sida sp.</i> Hamersley Range (K. Newbey 10692)	P3		X		X	X	N/A	Aug - Oct	Ironstone crevices of breakaways, gullies. ²	Yes	Previously Recorded.
<i>Solanum kentrocaule</i>	P3		X		X	X	N/A	May - Jul	Steep slope of ironstone hills. ²	Yes	Previously Recorded.
<i>Stackhousia clementii</i>	P3		X		X		20.98 km	Nov- Mar	Skeletal soils. Sandstone hills. ²	Unknown	Low. Limited suitable habitat.
<i>Streptoglossa sp.</i> Cracking clays (S. van Leeuwen et al. PBS 7353)	P3		X		X	X	1.79 km	Unknown	Cracking clays, colluvial and alluvial gravels in floodplain. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Stylidium weeliwolli</i>	P3		X		X	X	23.57 km	Aug - Sep	Gritty sand soil, sandy clay. Edge of watercourses. ²	Yes	Low. Limited suitable habitat.
<i>Swainsona thompsoniana</i>	P3		X		X	X	660 m	Unknown	Cracking clay floodplain. Dark reddish brown cracking clays. ²	Yes	Low. High level survey effort undertaken adjacent nearest record (660m) in suitable habitat.
<i>Themeda sp.</i> Hamersley Station (M.E. Trudgen 11431)	P3		X		X	X	N/A	Aug	Red clay. Clay pan, grass plain. ²	Yes	Previously Recorded.
<i>Triodia basitricha</i>	P3		X		X		22.62 km	Mar - Jun	Stony ground, gravelly hill, crests, hills, in gorges. ²	Yes	Low. Reasonable survey effort applied and records greater than 20km from Application Area.



<i>Triodia sp.</i> Mt Ella (M.E. Trudgen 12739)	P3		X		X	X	X	N/A	Feb - Mar	Light orange-brown, pebbly loam. Amongst rocks and outcrops, gully slopes. ²	Yes	Previously Recorded.
<i>Vittadinia sp.</i> Coondewanna Flats (S. van Leeuwen 4684)	P3		X		X	X	X	N/A	Jul	Flat plain. Red, brown sandy clay-loam. ²	Yes	Previously Recorded.
<i>Acacia bromilowiana</i>	P4		X		X	X	X	N/A	Jul - Aug	Red skeletal stony loam, orange-brown pebbly, gravel loam, laterite, banded ironstone, basalt. Rocky hills, breakaways, scree slopes, gorges, creek beds. ²	Yes	Previously Recorded.
<i>Eremophila magnifica subsp. magnifica</i>	P4		X		X	X	X	N/A	Aug - Nov	Skeletal soils over ironstone. Rocky screes. ²	Yes	Previously Recorded.
<i>Lepidium catapycnon</i>	P4		X		X	X	X	N/A	Oct	Stony hill slopes, south facing slopes, road verges and cuttings. ¹	Yes	Previously Recorded.
<i>Ptilotus mollis</i>	P4		X		X	X	X	4.41 km	May or Sep	Stony hills and screes. ²	Yes	Medium. Records within 10km of Application Area, however reasonable effort has been applied in suitable habitat.
<i>Sida sp.</i> Barlee Range (S. van Leeuwen 1642)	P4		X		X	X	X	N/A	Aug	Skeletal red soils pockets. Steep slope. ²	Yes	Previously Recorded.



Table 14: A summary of introduced flora species previously recorded from Application Area and desktop study area

Taxon	Common Name	Application Area	Desktop Study Area	WPP	
				Ecological Impact	Invasiveness
* <i>Aerva javanica</i>	Kapok Bush		X	H	R
* <i>Argemone ochroleuca subsp. ochroleuca</i>	Mexican Poppy		X	U	R
* <i>Bidens bipinnata</i>	Bipinnate Beggartick	X	X	U	R
* <i>Brassica tournefortii</i>	Mediterranean Turnip		X	H	R
* <i>Cenchrus ciliaris</i>	Buffel Grass	X	X	H	R
* <i>Cenchrus setiger</i>	Birdwood Grass		X	H	R
* <i>Chloris barbata</i>	Purpletop Chloris		X	H	R
* <i>Chloris virgata</i>	Feathertop Rhodes Grass	X	X	H	R
* <i>Citrullus amarus</i>	Camel Melon		X	-	-
* <i>Citrullus colocynthis</i>	Colocynth		X	U	M
* <i>Cucumis melo</i>	Muskmelon		X	U	M
* <i>Datura leichhardtii subsp. leichhardtii</i>	Native Thornapple		X	U	U
* <i>Echinochloa colona</i>	Awnless Barnyard Grass		X	H	R
* <i>Erigeron bonariensis</i>	Flaxleaf Fleabane	X	X	-	-
* <i>Euphorbia hirta</i>	Asthma Plant		X	L	S
* <i>Flaveria trinervia</i>	Speedy Weed	X	X	-	-
* <i>Hibiscus tridactylites</i>	Narrow-leaved Bladder Ketmia		X	-	-
* <i>Lactuca serriola</i>	Prickly Lettuce	X	X	-	-
* <i>Malvastrum americanum</i>	Spiked Malvastrum	X	X	H	R
* <i>Melinis repens</i>	Red Natal		X	-	-



* <i>Oxalis corniculata</i>	Yellow Wood Sorrel	X	X	-	-
* <i>Physalis sp.</i>	Wild Gooseberry		X	U	U
* <i>Portulaca oleracea</i>	Purslane		X	U	U
* <i>Portulaca pilosa</i>	Djanggara		X	-	-
* <i>Rumex vesicarius</i>	Ruby Dock	X	X	H	R
* <i>Setaria verticillata</i>	Whorled Pigeon Grass	X	X	H	R
* <i>Sigesbeckia orientalis</i>	Indian Weed	X	X	U	R
* <i>Solanum nigrum</i>	Black Berry Nightshade		X	L	R
* <i>Sonchus oleraceus</i>	Common Sowthistle	X	X	L	R
* <i>Tribulus terrestris</i>	Caltrop		X	U	M
* <i>Urochloa mosambicensis</i>	Sabi Grass		X	-	-
* <i>Vachellia farnesiana</i>	Mimosa Bush	X	X	H	R



4.1.6 Vegetation of the application area

Thirty-nine natural vegetation types across four broad landforms were identified within the Application Area, based on Biologic's (2021b) consolidated vegetation mapping. These vegetation types are summarised in **Table 15** below and presented in **Figure 9**.

Of these 39 vegetation types:

- Nine were represented by the Drainages landform.
- 13 were represented by the Hills landform.
- Two were represented by the Gorges and Gullies landform; and
- 15 were represented by the Plains landform.

The H10 (EIEgAmPITvTw) vegetation type was the most common, representing 14.62% (978.43 ha) of the Application Area. H10 was found to occur on hillslopes and hillcrests and is described as:

"Eucalyptus leucophloia subsp. *leucophloia* scattered low trees over *E. gamophylla* low open mallee woodland over *Acacia maitlandii* and *Petalostylis labicheoides* open shrubland over *Triodia vanleeuwenii* and *T. wiseana* open hummock grassland."

One additional unit, mapped as 'Disturbed', represented areas completely or almost completely devoid of native vegetation, which had been cleared for current and historical mining purposes. A total of 1,122.67 ha (16.78%) of the Application Area was mapped as Disturbed, which was automatically assign a vegetation condition rating of 'Completely Degraded' (see **Section 4.1.6.1**).



Table 15: Summary of vegetation types of the Application Area

Short Code	Vegetation Unit	Vegetation Description	Vegetation Condition	Extent (ha) Within Study Area	Proportion (%) of Study Area
Vegetation of Drainages					
D2	EvAcTErTHtTp	<i>Eucalyptus victrix</i> low open woodland over <i>Acacia citrinoviridis</i> tall open shrubland over <i>Tephrosia rosea</i> var. Fortescue Creeks (M.I.H. Brooker 2186) scattered low shrubs over <i>Themeda triandra</i> very open tussock grassland over <i>Triodia pungens</i> scattered hummock grasses to very open hummock grassland.	Very Good - Good	36.45	0.54%
D3	ExChPIApyTErTHtTp	<i>Eucalyptus xerothermica</i> and/or <i>Corymbia hamersleyana</i> low open woodland over <i>Petalostylis labicheoides</i> , <i>Acacia pyrifolia</i> tall open shrubland over <i>Tephrosia rosea</i> var. Fortescue Creeks (M.I.H. Brooker 2186) low open shrubland over <i>Themeda triandra</i> very open tussock grassland over <i>Triodia pungens</i> very open hummock grassland to scattered hummock grasses.	Excellent - Good	33.03	0.49%
D6	ChCdAanPITp	<i>Corymbia hamersleyana</i> and/or <i>C. deserticola</i> subsp. <i>deserticola</i> low open woodland over <i>Acacia 'aneura'</i> , <i>Petalostylis labicheoides</i> tall open shrubland over <i>Triodia pungens</i> open hummock grassland.	Excellent - Good	45.95	0.69%
D7	ChAmoTHtTp	<i>Corymbia hamersleyana</i> low open woodland over <i>Acacia monticola</i> tall shrubland over <i>Themeda triandra</i> very open tussock grassland over <i>Triodia pungens</i> very open hummock grassland.	Excellent – Very Good	31.95	0.48%
D8	EIChPIGOrAmoTHtTp	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> , <i>Corymbia hamersleyana</i> low open woodland over <i>Petalostylis labicheoides</i> , <i>Gossypium robinsonii</i> , <i>Acacia monticola</i> open shrubland over <i>Themeda triandra</i> tussock grassland over <i>Triodia pungens</i> open hummock grassland.	Excellent	4.89	0.07%
D9	EtTp	<i>Eucalyptus trivalva</i> low mallee woodland over <i>Triodia pungens</i> very open hummock grassland.	Excellent – Very Good	26.71	0.40%
D11	ExAanEtPIANIEUsTHtTp	<i>Eucalyptus xerothermica</i> and/or <i>Acacia 'aneura'</i> low open woodland over <i>E. trivalva</i> low open mallee woodland over <i>Petalostylis labicheoides</i> , <i>Androcalva luteiflora</i> open shrubland	Excellent – Very Good	27.09	0.40%



		over <i>Eulalia symonii</i> and/or <i>Themeda triandra</i> very open tussock grassland with <i>Triodia pungens</i> very open hummock grassland.			
D13	ExPIAppTtEmu	<i>Eucalyptus xerothermica</i> low open woodland over <i>Petalostylis labicheoides</i> , <i>Acacia pyrifolia</i> tall sparse shrubland over <i>Themeda triandra</i> , <i>Eriachne mucronata</i> tussock grassland.	Excellent	3.33	0.05%
D14	AcAapApyPITpTHtEENICYa	<i>Acacia citrinoviridis</i> , <i>A. aptaneura</i> isolated trees/low open woodland/woodland over <i>A. pyrifolia</i> var. <i>pyrifolia</i> , <i>Petalostylis labicheoides</i> tall sparse to tall open shrubland over <i>Indigofera georgei</i> , <i>Ptilotus obovatus</i> , <i>Solanum lasiophyllum</i> low isolated to low open shrubland over <i>Triodia pungens</i> sparse to open hummock grassland over <i>Themeda triandra</i> , <i>Erneapogon lindleyanus</i> , <i>Cymbopogon ambiguus</i> sparse to open tussock grassland.	Excellent - Good	175.48	2.62%
Vegetation of Gorges and Gullies					
G2	AanCALcCfCAPmPToERImARbTp	<i>Acacia 'aneura'</i> , <i>Callitris columellaris</i> and/or <i>Corymbia ferriticola</i> low woodland over <i>Capparis mitchellii</i> scattered tall shrubs over <i>Ptilotus obovatus</i> low open shrubland over <i>Eriachne mucronata</i> and/or <i>Aristida burbridgeae</i> very open tussock grassland with <i>Triodia pungens</i> scattered hummock grasses.	Excellent – Very Good	0.89	0.01%
G3	CfAmoTHtTp	<i>Corymbia ferriticola</i> low open woodland over <i>Acacia monticola</i> tall open shrubland over <i>Themeda triandra</i> very open tussock grassland over <i>Triodia pungens</i> scattered hummock grasses.	Excellent	2.86	0.04%
Vegetation of Hills					
H1	AanAayEIERfoERlaTpTw	<i>Acacia 'aneura'</i> and/or <i>A. ayersiana</i> , (<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>) low woodland over <i>Eremophila forrestii</i> subsp. <i>forrestii</i> , <i>E. latrobei</i> subsp. <i>latrobei</i> scattered shrubs over <i>Triodia pungens</i> , <i>T. wiseana</i> very open hummock grassland.	Excellent – Very Good	74.53	1.11%
H2	AanERsppTp	<i>Acacia 'aneura'</i> low woodland over <i>Eremophila jucunda</i> subsp. <i>pulcherrima</i> , <i>E. phyllopoda</i> subsp. <i>obliqua</i> , (<i>E. cuneifolia</i> , <i>E. oppositifolia</i> subsp. <i>angustifolia</i>) open shrubland over <i>Triodia pungens</i> very open hummock grassland.	Excellent – Very Good	5.68	0.08%
H3	AcaEIAanTp	<i>Acacia catenulata</i> subsp. <i>occidentalis</i> , (<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> , <i>A. 'aneura'</i>) low open forest over <i>Triodia pungens</i> open hummock grassland.	Excellent – Very Good	9.83	0.15%



H4	AiTw	<i>Acacia inaequilatera</i> scattered tall shrubs over <i>Triodia wiseana</i> open hummock grassland.	Excellent – Very Good	615.84	9.20%
H5	ChElAmHAgTpTw	<i>Corymbia hamersleyana</i> , <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> low open woodland over <i>Acacia maitlandii</i> open heath over <i>Halgania gustafsenii</i> var. Mid West (G. Perry 370) low open shrubland over <i>Triodia pungens</i> , <i>T. wiseana</i> hummock grassland.	Excellent	186.10	2.78%
H7	ElAmTvTp	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia maitlandii</i> scattered shrubs over <i>Triodia vanleeuwenii</i> , <i>T. pungens</i> open hummock grassland.	Excellent – Good	258.02	3.86%
H8	ElCdApTvTp	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and/or <i>Corymbia deserticola</i> subsp. <i>deserticola</i> low open woodland over <i>Acacia pruinocarpa</i> scattered tall shrubs over <i>Triodia vanleeuwenii</i> and/or <i>T. pungens</i> open hummock grassland.	Excellent – Very Good	90.29	1.35%
H9	ElCdEgTv	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and/or <i>Corymbia deserticola</i> subsp. <i>deserticola</i> low open woodland over <i>E. gamophylla</i> low open mallee woodland over <i>Triodia vanleeuwenii</i> open hummock grassland.	Excellent – Very Good	482.30	7.21%
H10	ElEgAmPITvTw	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>E. gamophylla</i> low open mallee woodland <i>Acacia maitlandii</i> , <i>Petalostylis labicheoides</i> open shrubland over <i>Triodia vanleeuwenii</i> , <i>T. wiseana</i> open hummock grassland.	Excellent – Good	978.43	14.62%
H11	ElEkAhTvTw	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>E. kingsmillii</i> low open mallee woodland <i>Acacia hamersleyensis</i> scattered tall shrubs over <i>Triodia vanleeuwenii</i> , <i>T. wiseana</i> open hummock grassland.	Excellent	65.68	0.98%
H14	ElTbrTw	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Triodia brizoides</i> , (<i>T. wiseana</i>) open hummock grassland.	Excellent – Very Good	56.84	0.85%
H15	ElTpTw	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> low open woodland over <i>Triodia pungens</i> and/or <i>T. wiseana</i> open hummock grassland.	Excellent – Very Good	168.70	2.52%
H16	ElTvTpTsm	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> low open woodland over <i>Triodia vanleeuwenii</i> , <i>T. pungens</i> and/or <i>T. sp.</i> Mt Ella (M.E. Trudgen 12739) open hummock grassland.	Excellent	211.71	3.16%



Vegetation of Plains					
P1	AanAayApTvTp	<i>Acacia 'aneura'</i> , <i>A. ayersiana</i> , <i>A. pruinocarpa</i> low open woodland over <i>Triodia vanleeuwenii</i> , <i>T. pungens</i> open hummock grassland.	Excellent – Very Good	52.16	0.78%
P2	AanAayERfoTm	<i>Acacia 'aneura'</i> , <i>A. ayersiana</i> low open woodland over <i>Eremophila forrestii</i> subsp. <i>forrestii</i> open shrubland over <i>Triodia melvillei</i> open hummock grassland.	Excellent	38.78	0.58%
P3	AanAcaApERfoTp	<i>Acacia 'aneura'</i> , <i>A. catenulata</i> subsp. <i>occidentalis</i> and/or <i>Acacia pruinocarpa</i> low woodland to low open forest over <i>Eremophila forrestii</i> subsp. <i>forrestii</i> open shrubland over <i>Triodia pungens</i> very open hummock grassland.	Excellent – Good	183.74	2.75%
P4	AanApAayTp	<i>Acacia 'aneura'</i> , <i>A. pruinocarpa</i> , <i>A. ayersiana</i> woodland over <i>Triodia pungens</i> open hummock grassland.	Excellent – Very Good	98.09	1.47%
P5	AanApERfoTp	<i>Acacia 'aneura'</i> and/or <i>A. pruinocarpa</i> low woodland to low open forest over <i>Eremophila forrestii</i> subsp. <i>forrestii</i> open shrubland over <i>Triodia pungens</i> very open hummock grassland.	Excellent – Very Good	22.53	0.34%
P6	AanApTp	<i>Acacia 'aneura'</i> , <i>A. pruinocarpa</i> low open woodland over <i>Triodia pungens</i> open hummock grassland.	Very Good	59.24	0.89%
P7	AanExERfoERloTHtTwTp	<i>Acacia 'aneura'</i> , <i>Eucalyptus xerothermica</i> scattered low trees to low open woodland over <i>Eremophila forrestii</i> subsp. <i>forrestii</i> and/or <i>E. longifolia</i> very open shrubland over <i>Themeda triandra</i> scattered tussock grasses over <i>Triodia wiseana</i> and/or <i>T. pungens</i> open hummock grassland.	Excellent – Good	250.07	3.74%
P8	AanTHtARcTp	<i>Acacia 'aneura'</i> scattered tall shrubs over <i>Themeda triandra</i> scattered tussock grasses to tussock grassland with <i>Aristida contorta</i> scattered bunch grasses to bunch grassland over <i>Triodia pungens</i> scattered hummock grasses.	Very Good	1.20	0.02%
P10	ElAtenAdAmTw	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> low open woodland over <i>Acacia tenuissima</i> , <i>A. dictyophleba</i> , <i>A. maitlandii</i> open shrubland <i>Triodia wiseana</i> hummock grassland.	Excellent	21.83	0.33%
P12	EgTpTv	<i>Eucalyptus gamophylla</i> low open mallee woodland over <i>Triodia pungens</i> and/or <i>T. vanleeuwenii</i> open hummock grassland.	Excellent – Very Good	275.57	4.12%
P13	ErEsMeTwTa	<i>Eucalyptus repullulans</i> , <i>E. socialis</i> subsp. <i>eucentrica</i> low open mallee woodland over <i>Melaleuca eleuterostachya</i> low open	Excellent	0.78	0.01%



		shrubland over <i>Triodia wiseana</i> , <i>T. angusta</i> very open hummock grassland.			
P14	EtErEsT spp	<i>Eucalyptus trivalva</i> , <i>E. repullulans</i> , <i>E. socialis</i> subsp. <i>eucentrica</i> low open mallee woodland over <i>Triodia wiseana</i> , (<i>T. angusta</i> , <i>T. pungens</i> , <i>T. longiceps</i>) open hummock grassland.	Excellent – Very Good	522.04	7.80%
P15	ASpASeARla	<i>Astrelba pectinata</i> , <i>Astrelba elymoides</i> and <i>Aristida latifolia</i> open tussock grassland (West Angelas Cracking-Clays Priority 1 PEC).	Excellent – Very Good	7.19	0.11%
P16	AanERfoCHf	<i>Acacia 'aneura'</i> tall open shrubland over <i>Eremophila forrestii</i> subsp. <i>forrestii</i> , <i>Rhagodia eremaea</i> open shrubland over <i>Chrysopogon fallax</i> scattered tussock grasses.	Excellent – Very Good	16.89	0.25%
M1	AanApTp/AanAcaApERfoTp	<i>Acacia 'aneura'</i> , <i>A. pruinocarpa</i> low open woodland/ <i>A. 'aneura'</i> , <i>A. catenulata</i> subsp. <i>occidentalis</i> and/or <i>A. pruinocarpa</i> low woodland to low open forest over <i>Eremophila forrestii</i> subsp. <i>forrestii</i> open shrubland over <i>Triodia pungens</i> open hummock grassland/ <i>T. pungens</i> very open hummock grassland.	Excellent – Good	430.11	6.43%
Other Units					
Dis	Disturbed	Devoid of vegetation.	Completely Degraded	1,122.67	16.78%
Total		6,692.052		100%	

² The spatial data used for this desktop assessment was obtained from several different sources and was provided to SLR in its current form. Due to variation in digitisation and processing of spatial data, including coordinate reference systems and projections, there are small discrepancies in total area between vegetation types, vegetation condition, and fauna habitat datasets. These discrepancies amount to less than 0.05% of the total area of the datasets.



4.1.6.1 Survey effort

The collective survey effort for flora sampling, from five recommended datasets as supplied by Rio Tinto, is presented in **Table 16** below (RTIO-HSE-0142330, RTIO-HSE-0185831, RTIO-HSE-0237243, RTIO-HSE-0336262 and RTIO-HSE-0358574). A total of 271 quadrats, 53 relevés and 374 mapping notes were recorded within the extent of the supplied data. Within the Application Area, 101 quadrats, 27 relevés, and 111 mapping notes were recorded.

Table 16: Collective flora sampling effort.

Sampling Type	Application Area	Outside Application Area	Total
Quadrat	101	170	271
Relevé	27	26	53
Vegetation mapping note	111	263	374
Total	239	459	698

The collective survey effort for flora sampling compared to the vegetation types recognised within the Application Area is presented in **Table 17** below.

Of the 39 natural vegetation types mapped for the Application Area, 38 vegetation types contained some level of sampling effort (**Table 17**). The 'Disturbed' unit contained 35 sampling sites within the Application Area, which is likely a result of disturbance occurring after the surveys were conducted.

When considering the survey effort that has been applied in the broader West Angelas locality against Biologic's (2021a) *West Angelas Development Envelope Consolidated Vegetation Mapping*:

- The P16 vegetation type was not represented by any sampling sites in either the Application Area, or within the broader West Angelas Development Envelope (RTIO supplied data)
- Three vegetation types mapped for the Application Area contained less than three replicated sampling sites (quadrats and/or relevés) required by the EPA (2016c), when considering the broader West Angelas Development Envelope (RTIO supplied data):
 - o D13, P1 and P4 (**Table 17**).



Table 17: Collective flora sampling effort per vegetation type from Rio Tinto supplied data based on the five recommended reports by RTIO.

Vegetation Types	Application Area			Total	RTIO Database			Total	Grand Total
	Quadrat	Relevé	Map Note		Quadrat	Relevé	Map Note		
D2	2	-	-	2	1	-	1	2	4
D3	8	2	2	12	9	-	-	9	21
D6	-	-	-	-	5	4	2	11	11
D7	1	4	2	7	-	-	-	-	7
D8	-	1	2	3	-	-	-	-	3
D9	2	1	-	3	-	-	-	-	3
D11	1	-	-	1	3	4	10	17	18
D13	-	-	-	-	2	-	-	2	2
D14	1	-	-	1	6	-	3	9	10
DIS	16	-	19	35	14	-	9	23	58
G2	-	-	-	-	1	9	6	16	16
G3	-	3	-	3	-	-	-	-	3
H1	5	4	3	12	-	-	1	1	13
H2	-	-	-	-	4	2	21	27	27
H3	1	1	-	2	1	2	4	7	9
H4	1	-	-	1	11	-	13	24	25
H5	3	1	3	7	-	-	-	-	7
H7	4	3	6	13	9	-	-	9	22
H8	1	-	1	2	7	1	25	33	35
H9	10	-	11	21	7	-	5	12	33
H10	14	3	19	36	3	-	1	4	40
H11	3	-	5	8	1	-	-	1	9
H14	-	-	1	1	4	-	5	9	10
H15	2	-	-	2	9	-	26	35	37
H16	4	1	10	15	7	-	31	38	53
M1	1	-	1	2	20	3	48	71	73
P1	-	1	1	2	-	-	-	-	2
P2	5	-	6	11	-	-	-	-	11
P3	1	-	-	1	4	-	-	4	5
P4	-	-	-	-	2	-	-	2	2
P5	1	1	-	2	2	-	-	2	4
P6	2	-	2	4	-	-	1	1	5
P7	1	-	-	1	8	1	8	17	18



P8	-	-	-	-	5	-	12	17	17
P10	1	-	1	2	1	-	-	1	3
P12	-	1	3	4	7	-	5	12	16
P13	-	-	-	-	4	-	3	7	7
P14	10	-	13	23	7	-	23	30	53
P15	-	-	-	-	6	-	-	6	6
P16	-	-	-	-	-	-	-	-	-
Grand Total	101	27	111	239	170	26	263	459	698

4.1.7 Vegetation condition

Vegetation condition within the Study Area ranged from Excellent to Completely Degraded, with Excellent condition being the most common ranking (45.78%). The breakdown of vegetation condition for the Study Area is presented in **Table 18** and is displayed in **Figure 10**.

Vegetation mapped as 'Disturbed' was automatically assigned a ranking of Completely Degraded.

Table 18: Vegetation Condition of the Application Area

Condition	Area (ha)	Proportion (%) of Study Area
Excellent	3,063.67	45.78%
Very Good	2,212.42	33.06%
Good	293.30	4.38%
Poor	0	0%
Degraded	0	0%
Completely Degraded	1,122.67	16.78%
Total	6,692.043	100.00%

4.1.8 Vegetation of conservation significance

4.1.8.1 Threatened and priority ecological communities

No State or Commonwealth listed TECs were identified within the Application Area by the database searches.

The buffer zones of One State listed PEC, West Angelas Cracking-Clays (Priority 1), were found to intersect the Application Area (Department of Biodiversity Conservation and Attractions, 2023).

This PEC occurs throughout the West Angelas area, and is described as:

'open tussock grasslands of *Astrelba pectinata*, *A. elymoides*, *Aristida latifolia*, in combination with low scattered shrubs of *Sida fibulifera*, on basalt (Jerrinah formation) derived cracking-clay loam depressions and flowlines. Occurs throughout the central and eastern Hamersley Range from near Tom Price east to Newman. Threats: clearing for

³ The spatial data used for this desktop assessment was obtained from several different sources and was provided to SLR in its current form. Due to variation in digitisation and processing of spatial data, including coordinate reference systems and projections, there are small discrepancies in total area between vegetation types, vegetation condition, and fauna habitat datasets. These discrepancies amount to less than 0.05% of the total area of the datasets.



mining, infrastructure and solar farms, possible weed invasion, fragmentation and altered fire regimes’.

The P15 vegetation type identified by Biologic (2021b) is considered to be analogous with West Angelas Cracking-Clays (Priority 1) PEC. A total of 7.19 ha was recorded within the Application Area (**Table 15**). No other vegetation types mapped for the Application Area are considered to represent PECs or TECs.

An additional three State listed PECs occur within 50 km of the Study Area (Department of Biodiversity Conservation and Attractions, 2023) (**Figure 11**):

- Brockman Iron cracking clay communities of the Hamersley Range (Priority 1) – 1.9 km north-west of the Study Area. While a nearby record was located, this PEC is found in conjunction with the Brockman land system, and therefore would not occur in the Application Area.
- Coolibah - Lignum flats: *Eucalyptus victrix* over lignum community in the Pilbara
 - o Sub type 1: Coolibah and mulga (*Acacia aneura*) woodland over lignum and tussock grasses on clay plains (Coondewanna Flats and Wanna Munna Flats) (Priority 3) – 3.5 km north of the Application Area. The PEC sub-community occurs is restricted to clay plains on Coondewanna Flats and Wanna Munna Flats, therefore is unlikely to occur within the Application Area.
 - o Sub type 2: Coolibah woodlands over lignum (*Duma florulenta*) over swamp wandiree (Priority 1). 6.6 km north of Application Area. This PEC sub-community is only known to occur from Lake Robinson (Department of Biodiversity Conservation and Attractions, 2023), therefore would not occur in the Application Area.
- Weeli Wolli Spring Community (Priority 1) – 19.1 km east of the Study Area. This PEC is restricted to Weeli Wolli Spring, approximately 28 km northeast of the study area (from Deposit H) and would not occur in the Application Area.

4.1.8.2 Vegetation of restricted distribution

One vegetation type (D2) was considered to have a restricted distribution due to its association with a major drainage line. It represents a potential GDE, dominated by *Eucalyptus victrix* (Biota Environmental Services, 2020). No other vegetation types recorded within the Application Area were considered to represent restricted distribution.

4.1.9 Vegetation of local significance

At a local level, 27 of the 39 mapped vegetation types of the Application Area were found to support Priority listed flora (**Table 19**), across four landforms. These vegetation types are only considered locally significant and do not reflect vegetation types of conservation significance EPA (2016c).

Table 19: Vegetation types of elevated local significance within the Application Area

Habitat	Mapping Unit	Reason
Drainages	D3, D6, D7, D8, D11, D14	-Supports Priority 2 populations and/or large numbers of Priority 3 flora, OR -Supports scattered records of Priority 3 flora, or Priority 4 flora
Gorges and Gullies	G2, G3	
Hills	H1, H3, H4, H5, H7, H8, H9, H10, H14, H15, H16	
Plains	M1, P1, P2, P3, P4, P7, P12, P14	



4.2 Fauna

4.2.1 Literature review

Fifteen previous reports, either publicly available or provided by Rio Tinto, were reviewed as part of the fauna literature review. The key findings of these reports are summarised below in **Table 20**.

4.2.2 Database searches

Database searches identified 364 terrestrial vertebrate fauna species occurring within the Desktop Study Area comprising:

- 172 bird species
- 48 mammal species
- 137 reptile species
- Seven amphibian species.

The results of the database searches are mapped in **Figure 12**. A list of fauna taxa identified during the database searches is presented in **Appendix D**.



Table 20: Findings of the literature review

Report	Location	Survey Timing	Survey Type	Significant Terrestrial Vertebrate Fauna Recorded Onsite	Fauna Habitats
Greater West Angelas Terrestrial Fauna Assessment (Ecologia Environment, 2014)	Overlaps the Application Area	September – October 2012 March 2013	Two-phase Detailed Vertebrate Fauna assessment Invertebrate SRE Assessment	<ul style="list-style-type: none"> Pilbara Leaf-nosed Bat (<i>Rhinonictoris aurantia</i> Pilbara form) - VU Fork-tailed Swift (<i>Apus pacificus</i>) – MI, MA Pilbara Barking Gecko (<i>Underwoodisaurus seorsus</i>) – P2 Western Pebble-mound Mouse (<i>Pseudomys chapmani</i>) – P4 	Eight fauna habitats were identified: Cracking Clay Footslope or Plain Hilltop, Hillslope, Ridge, or Cliff Major Drainage Major Gorge or Gully Mesa Top Mixed Acacia Woodland Mulga Woodland
Hope Downs 2 Proposal – Ghost Bat Cave Characteristics, February/March 2020 (Astron Environmental Services, 2020a)	1.5 km northeast of the Application Area	February, March 2020	Ghost Bat Cave Assessment	<ul style="list-style-type: none"> Northern quoll (<i>Dasyurus hallucatus</i>) - EN Ghost bat (<i>Macroderma gigas</i>) - VU 	Four confirmed Ghost Bat roost caves. Three potential Ghost Bat roost caves.
Hope Downs 2 Proposal Fauna Survey (Astron Environmental Services, 2019a)	1.5 km northeast of the Application Area	November-December 2017 May 2018 March 2019	Detailed Fauna Assessment Invertebrate SRE Assessment	<ul style="list-style-type: none"> Northern quoll (<i>Dasyurus hallucatus</i>) - EN Ghost bat (<i>Macroderma gigas</i>) - VU 	Eight fauna habitats were identified: Minor Drainage Gorge/Gully Breakaway Rocky Hill



				<ul style="list-style-type: none"> • Pilbara Leaf-nosed Bat (<i>Rhinonicteris aurantia</i> Pilbara form) - VU • Oriental Plover (<i>Charadrius veredus</i>) – MI, MA • Unpatterned Robust Lerista (<i>Lerista Macropisthopus remota</i>) – P2 • Letter-wing Kite (<i>Elanus scriptus</i>) – P4 • Pilbara Grasswren (<i>Amytornis whitei whitei</i>) – P4 • Western Pebble-mound Mouse (<i>Pseudomys chapmani</i>) – P4 	<p>Low Hill and Slopes Alluvial Plain Mulga Woodland Stony Plain</p>
Flora, Vegetation and Fauna Habitat Assessment at Juna Downs Native Vegetation Clearing Permit – Supporting Report (Rio Tinto Iron Ore, 2016b)	20 km north northwest of the Application Area	October, November 2014 April 2015	Flora and Vegetation Assessment Fauna Habitat Assessment	<ul style="list-style-type: none"> • Northern quoll (<i>Dasyurus hallucatus</i>) - EN • Western Pebble-mound Mouse (<i>Pseudomys chapmani</i>) – P4 	<p>Six fauna habitats were identified: Rocky slopes Undulating slopes Minor drainage Line</p>
West Angelas - Deposit B and F Ghost Bat Assessment (Biologic)	50 m northeast of the Application Area	November 2023	Ghost Bat Monitoring Survey	<ul style="list-style-type: none"> • Ghost bat (<i>Macroderma gigas</i>) - VU 	<p>Four confirmed Ghost Bat roost caves.</p>



Environmental Survey, 2014)					
2017 West Angelas Ghost Bat Monitoring (Biologic Environmental Survey, 2018)	50 m northeast of the Application Area	October 2017	Ghost Bat Monitoring Survey	<ul style="list-style-type: none"> Ghost bat (<i>Macroderma gigas</i>) - VU 	Five confirmed Ghost Bat roost caves.
West Angelas Gas Pipeline Native Vegetation Clearing Permit (B-2018-007) (Biota Environmental Services, 2019)	Overlaps the Application Area	October 2016	Flora and Vegetation Assessment Fauna Habitat Assessment	<ul style="list-style-type: none"> Western Pebble-mound Mouse (<i>Pseudomys chapmani</i>) – P4 	Six fauna habitats were identified: Hill slopes and colluvial slopes Mulga groves Plains Minor drainage lines Major creeks
West Angelas Deposit G – Basic and Targeted Fauna Survey 2022 (Biologic Environmental Survey, 2022f)	Overlaps the Application Area	February 2022	Fauna Habitat Assessment Targeted Significant Fauna Survey	<ul style="list-style-type: none"> N/A 	Four fauna habitats were identified: Footslopes and plain Major drainage line Hillcrest and hillslope Mixed acacia woodland
West Angelas Beyond 2020 Level 2 Vertebrate Fauna, SRE Invertebrate and Fauna Assessment Phase 1 and 2 (Biologic Environmental Survey, 2019b)	Overlaps the Application Area	October 2018 March 2019	Two-phase Detailed Vertebrate Fauna assessment Invertebrate SRE Assessment	<ul style="list-style-type: none"> Northern Quoll (<i>Dasymercus hallucatus</i>) – EN Ghost Bat (<i>Macroderma gigas</i>) – VU Pilbara Leaf-nosed Bat (<i>Rhinonictoris aurantia</i>) – VU Pilbara Olive Python (<i>Liasis</i> 	Seven fauna habitats were identified: Hilltop, hillslope, ridge, or cliff Footslope and plain Mulga spinifex woodland Minor drainage Gorge or gully Drainage Area



				<ul style="list-style-type: none"> <i>olivaceus barroni</i>) - VU Fork-tailed Swift (<i>Apus pacificus</i>) – MI, MA Gane’s Blind Snake (<i>Aniliios ganei</i>) – P1 Western Pebble-mound Mouse (<i>Pseudomys chapmani</i>) – P4 	Mixed acacia woodland
West Angelas Beyond 2020: Targeted Vertebrate Fauna Survey (Biologic Environmental Survey, 2020)	Overlaps the Application Area	June – July 2019	Targeted Fauna Surveys	<ul style="list-style-type: none"> Ghost Bat (<i>Macroderma gigas</i>) – VU Pilbara Leaf-nosed Bat (<i>Rhinonictoris aurantia</i>) – VU 	Three additional Ghost Bat roost caves.
West Angelas Managed Aquifer Targeted Flora and Fauna Survey (Biologic Environmental Survey, 2023b)	Overlaps the Application Area	February 2021	Fauna Habitat Assessment Targeted Significant Fauna Survey	<ul style="list-style-type: none"> Northern Quoll (<i>Dasyercus hallucatus</i>) – EN Ghost Bat (<i>Macroderma gigas</i>) – VU Western Pebble-mound Mouse (<i>Pseudomys chapmani</i>) – P4 	Four fauna habitats identified: Footslope or plain Hilltop, hillslope, ridge, or cliff Mixed acacia woodland Major Drainage
West Angelas Beyond 2020 Infrastructure Corridors Reconnaissance and Targeted Survey	Immediately Adjacent to Application Area	February 2022	Fauna Habitat Assessment Targeted Significant Fauna Survey	<ul style="list-style-type: none"> Western Pebble-mound Mouse (<i>Pseudomys chapmani</i>) – P4 	Six fauna habitats identified: Footslope and plain Hillcrest and hillslope Gorge/gully



(Biologic Environmental Survey, 2022c)					Mixed acacia woodland Drainage Line PEC cracking clay
West Angelas Beyond 2020 Mt Ella East and Dep J Detailed and Targeted Survey (Biologic Environmental Survey, 2022d)	Overlaps the Application Area	July 2022	Detailed Fauna Assessment Targeted Fauna Survey	<ul style="list-style-type: none"> • Ghost Bat (<i>Macroderma gigas</i>) – VU • Western Pebble-mound Mouse (<i>Pseudomys chapmani</i>) – P4 	Five fauna habitats identified: Hillcrest and hillslope Foothills and plain Gorge/gully Mixed acacia woodland Drainage line
West Angelas Deposit F North and Deposit H Areas Fauna Survey (Biologic Environmental Survey, 2022e)	Overlaps the Application Area	July 2022	Fauna Habitat Assessment Targeted Significant Fauna Survey	<ul style="list-style-type: none"> • nil 	Four fauna habitats identified: Hillcrest and hillslope Gorge/gully Mixed acacia woodland Drainage line
Metadata Statement – Beyond 2020 Deposit F and Deposit H Additional Areas (Rio Tinto Iron Ore, 2022)	Overlaps the Application Area	November 2021	Fauna Habitat Assessment	<ul style="list-style-type: none"> • nil 	Four fauna habitats identified: Hillcrest and hillslope Gorge/gully Foothills and plain Drainage line



4.2.3 Significant fauna

The likelihood of occurrence assessment identified 30 significant fauna species potentially occurring within the Application Area. Five had been previously recorded within the Application Area:

- Ghost Bat (*Macroderma gigas*), listed as Vulnerable under the BC Act and EPBC Act
- Pilbara Olive Python (*Liasis olivaceus barroni*), listed as Vulnerable under the BC Act and EPBC Act
- Gane's Blind Snake (*Anilius ganei*), listed as P1 by DBCA
- Pilbara Barking Gecko (*Underwoodisaurus seorsus*), listed as P2 by DBCA
- Western Pebble-mound Mouse (*Pseudomys chapmani*), listed as P4 by DBCA

Three species have a high likelihood of occurrence within the Application Area:

- Northern Quoll (*Dasyurus hallucatus*) listed as Endangered under the BC Act and EPBC Act
- Pilbara Leaf-nosed Bat (*Rhinonictis aurantia*), listed as Vulnerable under the BC Act and EPBC Act
- Fork-tailed Swift (*Apus pacificus*), listed as Migratory and Marine under the EPBC Act and as Migratory under the BC Act and

Four species have a medium likelihood of occurrence within the Application Area:

- Grey Falcon (*Falco hypoleucos*), listed as Vulnerable under the BC Act and EPBC Act
- Peregrine Falcon (*Falco peregrinus*), listed as Other Specially Protected under the BC Act
- Unpatterned Robust Slider (*Lerista macropisthopus remota*), listed as P2 by DBCA
- Pilbara Grasswren (*Amytornis whitei whitei*), listed as P4 by DBCA (as *A. striatus striatus*).

A further 18 species were assessed as having a low likelihood of occurrence within the Application Area. The results of the likelihood assessment are presented in detail in **Table 21** below.



Table 21: Likelihood of occurrence within the Application Area

Conservation Status: State - Listed under Biodiversity Conservation Act 2016 or Department of Biodiversity, Conservation and Attractions Conservation, Federal - Listed under Environmental Protection and Biodiversity Conservation Act 1999. CR - Critically Endangered, EN - Endangered, VU - Vulnerable, MI - Migratory, CD - Conservation Dependent fauna, OS - Other Specially Protected fauna, MA - Marine, P - Listed as Priority by DBCA. Source: RTIO – Rio Tinto Iron Ore internal database, DBCA - DBCA Threatened and Priority Fauna database search, NM - NatureMap, PMST - EPBC Protected Matters Search Tool, record numbers - inside Desktop Assessment Area (within Application Area). Literature numbers reflect number of sources that recorded each taxon.

Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Birds										
Scolopacidae	<i>Calidris ferruginea</i> Curlew Sandpiper	CR	CR, MI, MA				x		Low	No nearby records identified from the database searches or literature. No suitable habitat is present in the Application Area. Preferred habitat includes inter-tidal mudflats of estuaries, lagoons, mangrove channels, dams, floodwaters, flooded saltbush surrounds of inland lakes. ¹
Psittaculidae	<i>Pezoporus occidentalis</i> Night Parrot	CR	EN				x		Low	No nearby records identified from the database searches or literature. No suitable habitat is present in the Application Area. Preferred habitat includes long unburnt spinifex and samphire shrublands bordering salt lakes. ¹



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Rostratulidae	<i>Rostratula australis</i> Australian Painted Snipe	EN	EN, MA				x		Low	No nearby records identified from the database searches or literature. No suitable habitat is present in the Application Area. Preferred habitat includes well vegetated surrounds and shallows of wetlands. ¹
Accipitridae	<i>Erythrotriorchis radiatus</i> Red Goshawk	VU	EN				x		Low	No nearby records identified from the database searches or literature. No suitable habitat is present in the Application Area. Preferred habitat includes tropical and subtropical open-forests and woodlands dominated by eucalypts and paperbarks along streams and near wetlands. ²
Falconidae	<i>Falco hypoleucos</i> Grey Falcon	VU	VU		4	4	x		Medium	Four DBCA records within 35 km of the Application Area, including 12.1 km north of the Application Area in 2008 and 2.3 km northwest of the Application Area in 1997. ³ Suitable habitat is present in the Application Area. Preferred habitat includes open plains with treed watercourses in arid inland. ²



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Psittaculidae	<i>Polytelis alexandrae</i> Princess Parrot	P4	VU				x		Low	No nearby records identified from the database searches or literature. Suitable habitat is present in the Application Area. Preferred habitat includes spinifex with <i>Eucalyptus</i> , <i>Acacia</i> , desert oaks, and <i>Hakea</i> around salt lakes. ⁴
Acanthizidae	<i>Aphelocephala leucopsis</i> Southern Whiteface		VU			2	x		Low	Two NatureMap records within 40 km of the Application Area. ⁵ Suitable habitat is present in the Application Area. Preferred habitat includes wide range of open woodlands and shrublands where there is an understorey of grasses and/or shrubs, usually dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains. ⁶



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Scolopacidae	<i>Actitis hypoleucos</i> Common Sandpiper	MI	MI, MA				x		Low	No nearby records identified from the database searches or literature. No suitable habitat is present in the Application Area. Preferred habitat includes coastal and interior wetlands, narrow muddy edges of billabongs, river pools, mangroves, rocky beaches, estuaries, near-coastal salt lakes, lagoons, claypans, sewage ponds. ¹⁷
Apodidae	<i>Apus pacificus</i> Fork-tailed Swift	MI	MI, MA	8	6	6	x	2	High	Six unique records returned from the Rio Tinto Internal Database within 20km of the Application Area, including 0.1 km north of the Application Area in 2013 and 0.3 km south of the Application Area in 2013. ⁸ No additional records were identified from the DBCA database. ³ Suitable habitat is present in the Application Area. Preferred habitat includes low to very high airspace over varied habitat. ¹



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Scolopacidae	<i>Calidris acuminata</i> Sharp-tailed Sandpiper	MI	MI, MA				x		Low	No nearby records identified from the database searches or literature. No suitable habitat is present in the Application Area. Preferred habitat includes fresh and salt wetlands, muddy edges of lagoons, swamps, lakes, dams, soaks, sewage farms, temporary floodwaters. ¹
Scolopacidae	<i>Calidris melanotos</i> Pectoral Sandpiper	MI	MI, MA				x		Low	No nearby records identified from the database searches or literature. No suitable habitat is present in the Application Area. Preferred habitat includes coastal fresh to saline wetlands, inland permanent and temporary wetlands, mudflats, swamps with dense vegetation. ¹
Charadriidae	<i>Charadrius veredus</i> Oriental Plover	MI	MI, MA	1	1		x	1	Low	One unique record returned from the Rio Tinto Internal Database 11.7 km northeast of the Application Area in 2019. ⁸ No additional unique records were identified from the DBCA database. ³ Suitable habitat is present in the Application Area. Preferred habitat includes grasslands, thinly vegetated plains. ²



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Hirundinidae	<i>Hirundo rustica</i> Barn Swallow	MI	MI, MA				x		Low	No nearby records identified from the database searches or literature. No suitable habitat is present in the Application Area. Preferred habitat includes coastal, wetlands. ² Forages over open country, often congregates in areas with high densities of flying insects.
Motacillidae	<i>Motacilla cinerea</i> Grey Wagtail	MI	MI, MA				x		Low	No nearby records identified from the database searches or literature. No suitable habitat is present in the Application Area. Preferred habitat includes fresh sandy or rocky streams, mown grass, ploughed land, sewage ponds. ¹
Motacillidae	<i>Motacilla tschutschensis</i> Eastern Yellow Wagtail	MI	MI, MA				x		Low	No nearby records identified from the database searches or literature. No suitable habitat is present in the Application Area. Preferred habitat includes damp short grass flats, swamp edges, sewage ponds, mowed grass. ⁷



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Falconidae	<i>Falco peregrinus</i> Peregrine Falcon	OS			4	6			Medium	Four DBCA records within 35 km of the Application Area, including 14.5 km northwest of the Application Area in 2013. ³ Suitable habitat is present in the Application Area. Preferred habitat includes most environments with suitable nest sites: cliff faces preferred, including man-made ones, commonly uses stick nests built by other species. ² May use the Survey Area for hunting.
Maluridae	<i>Amytornis whitei whitei</i> Pilbara Grasswren	P4 (as <i>A. striatus striatus</i>)		13		45		1	Medium	Seven unique records returned from the Rio Tinto Internal Database within 20km of the Application Area, including 9.4 km northeast of the Application Area in 2018 and 15.7 km northeast of the Application Area in 2022. ⁸ Suitable habitat is present in the Application Area. Preferred habitat includes tall dense spinifex hummocks on rocky slopes and ridges. ² Distributed across the ironstone Chichester, Hamersley, Ophthalmia, Parry and Barlee Ranges. ⁹



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Accipitridae	<i>Elanus scriptus</i> Letter-winged Kite	P4		2	1	1		1	Low	One unique record returned from the Rio Tinto Internal Database, 3.7 km north of the Application Area in 2018. ⁸ No additional unique records were identified from the DBCA database. ³ Suitable habitat is present in the Application Area. Preferred habitat includes open country and grasslands of arid and semi-arid interior. ²
Mammals										
Dasyuridae	<i>Dasyurus hallucatus</i> Northern Quoll	EN	EN	38	8	17	x	5	High	Twenty-one unique records returned from the Rio Tinto Internal Database including 0.5 km south of the Application Area in 2021. ⁸ Three additional unique records identified from the DBCA database within 35 km of the Application Area, including 20.2 km northeast in 2019. ³ Suitable habitat is present in the Application Area. Preferred habitat includes rocky escarpments, eucalypt forest and woodland. ¹⁰



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Megadermatidae	<i>Macroderma gigas</i> Ghost Bat	VU	VU	79 (2)	197 (1)	184	x	7	Previously Recorded	Two unique records returned from the Rio Tinto Internal Database within the Application Area in 2018 and 2013. Forty-eight unique records returned from the Rio Tinto Internal Database, including 20 m north of the Application Area in 2013 and 0.2 km north of the Application Area in 2019. ⁸ One DBCA record from within the Application Area in 2017. One hundred and ninety-six DBCA records within 35 km of the Application Area, including six records 20 m north of the Application Area and 1 km south of the Application Area in 2022. ³ Suitable habitat is present in the Application Area. Preferred habitat includes deep caves and mines, and occasionally rock fissures and boulder piles occurring within a widespread but patchy distribution across northern Australia from the arid Pilbara to the lush rainforests of north Queensland. ¹⁴



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Thylacomyidae	<i>Macrotis lagotis</i> Bilby, Dalgyte	VU	VU		3	4	x		Low	Three historical DBCA records within 35 km of the Application Area, including 6.8 km north of the Application Area in 1984. ³ Suitable habitat is present in the Application Area. Preferred habitat includes Mitchell grass and stony downs country of cracking clays, desert sandplains and dune fields sometimes containing laterite, hummock grassland and massive red earths with <i>Acacia</i> shrubland. ¹⁰



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Rhinonycteridae	<i>Rhinonycteris aurantia</i> Pilbara form Pilbara Leaf-nosed Bat	VU	VU	19	15	10	x	3	High	Fifteen unique records returned from the Rio Tinto Internal Database including 0.3 km south of the Application Area in 2013 and 1 km east of the Application Area in 2019. ⁸ Thirteen additional unique records identified from the DBCA database within 35 km of the Application Area, including 2.2 km east of the Application Area in 2022 and 0.3 km south of the Application Area in 2013. ³ Suitable habitat is present in the Application Area. Often observed foraging in gorges and gullies, often over pools; also, spinifex hummock grasslands. ¹¹
Dasyuridae	<i>Dasyurus blythi</i> Brush-tailed Mulgara, Ampurta	P4			1	12			Low	One DBCA record within 35 km of the Application Area, 19.6 km south of the Application Area in 2022. ³ Suitable habitat is present in the Application Area. Preferred habitat includes hummock grasslands (eg <i>Triodia</i> spp.) and shrublands on sandy soils. ¹²



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Muridae	<i>Leggadina lakedownensis</i> Short-tailed Mouse	P4			4	4			Low	Three unique DBCA records within 35 km of the Application Area, including 2.4 km and 3.1 km northwest of the Application Area in 1997. ³ Suitable habitat is present in the Application Area. Preferred habitat includes monsoon tropical coast to semiarid areas in spinifex and tussock grasslands, samphire, sedgeland, <i>Acacia</i> shrublands, tropical eucalypt and <i>Melaleuca</i> woodlands and stony ranges. ¹¹



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Muridae	<i>Pseudomys chapmani</i> Western Pebble-mound Mouse	P4		524 (80)	333 (21)	170		7	Previously Recorded	Eighty records returned from the Rio Tinto Internal Database within the Application Area from 2013 to 2022. Four hundred and forty-four records returned from the Rio Tinto Internal Database, including 0.1 km east of the Application Area in 2022 and 0.1 km south of the Application Area in 2021. ⁸ Three-hundred and thirty-three DBCA records within 35 km of the Application Area, including 21 records within the Application Area. ³ Suitable habitat is present in the Application Area. Preferred habitat includes gentler slopes of rocky ranges covered by stony mulch and hard spinifex, often with a sparse overstorey of eucalypts and scattered shrubs. ¹¹



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Reptiles										
Pythonidae	<i>Liasis olivaceus barroni</i> Pilbara Olive Python	VU	VU	4 (1)	4	5	x		Previously Recorded	One record returned from the Rio Tinto Internal Database within the Application Area in 2018. Two unique records returned from the Rio Tinto Internal Database, including 1.5 km east of the Application Area in 2018 and 17.3 km east in 2020. ⁸ Four additional unique DBCA records within 35 km of the Application Area, including 20.4 km north of the Application Area in 2022 and 13.3 km northwest of the Application Area in 2013. ³ Suitable habitat is present within the Application Area. Preferred habitat includes arid to subhumid areas of the Pilbara and the northern Gascoyne. Associated with open water, watercourses, and rock pools especially those close to rocky areas. Often found in rocky hills, escarpments, and plains dominated by dense grassy vegetation such as <i>Triodia</i> . ¹³



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Scincidae	<i>Liopholis kintorei</i> Great Desert Skink	VU	VU				x		Low	No nearby records identified from the database searches or literature. Suitable habitat is present in the Application Area. Preferred habitat includes arid sandflats and clay-based/loamy soils with spinifex. ¹³
Typhlopidae	<i>Aniliios ganei</i> Gane's Blind Snake	P1		5 (1)	3	4			Previously Recorded	One record returned from the Rio Tinto Internal Database within the Application Area in 2018. Two unique records returned from the Rio Tinto Internal Database including 13.5 km northeast of the Application Area in 2019 and 2021. ⁸ Three additional unique DBCA records within 35 km of the Application Area, including 14.9 km south of the Application Area in 2022 and 5.6 km northeast in 1999. ³ Limited Suitable habitat is present within the Application Area. Possibly associated with moist gorges and gullies. ¹³



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Scincidae	<i>Lerista macropisthopus remota</i> Unpatterned Robust Slider	P2		1	4	3		1	Medium	One record returned from the Rio Tinto Internal Database, 10.2 km northeast of the Application Area in 2019. ⁸ Three additional unique DBCA records within 35 km of the Application Area, 14.3 to 16.2 km east of the Application Area in 2019. ³ Suitable habitat is present within the Application Area. Preferred habitat includes Acacia shrubland and woodlands in the central interior of WA, where it shelters in loose soil under leaf litter at the base of shrubs. ¹³



Family	Taxa	Conservation Status		Source					Likelihood of Occurrence	Justification
		State	Federal	RTIO	DBCA	NM	PMST	Literature		
Carphodactylidae	<i>Underwoodisaurus seorsus</i> Pilbara Barking Gecko	P2		1 (1)	14 (1)	8		1	Previously Recorded	One record returned from the Rio Tinto Internal Database within the Application Area in 2018. ⁸ Ten additional unique DBCA records within 35 km of the Application Area, including 1.4 km south of the Application Area in 2011 and 14.5 km northeast of the Application Area in 2010. ³ Suitable habitat is present in the Application Area. Preferred habitat includes rocky areas with spinifex and low tree cover in the Hammersley Range from Tom Price southeast to near Newman. ¹³

1 - (Morcombe, 2017), 2 - (Menkhorst et al., 2017), 3 - (DBCA, 2023c), 4 - (Pizzey & Knight, 2001), 5 - (DBCA, 2023b), 6 - (DCCEEW, 2023), 7 - (Johnstone & Storr, 1998), 8 - (Rio Tinto Iron Ore, 2023b), 9 - (Black et al., 2020), 10 - (Van Dyck & Strahan, 2008), 11 - (Van Dyck et al., 2013), 12 - (Menkhorst & Knight, 2004), 13 - (Wilson & Swan, 2021), 14 - (Baker & Gynther, 2023).



4.2.4 Fauna habitat

From the desktop assessment six broad fauna habitats (excluding cleared areas) were identified from 168 habitat assessment locations and mapped within the Application Area (**Figure 13**). Given the size of the Application Area, and the moderately even distribution throughout, the previous survey effort is considered to provide an accurate representation of the habitats within the Application Area. Habitat condition varied throughout the Application Area, with large areas being relatively undisturbed fauna habitat and other areas having disturbances and clearing for mining activities, exploration drilling access and drill pads.

A description, extent within the Application Area, and proportion of Application Area is provided for each fauna habitat in **Table 22** below.

Table 22: Fauna habitats within the Application Area

Fauna Habitat	Fauna Habitat Description	Significant Microhabitat	Extent (ha) Within Application Area	Proportion of Application Area
Mulga Woodland	Mulga woodland habitat comprises areas where vegetation is a dense mix of Acacia, with a mixture of mulga (<i>Acacia aneura</i>), <i>A. maitlandii</i> and <i>A. pruinocarpa</i> over a mixture of sparse small shrubs and grasses, such as <i>Triodia</i> and <i>Senna</i> sp. This habitat may be suitable for Short-tailed Mouse, Bilby, Pilbara Barking Gecko, and woodland birds such as the Rufous Grasswren.	No	236.94	3.52%
Rocky Hill	Rocky Hill habitat comprises hills and undulating stony plains of higher elevation, often supporting hard spinifex with a mantle of gravel and larger rocks. Scattered areas of minor outcropping and breakaway, particularly atop hillcrests. This habitat may be suitable for Brush-tailed Mulgara, Short-tailed Mouse, Western Pebble-mound Mouse, and Pilbara Olive-Python.	No	3,033.78	45.12%
Gorge/Gully	Gorges and gullies are rugged, steep-sided valleys incised into the surrounding landscape. Gorges tend to be deeply incised, with vertical cliff faces, while gullies are more open (but not as open as Drainage Area or Valleys). Caves and rock pools are present. This habitat may be suitable for Northern Quoll, Ghost Bat, Pilbara Leaf-nosed Bat, Pilbara Olive Python, and Gane's Blind Snake.	Yes	93.92	1.40%
Low Hills and Slopes	Low hills and slopes habitat comprises low-lying open plains and the rolling hills below upland areas. Vegetation consists of isolated trees (<i>Corymbia hamersleyana</i> , <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> , and <i>C. deserticola</i>) and moderate to densely vegetated	No	2,085.07	31.01%



	plains of spinifex grassland. This habitat may be suitable for Brush-tailed Mulgara, Short-tailed Mouse, Western Pebble-mound Mouse, Pilbara Olive-Python, Pilbara barking Gecko, and many grassland bird species such as the Pilbara Grasswren.			
Major Drainage	Major drainage habitat comprises densely vegetated plains occurring on low-lying deeply alluvial plains, with a moderate-high amount of leaf litter and woody debris. Vegetation often consists of <i>Eucalyptus victrix</i> woodland over <i>Acacia citrinoviridis</i> shrublands and various sedges and grasses fringing the channel. This habitat becomes seasonally inundated with water after heavy rain events, which flows through the channels from higher altitude areas into nearby rivers, streams, and pools. This habitat may be suitable hunting areas for Northern Quoll, Ghost Bat, Pilbara Leaf-nosed Bat, and Pilbara Olive Python. Many birds of prey will also utilise the airspace above this habitat for hunting.	Yes	67.40	1.00%
Clay Plain	Clay plain habitat is characterised by open and sparse low vegetation with approximately half of its area being bare ground. Isolated shrubs of <i>Salsola australis</i> , <i>Boerhavia paludosa</i> and <i>Ptilotus nobilis</i> subsp. <i>nobilis</i> occur over open tussock grass. This habitat is of little value to most significant fauna, but the tussocks may be utilised when animals are moving through the area to different landscapes. This area may also be seasonally inundated with water which will be utilised by all fauna species.	No	0.58	0.01%
Disturbed		No	1,177.58	17.94%
Total			6,695.264	100%

4.2.5 Fauna habitat of significance

Two broad fauna habitats within the Application Area contained microhabitats that were identified as important habitats for significant fauna species (**Figure 13**).

The desktop assessment identified the 'Gorge/Gully' habitats contain cave systems which are deep and humid enough to support Pilbara Leaf-nosed Bat and Ghost Bat roosts, as well as suitable cave habitat for Northern Quoll dens and Pilbara Olive Python hunting areas. The Gorge/Gully habitats

⁴ The spatial data used for this desktop assessment was obtained from several different sources and was provided to SLR in its current form. Due to variation in digitisation and processing of spatial data, including coordinate reference systems and projections, there are small discrepancies in total area between vegetation types, vegetation condition, and fauna habitat datasets. These discrepancies amount to less than 0.05% of the total area of the datasets.



also have areas which would be suitable for Gane’s Blind Snake, and the airspace will also be utilised by birds of prey (e.g. Peregrine Falcon) while hunting. These birds of prey will typically nest on cliff faces and rock ledges which may also be found in the Gorge/Gully habitats. The desktop assessment also found that the ‘Drainage Line’ habitats contain suitable creek systems and wetland areas to support Pilbara Olive Pythons, and are suitable hunting areas for Northern Quolls, Ghost Bats, and Pilbara Leaf-nosed Bats.

Both the Gorge/Gully and Drainage Line habitats constitute a small portion of the Application Area (161.88 ha, 2.41%), but are widely and evenly distributed throughout the Application Area and the broader Hamersley sub-region. As Ghost Bats and Pilbara Olive Pythons have previously been recorded within the Application Area, and Pilbara Leaf-nosed Bats were recorded in close proximity, it is likely that these species will utilise these habitats for roosting and hunting.

The rocky hill, and low hills and slopes habitats were also suitable for a variety of grassland species such as the Brush-tailed Mulgara, Short-tailed Mouse, Western Pebble-mound Mouse, Pilbara Barking Gecko, and Pilbara Grasswren. The Western Pebble-mound Mouse and Pilbara Barking Gecko have previously been recorded within the Application Area and are likely to rely on the habitats within the Application Area.

5.0 Conclusion

5.1 Flora

5.1.1 Floristic Diversity

Within the Application Area, total of 517 native vascular flora species were recorded, from 177 genera and 52 families, including 22 conservation significant species. An additional 13 introduced flora species were recorded.

5.1.2 Threatened Flora

One Federally listed species, *Seringia exastia*, was recorded from the Application Area, however this is expected to be delisted in the future, due to its taxonomic incorporation in the common and widespread species, *Seringia elliptica*.

An additional Threatened species, *Thryptomene wittweri*, is recognised as having ‘medium’ potential to occur within the Application Area, due to the existing records identified during the desktop assessment, and the presence of limited but suitable habitat.

5.1.3 Priority Flora

Twenty-one Priority listed flora species were recorded from the Application Area (**Table 23**). An additional two Priority species are considered to have a high likelihood of occurrence, and twenty-two Priority species have medium likelihood of occurrence within the Application Area (see **Section 4.1.4**).

Table 23: Significant flora recorded from the Application Area

Taxon	Status
<i>Aristida lazaridis</i>	P2
<i>Eremophila pusilliflora</i>	P2
<i>Hibiscus</i> sp. Gurinbidy Range (M.E. Trudgen MET 15708)	P2
<i>Acacia effusa</i>	P3
<i>Acacia subtiliformis</i>	P3
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	P3
<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3



<i>Eremophila naaykensis</i>	P3
<i>Indigofera gilesii</i>	P3
<i>Isotropis parviflora</i>	P3
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	P3
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	P3
<i>Sida</i> sp. Hamersley Range (K. Newbey 10692)	P3
<i>Solanum kentrocaule</i>	P3
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3
<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)	P3
<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)	P3
<i>Acacia bromilowiana</i>	P4
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	P4
<i>Lepidium catapycnon</i>	P4
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	P4

5.1.4 Introduced Flora

A total of 13 introduced flora species out of 32 total identified through the database and literature review, were recorded from the Application Area, comprising:

- **Bidens bipinnata*
- **Cenchrus ciliaris*
- **Chloris virgata*
- **Erigeron bonariensis*
- **Flaveria trinervia*
- **Lactuca serriola*
- **Malvastrum americanum*
- **Oxalis corniculata*
- **Rumex vesicarius*
- **Setaria verticillate*
- **Sigesbeckia orientalis*
- **Sonchus oleraceus*
- **Vachellia farnesiana*

None of these represent WoNS or Declared Pests, however six of these rank High for Ecological Impact and Rapid for Invasiveness under the DBCA Weed Prioritisation Process.

5.2 Vegetation

5.2.1 Vegetation Types

Thirty-nine natural vegetation types across four broad landforms were identified within the Application Area, with H10 being the most common, comprising 978.43 ha (14.62%).

5.2.2 Vegetation Condition

The condition of the vegetation in the Application Area ranged from Excellent to Completely Degraded, with Excellent condition being the most common ranking, comprising 1122.67 ha (45.78%).



5.2.3 Vegetation of Significance

No State or Commonwealth listed TECs were identified within the Application Area by either database searches or previous mapping.

The buffer zones of one State listed PEC, West Angelas Cracking-Clays (Priority 1), was identified as intersecting the Application Area (Department of Biodiversity Conservation and Attractions, 2023). The consolidated mapping exercise undertaken by Biologic (2021b) identified the P15 vegetation type as being analogous to this PEC. A total of 7.19 ha of P15 was mapped for the Application Area. No other vegetation mapped for the Application Area was considered to be analogous with any TECs or PECs.

One vegetation type of other significance, (D2) has a restricted distribution due to its association with a major drainage line. It represents a potential GDE.

5.3 Vertebrate fauna

5.3.1 Significant Fauna

Five significant fauna species were previously recorded within the Application Area during the fauna surveys:

- Ghost Bat (*Macrodermis gigas*) – VU (BC Act) VU (EPBC Act)
- Pilbara Olive Python (*Liasis olivaceus barroni*) – VU (BC Act) VU (EPBC Act)
- Gane's Blind Snake (*Anilius ganei*) – Priority 2 (DBCA)
- Pilbara Barking Gecko – Priority 2 (DBCA)
- Western Pebble-mound Mouse (*Pseudomys chapmani*) – Priority 4 (DBCA).

Three significant fauna species have a high likelihood of occurrence:

- Northern Quoll (*Dasyurus hallucatus*) – EN (BC Act) EN (EPBC Act)
- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) – VU (BC Act) VU (EPBC Act)
- Fork-tailed Swift (*Apus pacificus*) – MI (BC Act) MI, MA (EPBC Act).

5.3.2 Fauna Habitat

Six broad fauna habitats were mapped within the Application Area:

- Mulga Woodland
- Rocky Hill
- Gorge/Gully
- Low Hills and Slopes
- Major Drainage
- Clay Plain.

Gorge/gully and Major Drainage habitats represent the most value to significant fauna.



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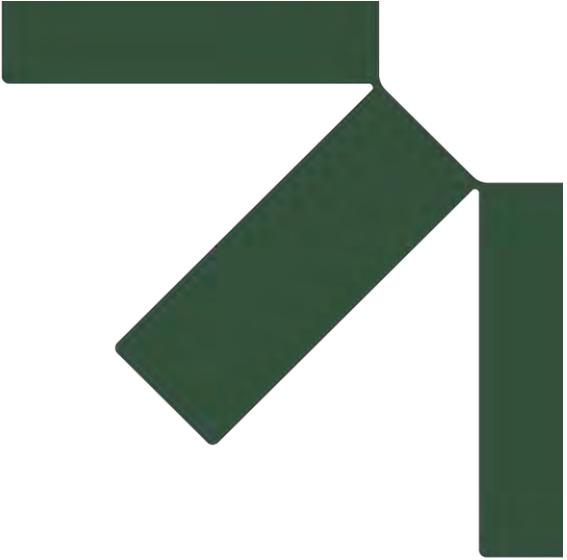


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Appendix A Figures

West Angelas NVCP 1

Flora, Vegetation, and Fauna Desktop Assessment

Rio Tinto Iron Ore

SLR Project No.: 675.072156.00001

15 April 2024

Figure 1 –Application Area

Figure 2 – Soil and Land Systems

Figure 3 – Hydrography

Figure 4 – Broad Vegetation Types

Figure 5 – Conservation Areas, Environmentally Sensitive Areas, and Land Use

Figure 6 – Previous Survey Areas

Figure 7a-c – Field Survey Effort of Consolidated Reports

Figure 8 – DBCA Flora database Search Results

Figure 9a-c – Vegetation Types Within the Application Area

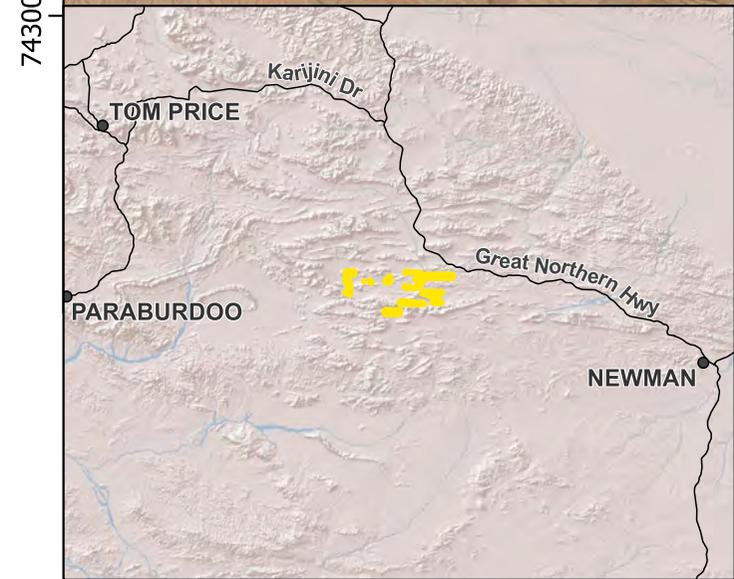
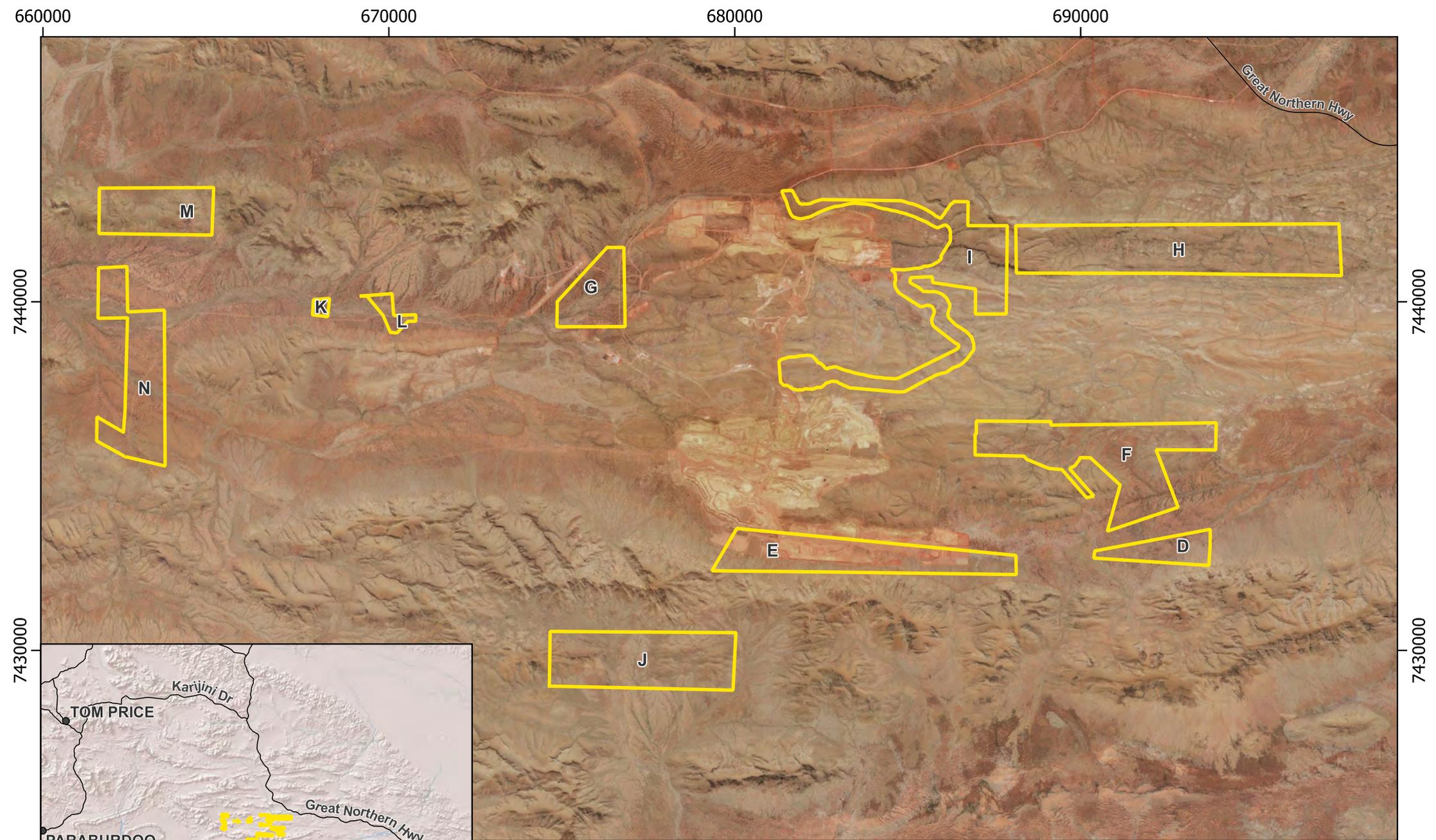
Figure 10a-c – Vegetation Condition Mapping

Figure 11 – DBCA Threatened and Priority Communities Database Search Results

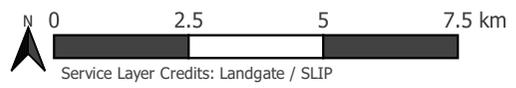
Figure 12 – DBCA Fauna Database Search Results

Figure 13a-c - Fauna Habitats and Fauna Habitats of Significance Within the Application Area





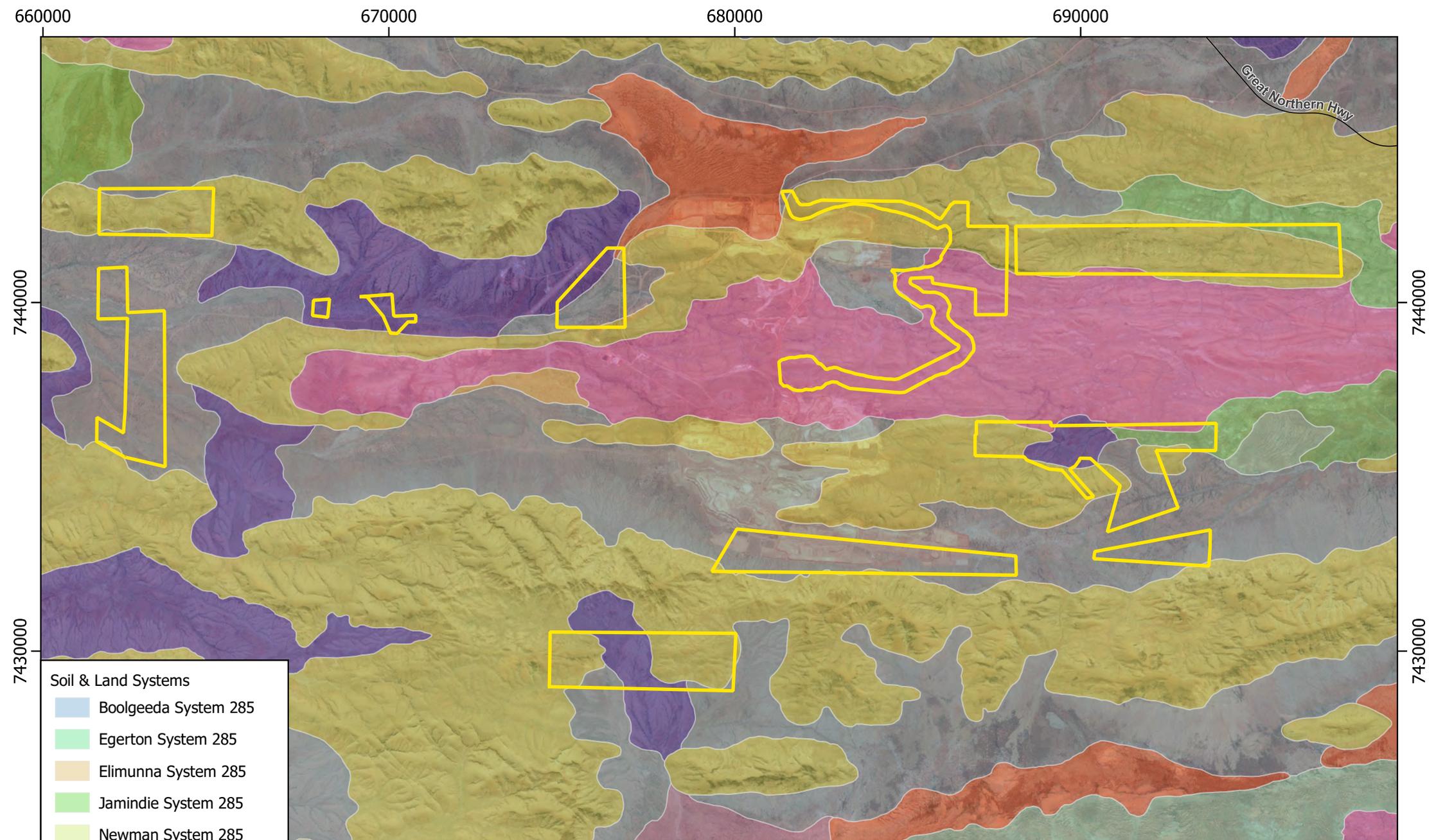
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Coordinate System: GDA94 / MGA zone 50
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 Date Drawn: 18-Jan-2024
 Drawn By: PW
 Reviewed By: SG

Rio Tinto Iron Ore
 West Angelas NVCP 1

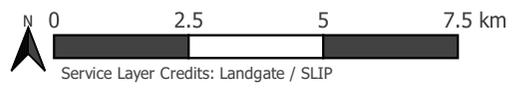
Application Area
 FIGURE 1



- Soil & Land Systems**
- Boolgeeda System 285
 - Egerton System 285
 - Elimunna System 285
 - Jamindie System 285
 - Newman System 285
 - Pindering System 285
 - Platform System 285
 - Rocklea System 285
 - Spearhole System 285
 - Wannamunna System 285



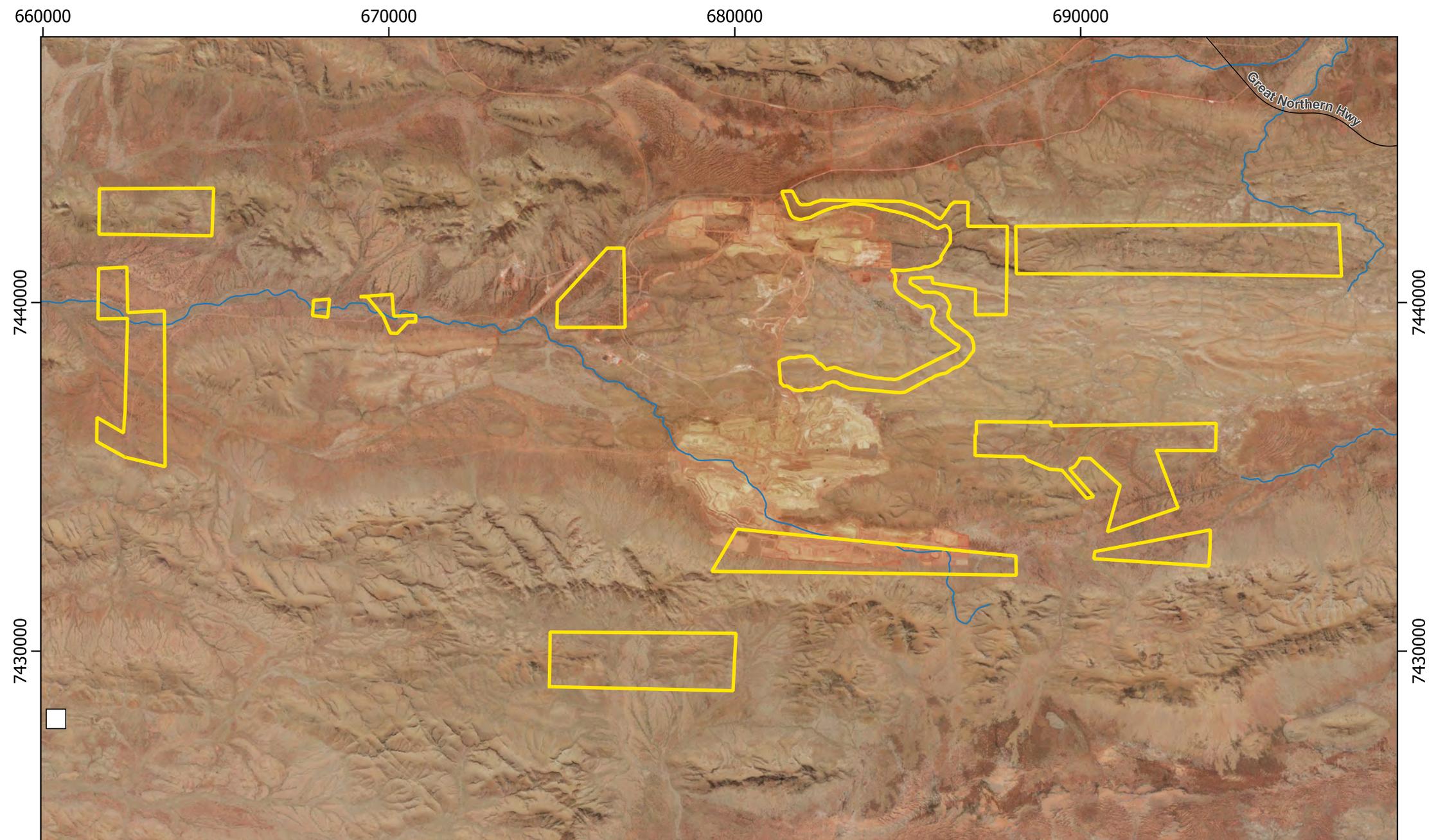
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 West Angelas NVCP 1

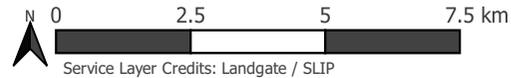
Soil & Land Systems
 FIGURE 2



— Hydrography



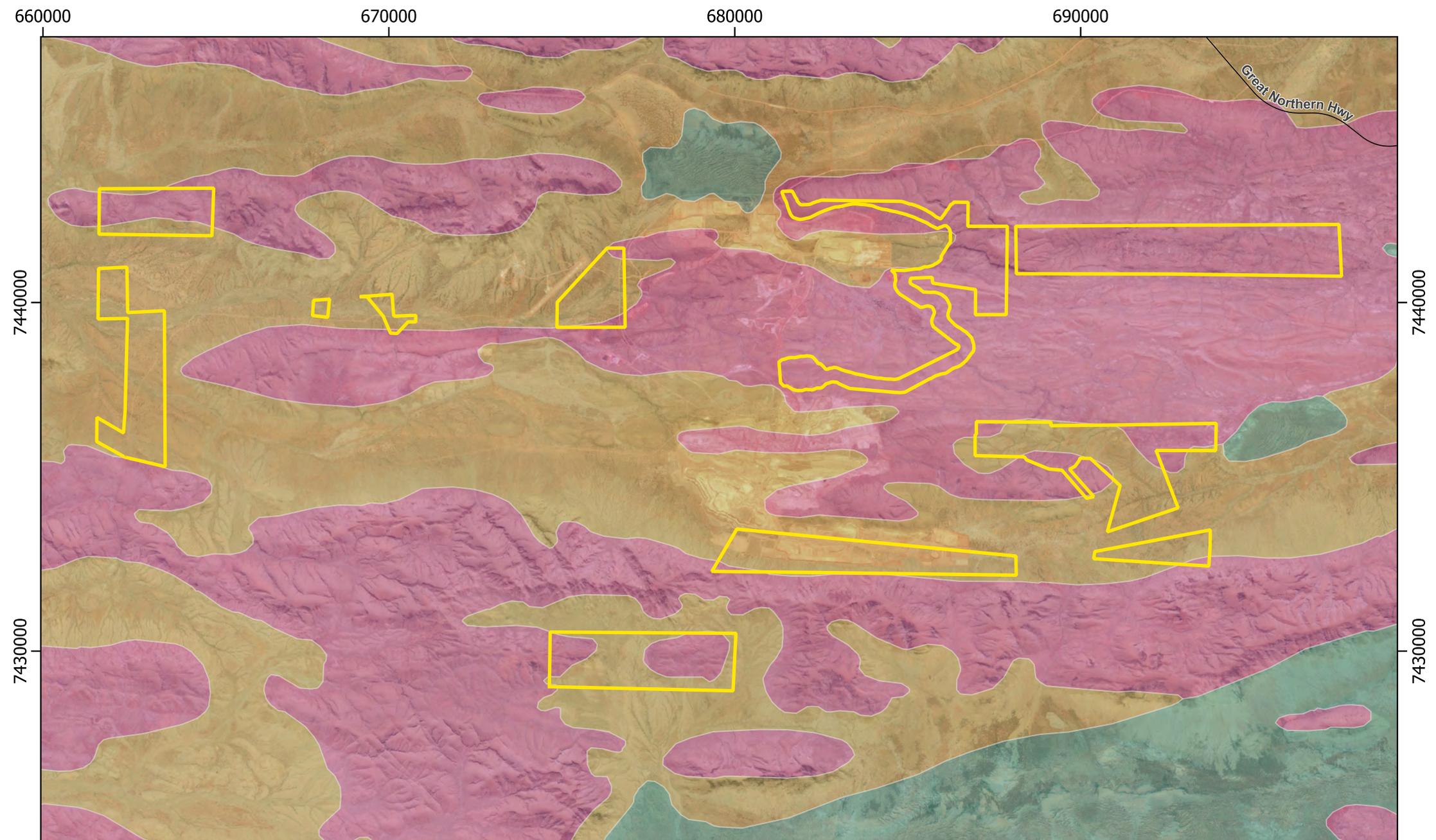
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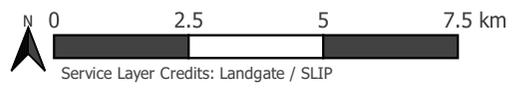
Hydrography
 FIGURE 3



- Broad Vegetation Types**
- Hammersley 18: Low woodland, open low woodland or sparse woodland
 - Hammersley 29: Low woodland, open low woodland or sparse woodland
 - Hammersley 82: Low tree-steppe



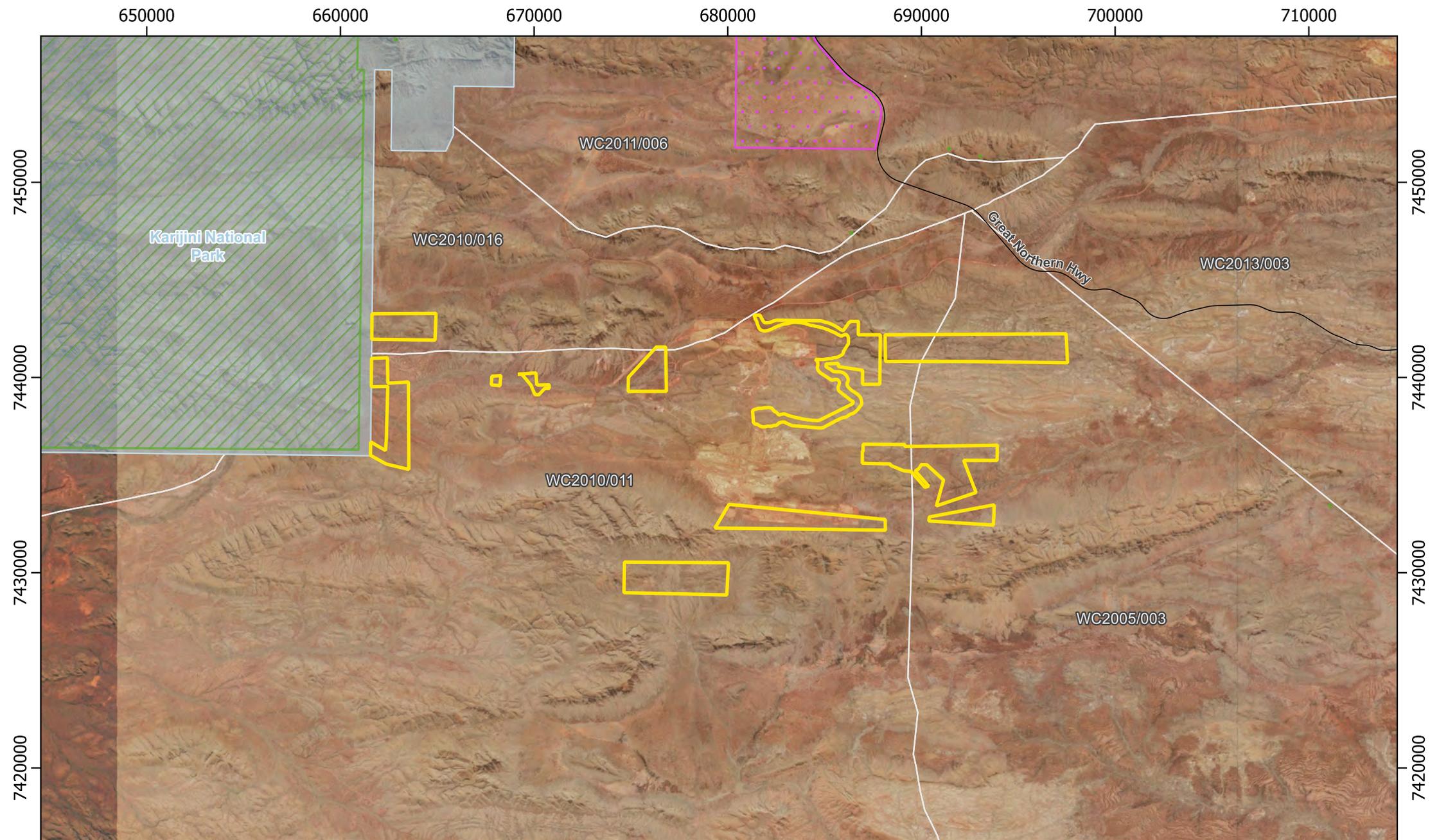
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Rio Tinto Iron Ore
 West Angelas NVCP 1

**Broad Vegetation Types
 FIGURE 4**



-  Environmentally Sensitive Areas
-  Legislated Lands and Waters
-  Lands of Interest
-  Native Title Determination



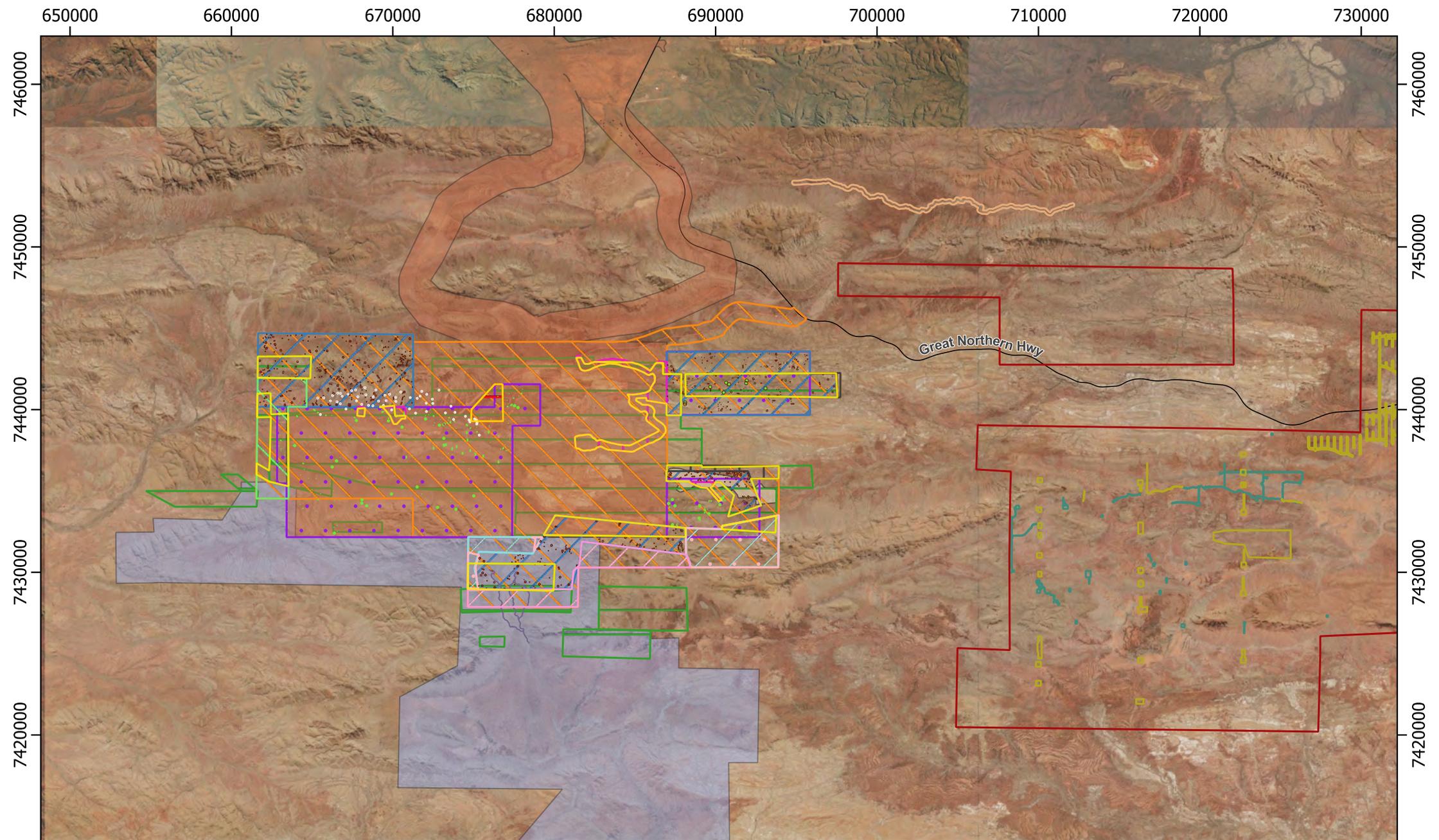
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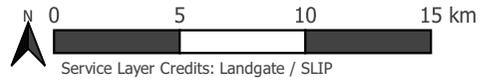
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 Scale: 1:250,000 at A4
 Project Number: 675.072156
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 Drawn By: PW
 Reviewed By: SG

Rio Tinto Iron ore
West Angelas NVCP 1

ESAs, Conservation Areas, and
Native Title Determination
FIGURE 5



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Rio Tinto Iron Ore
 West Angelas NVCP 1

Previous Survey Areas
 FIGURE 6

Figure 6: Previous Survey Areas

-  Application Area
-  RTIO-HSE-0015956 Flora and Vegetation Surveys of Orebody A and Orebody B in the West Angelas Hill Area (M. Trudgen and Associates, 1998)
-  West Angelas Gas Pipeline Native Vegetation Clearing Permit (B-2018-007) (Biota Environmental Services, 2019b)
-  RTIO-HSE-0215896 Greater West Angelas Terrestrial Fauna Assessment (Ecologia Environment, 2014)
-  RTIO-0981006 West Angelas Infrastructure Reconnaissance Flora and Vegetation Survey (Biologic Environmental Survey, 2023a)
-  RTIO-0980461 West Angelas Beyond 2020 Infrastructure Corridors Reconnaissance and Targeted Survey (Biologic Environmental Survey, 2022c)
-  RTIO-0982790 West Angelas Beyond 2020 Mt Ella East and Dep J Detailed and Targeted Survey (Biologic Environmental Survey, 2022d)
-  RTIO-0959130 West Angelas Beyond 2020 Deposit G Reconnaissance and Targeted Survey (Biologic Environmental Survey, 2022b)
-  RTIO-1011771 West Angelas Beyond 2020 Mt Ella East and Dep J Detailed and Targeted Survey (Biologic Environmental Survey, 2022a)
-  RTIO-HSE-0331473 West Angelas Beyond 2020 Level 2 Vertebrate Fauna, SRE Invertebrate and Fauna Assessment Phase 1 and 2 (Biologic Environmental Survey, 2019)
-  RTIO-HSE-0345168 West Angelas Beyond 2020 Targeted Vertebrate Fauna Survey (Biologic Environmental Survey, 2020)
-  RTIO-HSE-0359919 Metadata Statement – Beyond 2020 Deposit F and Deposit H Additional Areas (Rio Tinto Iron Ore, 2022)
-  RTIO-0980459 West Angelas Deposit F North and Deposit H Areas Fauna Survey (Biologic Environmental Survey, 2022e)
-  RTIO-HSE-0355391 West Angelas Development Envelope Consolidated Vegetation Mapping (Biologic Environmental Survey, 2021b)
-  RTIO-HSE-0355392 West Angelas Development Envelope Fauna Habitat Mapping (Biologic Environmental Survey, 2021c)
-  RTIO-0959551 West Angelas Vegetation Condition Assessment (Biologic Environmental Survey, 2022h)
-  RTIO-HSE-0348947 West Angelas Desktop Mapping December 2020 (Astron Environmental Services, 2020c)
-  RTIO-HSE-0357297 West Angelas Managed Aquifer Targeted Flora and Fauna Survey (Biologic Environmental Survey, 2023b)
-  RTIO-HSE-0254367 West Angelas NVCP Application Supporting Report (Rio Tinto Iron Ore, 2015)
-  Area C West to Yandi Flora and Vegetation Assessment (Astron Environmental Services, 2018)
-  Rhodes Ridge Detailed Flora and Vegetation Survey (Astron Environmental Services, 2020b)
-  Rhodes Ridge Targeted Flora Survey (Astron Environmental Services, 2019c)
-  Rhodes Ridge Targeted Flora Survey (Stantec, 2021)
-  RTIO-HSE-0185831 Greater West Angelas Vegetation and Flora Assessment (Ecologia Environment, 2013)
-  RTIO-HSE-0336262 West Angelas Beyond 2020 Detailed Flora and Vegetation Survey: Phases 1 and 2 (Biota Environmental Services, 2020)
-  RTIO-HSE-0959550 West Angelas Development Envelope Consolidated Vegetation Mapping - Dep J MTEE (Biologic Environmental Survey, 2022g)
-  RTIO-HSE-0358574 Deposit J Riparian Flora and Vegetation Survey (Biologic Environmental Survey, 2021a)
-  RTIO-HSE-0237243 West Angelas Deposit F Native Vegetation Clearing Permit Report (Biota Environmental Sciences, 2014)
-  RTIO-HSE-0142330 Angelo River Flora and Vegetation Assessment (ENV Australia, 2011)

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Consolidated Survey Effort

Fauna Sites

- Acoustic recording
- Active foraging
- Avifauna census
- Cage trap

- Echolocation recording
- Elliott trap
- Funnel trap
- Leaf/soil sieving
- Motion camera (active)

- Other
- Pitfall trap
- Pitfall trap (dry)
- Targeted searches
- Habitat assessment

Flora Sites

- ▲ Quadrat
- ▲ Releve
- Vegetation mapping note
- Flora Tracks
- Fauna Tracks



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Rio Tinto Iron Ore
 West Angelas NVCP 1

Consolidated Survey Effort
 FIGURE 7a

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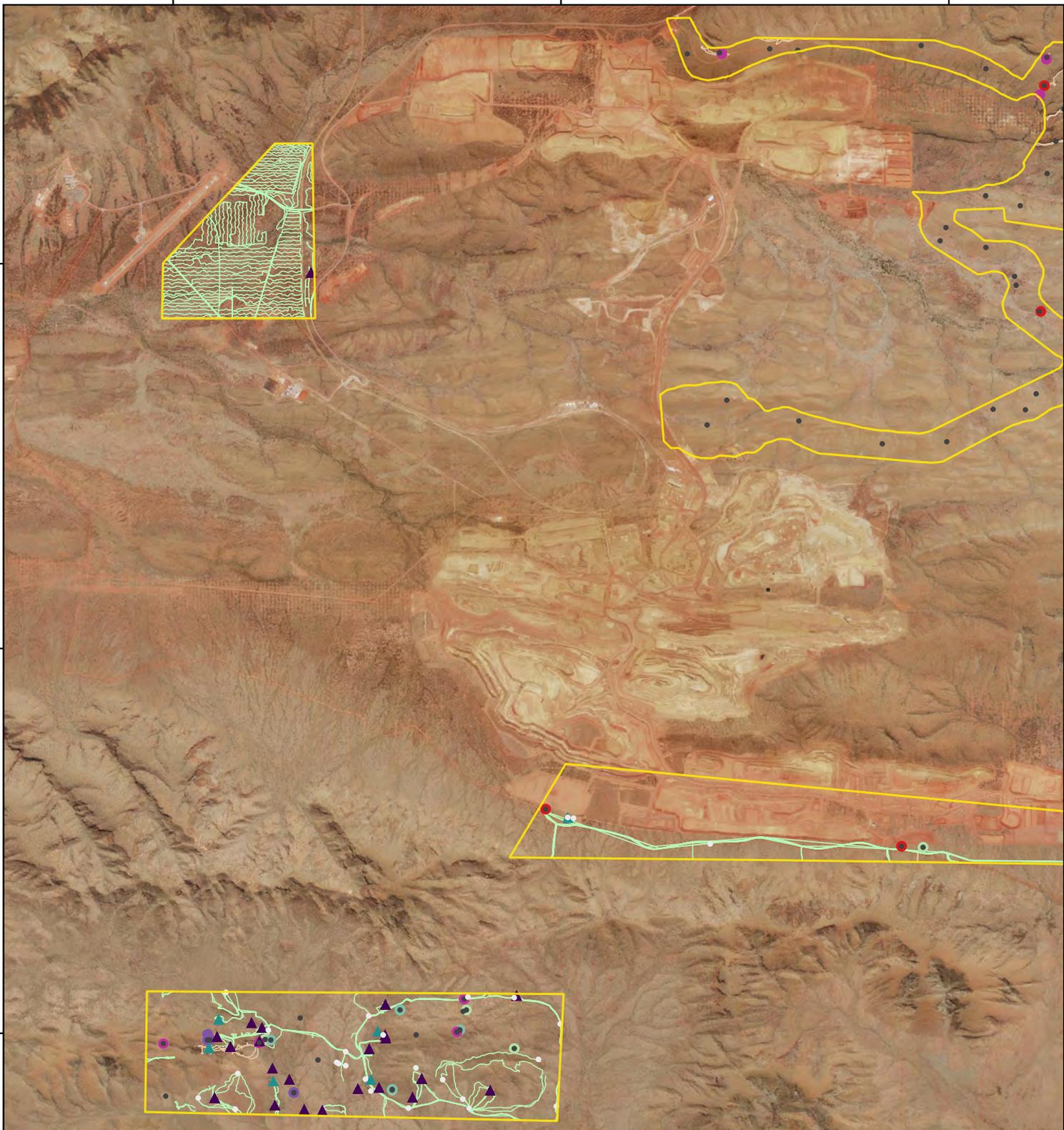
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Consolidated Survey Effort

Fauna Sites

- Acoustic recording
- Active foraging
- Avifauna census
- Cage trap

- Echolocation recording
- Elliott trap
- Funnel trap
- Leaf/soil sieving
- Motion camera (active)

- Other
- Pitfall trap
- Pitfall trap (dry)
- Targeted searches
- Habitat assessment

Flora Sites

- ▲ Quadrat
- ▲ Relieve
- Vegetation mapping note
- Flora Tracks
- Fauna Tracks



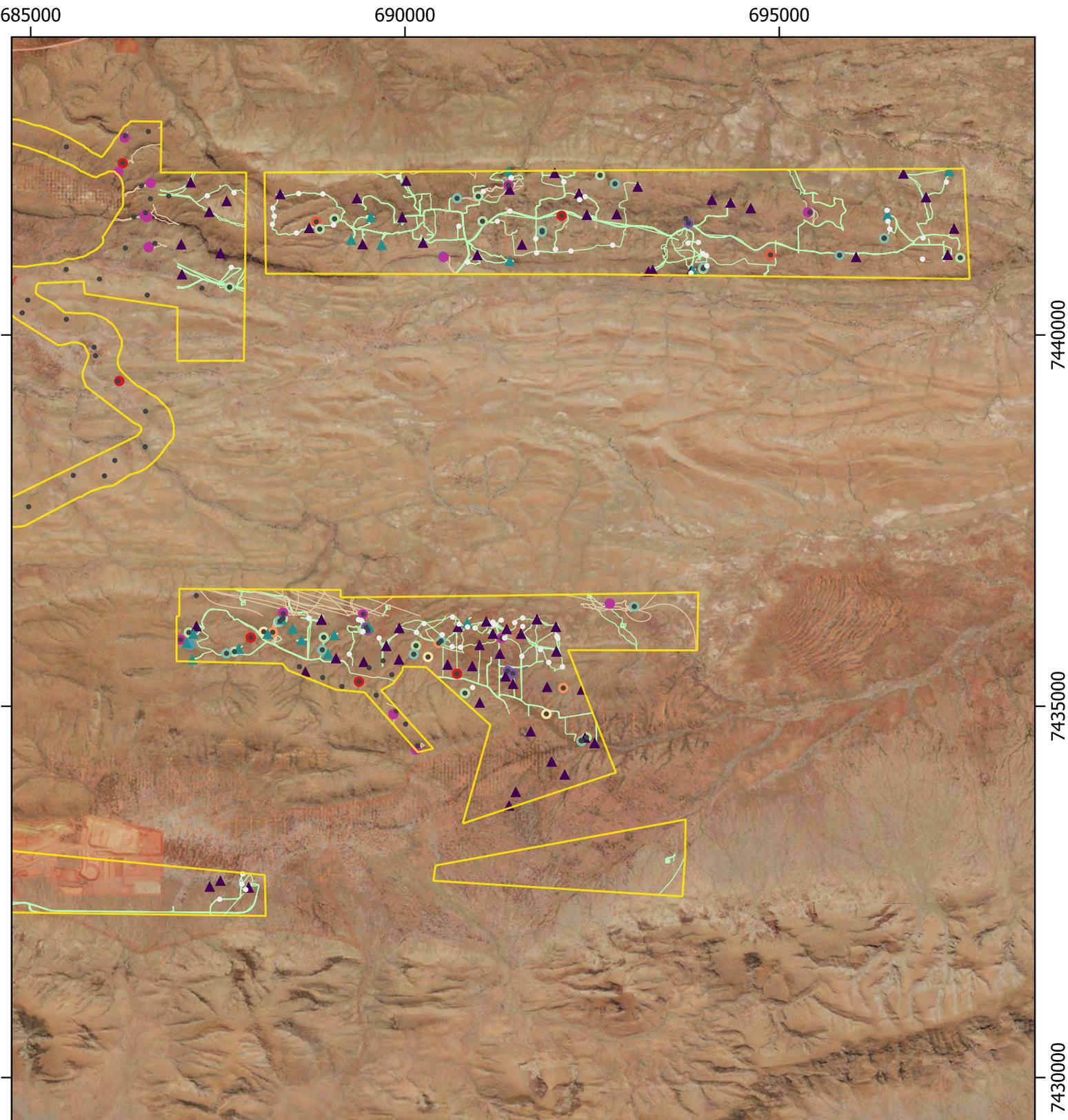
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Rio Tinto Iron Ore
 West Angelas NVCP 1

**Consolidated Survey Effort
 FIGURE 7b**



Consolidated Survey Effort			
Fauna Sites			
● Acoustic recording	● Echolocation recording	● Other	Flora Sites
● Active foraging	● Elliott trap	● Pitfall trap	▲ Quadrat
● Avifauna census	● Funnel trap	● Pitfall trap (dry)	▲ Releve
● Cage trap	● Leaf/soil sieving	● Targeted searches	● Vegetation mapping note
	● Motion camera (active)	● Habitat assessment	— Flora Tracks
			— Fauna Tracks



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 Reviewed By: SG

Rio Tinto Iron Ore
 West Angelas NVCP 1

**Consolidated Survey Effort
 FIGURE 7c**

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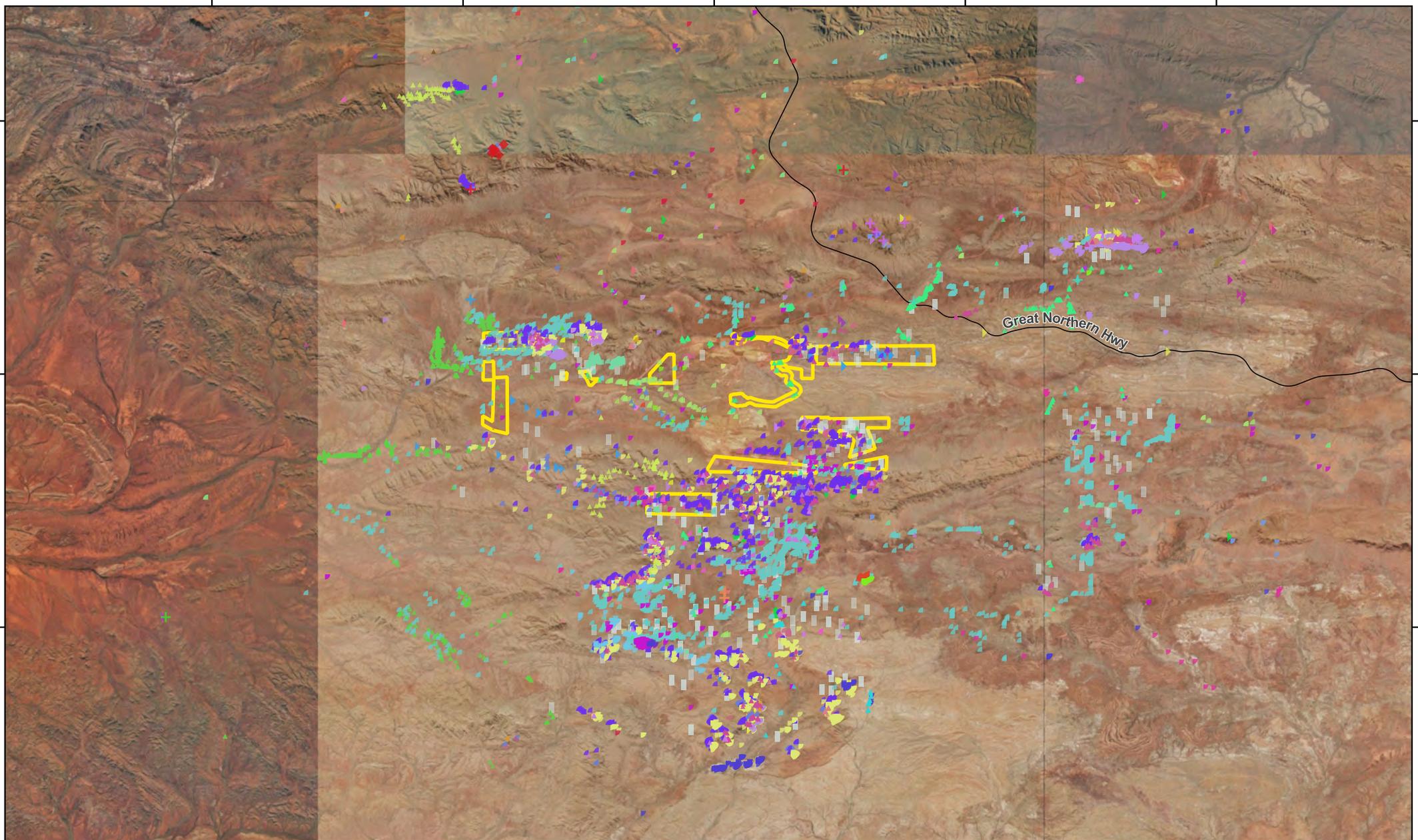
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Great Northern Hwy



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 Date Drawn: 23-Jan-2024
 Drawn By: PW
 Reviewed By: SG

Rio Tinto Iron Ore
 West Angelas NVCP 1

Threatened and Priority Flora
 Records (DBCA and RTIO)
 FIGURE 8

Threatened and Priority Flora Records (DBCA and RTIO)

- ◆ *Thryptomene wittweri*, T (BC Act); VU (EPBC Act)
- + *Hibiscus* sp. Mt Brockman (E. Thoma ET 1354), P1
- + *Isotropis forrestii*, P1
- + *Dicrastylis mitchellii*, P1
- + *Rhodanthe ascendens*, P1
- + *Sida* sp. Turee Creek (P.-L.de Kock PLDK1116), P1
- + *Triodia* sp. Karijini (S. van Leeuwen 4111), P1
- ▲ *Aristida lazaridis*, P2
- ▲ *Eragrostis* sp. Mt Robinson (S. van Leeuwen 4109), P2
- ▲ *Eremophila pusilliflora*, P2
- ▲ *Eremophila* sp. West Angelas (S. van Leeuwen 4068), P2
- ▲ *Euphorbia inappendiculata* var. *inappendiculata*, P2
- ▲ *Hibiscus* sp. Gurinbiddy Range (M.E. Trudgen MET 15708), P2
- ▲ *Ipomoea racemigera*, P2
- ▲ *Oxalis* sp. Pilbara (M.E. Trudgen 12725), P2
- ▲ *Pentalepis trichodesmoides* subsp. *hispida*, P2
- ▲ *Tetratheca fordiana*, P2
- ▲ *Euphorbia inappendiculata* var. *queenslandica*, P2
- ▲ *Neptunia longipila*, P2
- ▲ *Acacia daweana*, P3
- ▲ *Acacia effusa*, P3
- ▲ *Acacia subtiliformis*, P3
- ▲ *Aristida jerichoensis* var. *subspinulifera*, P3
- ▲ *Dampiera metallorum*, P3
- ▲ *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479), P3
- ▲ *Eremophila magnifica* subsp. *velutina*, P3
- ▲ *Eremophila naaykensis*, P3
- ▲ *Euphorbia clementii*, P3
- ▲ *Geijera salicifolia*, P3
- ▲ *Goodenia lyrata*, P3
- ▲ *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727), P3
- ▲ *Grevillea saxicola*, P3
- ▲ *Gymnanthera cunninghamii*, P3
- ▲ *Indigofera gilesii*, P3
- ▲ *Isotropis parviflora*, P3
- ▲ *Olearia mucronata*, P3
- ▲ *Pilbara trudgenii*, P3
- ▲ *Rhagodia* sp. Hamersley (M. Trudgen 17794), P3
- ▲ *Rostellularia adscendens* var. *latifolia*, P3
- ▲ *Sida* sp. Hamersley Range (K. Newbey 10692), P3
- ▲ *Solanum kentrocaule*, P3
- ▲ *Streptoglossa* sp. Cracking clays (S. van Leeuwen et al. PBS 7353), P3
- ▲ *Swainsona thompsoniana*, P3
- ▲ *Themeda* sp. Hamersley Station (M.E. Trudgen 11431), P3
- ▲ *Triodia* sp. Mt Ella (M.E. Trudgen 12739), P3
- ▲ *Vittadinia* sp. Coondewanna Flats (S. van Leeuwen 4684), P3
- ▲ *Euphorbia stevenii*, P3
- ▲ *Goodenia lyrata*, P3
- ▲ *Stackhousia clementii*, P3
- ▲ *Stylidium weeliwolli*, P3
- ▲ *Triodia basitricha*, P3
- ▲ *Acacia bromilowiana*, P4
- ▲ *Eremophila magnifica* subsp. *magnifica*, P4
- ▲ *Lepidium catapycnon*, P4
- ▲ *Ptilotus mollis*, P4
- ▲ *Sida* sp. Barlee Range (S. van Leeuwen 1642), P4
- ▲ *Seringia exastia*, DL (BC Act); VU (EPBC Act)

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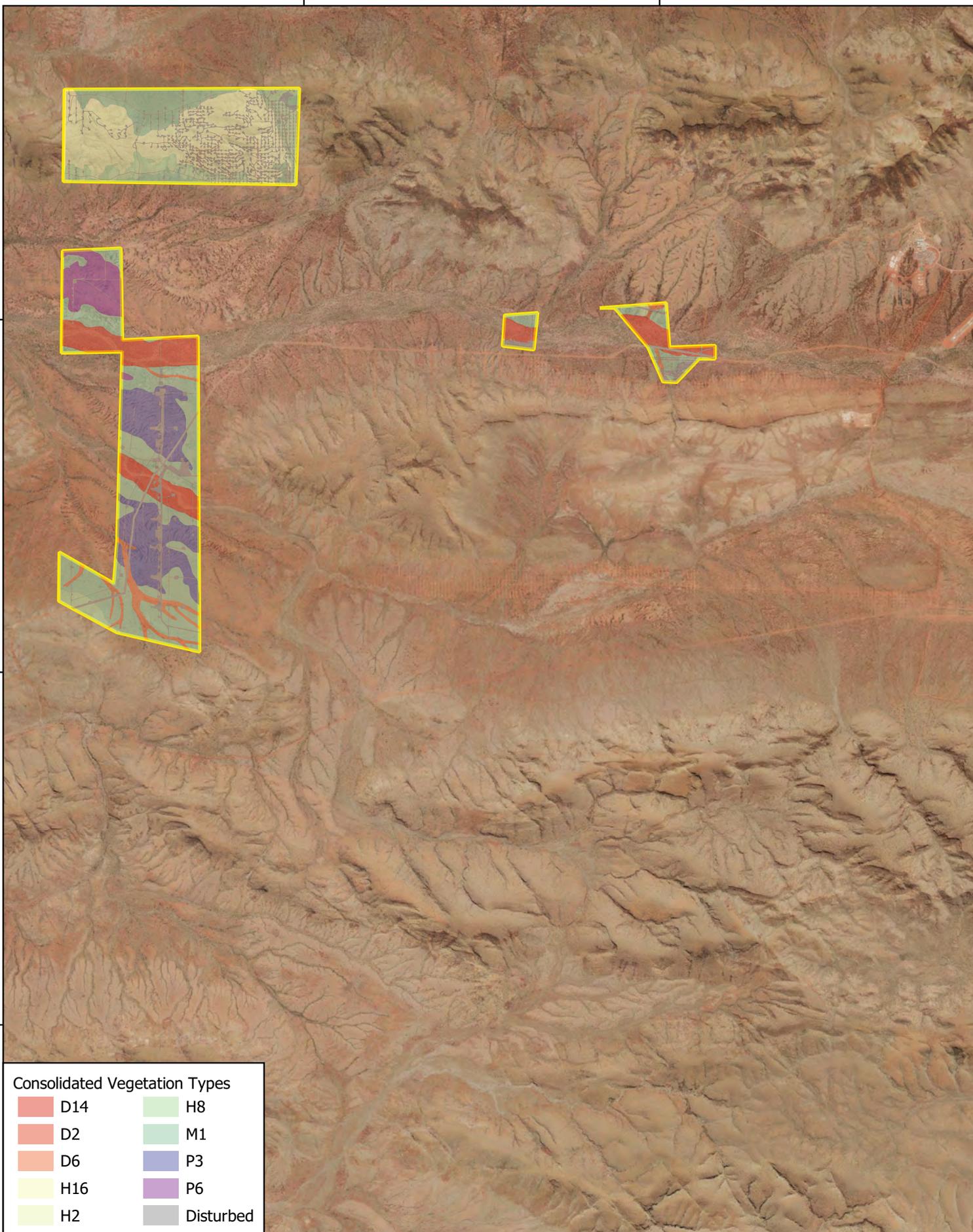
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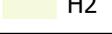
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Consolidated Vegetation Types

 D14	 H8
 D2	 M1
 D6	 P3
 H16	 P6
 H2	 Disturbed



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 Reviewed By: SG

Rio Tinto Iron Ore
 West Angelas NVCP 1

**Consolidated Vegetation Types
 FIGURE 9a**

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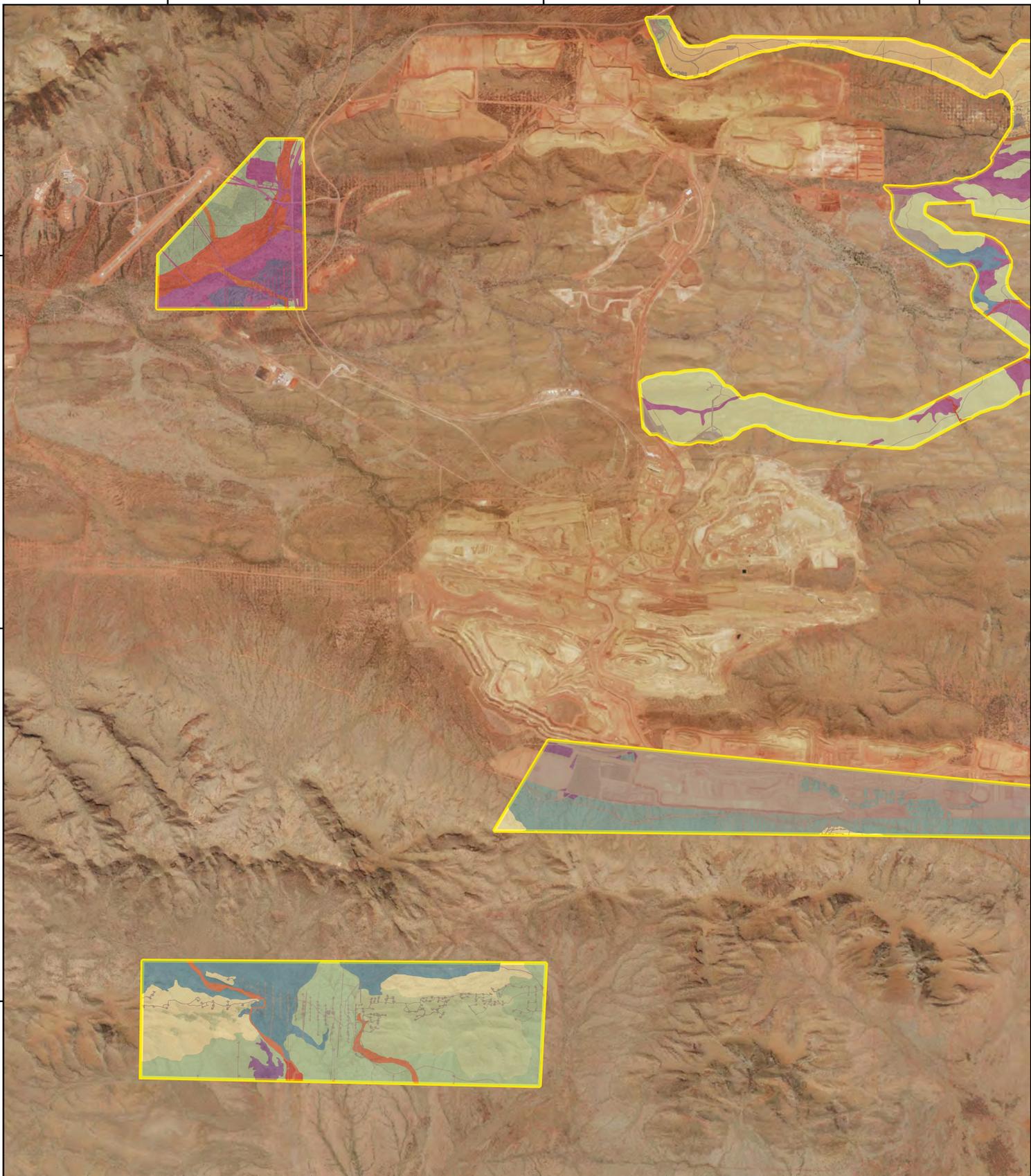
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Consolidated Vegetation Types

D11	D2	G2	H14	H4	H8	P12	P16	P7
D13	D3	H1	H15	H5	H9	P14	P3	Disturbed
D14	D6	H10	H3	H7	M1	P15	P5	



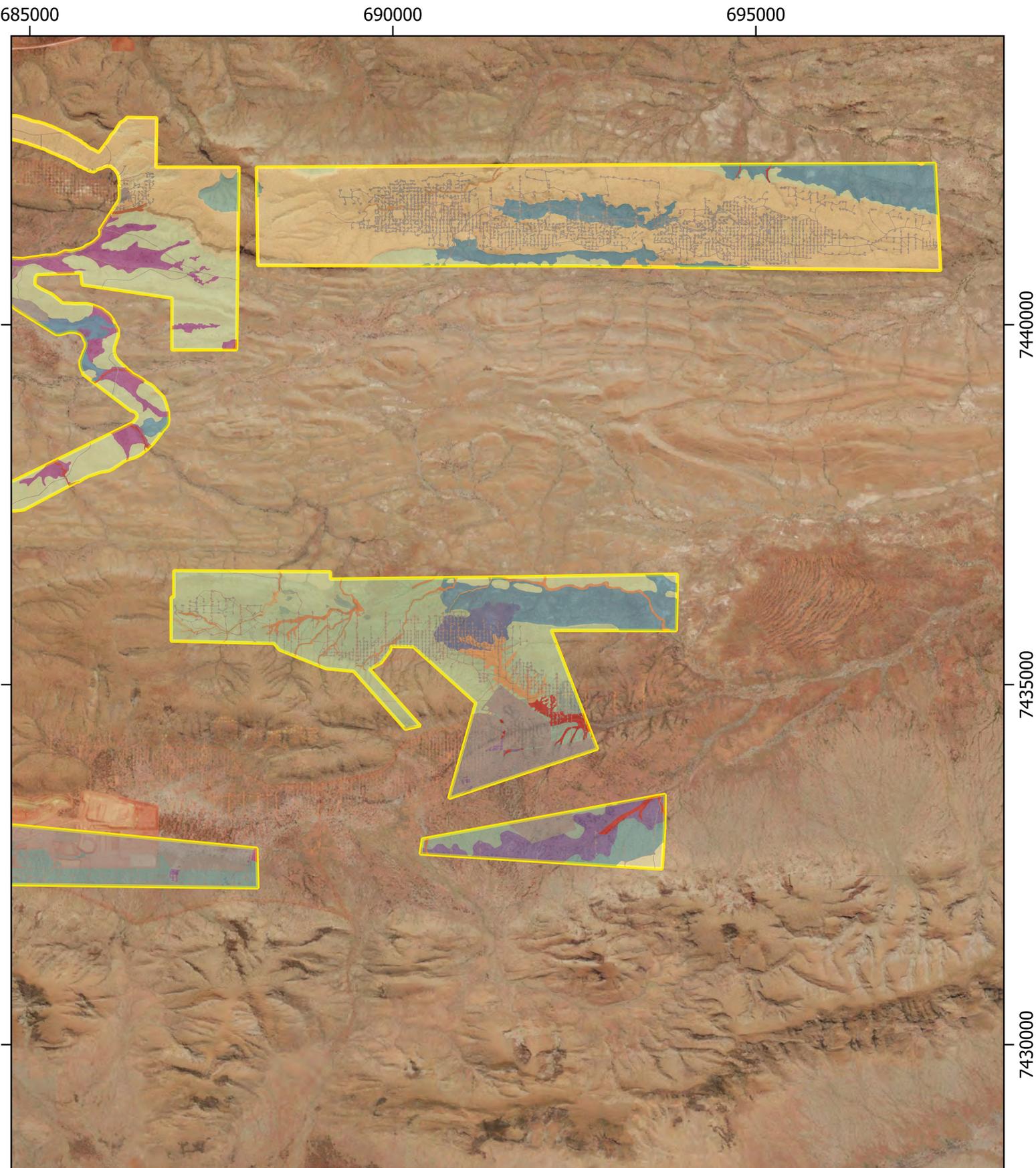
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Rio Tinto Iron Ore
 West Angelas NVCP 1

**Consolidated Vegetation Types
 FIGURE 9b**



Consolidated Vegetation Types

D11	D7	G2	H10	H15	H9	P12	P15	P4	P8
D3	D8	G3	H11	H4	P1	P13	P16	P5	Disturbed
D6	D9	H1	H14	H7	P10	P14	P2	P7	



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Rio Tinto Iron Ore
 West Angelas NVCP 1

**Consolidated Vegetation Types
 FIGURE 9c**

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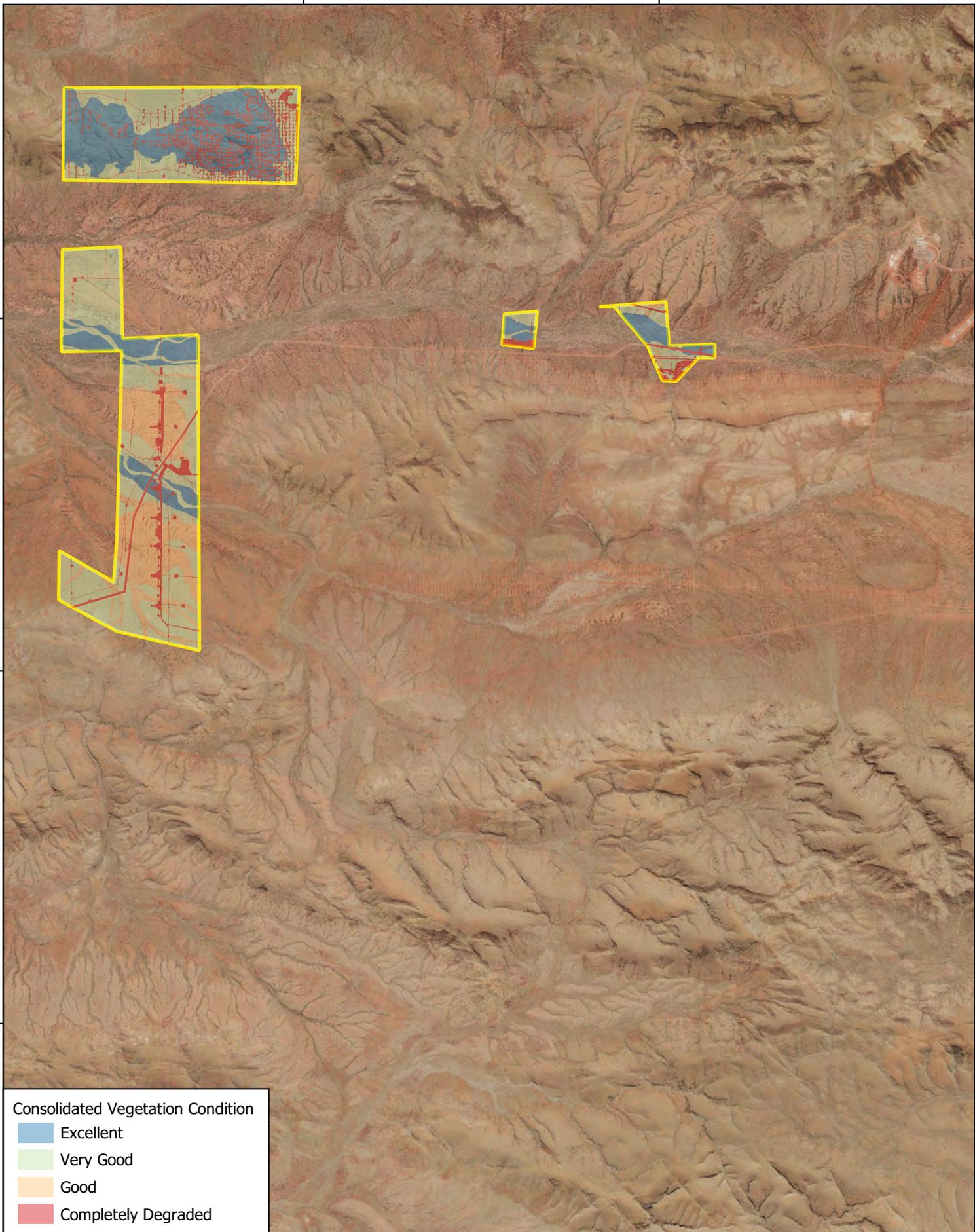
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Consolidated Vegetation Condition

- Excellent
- Very Good
- Good
- Completely Degraded



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Rio Tinto Iron Ore
 West Angelas NVCP 1

Consolidated Vegetation Condition
FIGURE 10a

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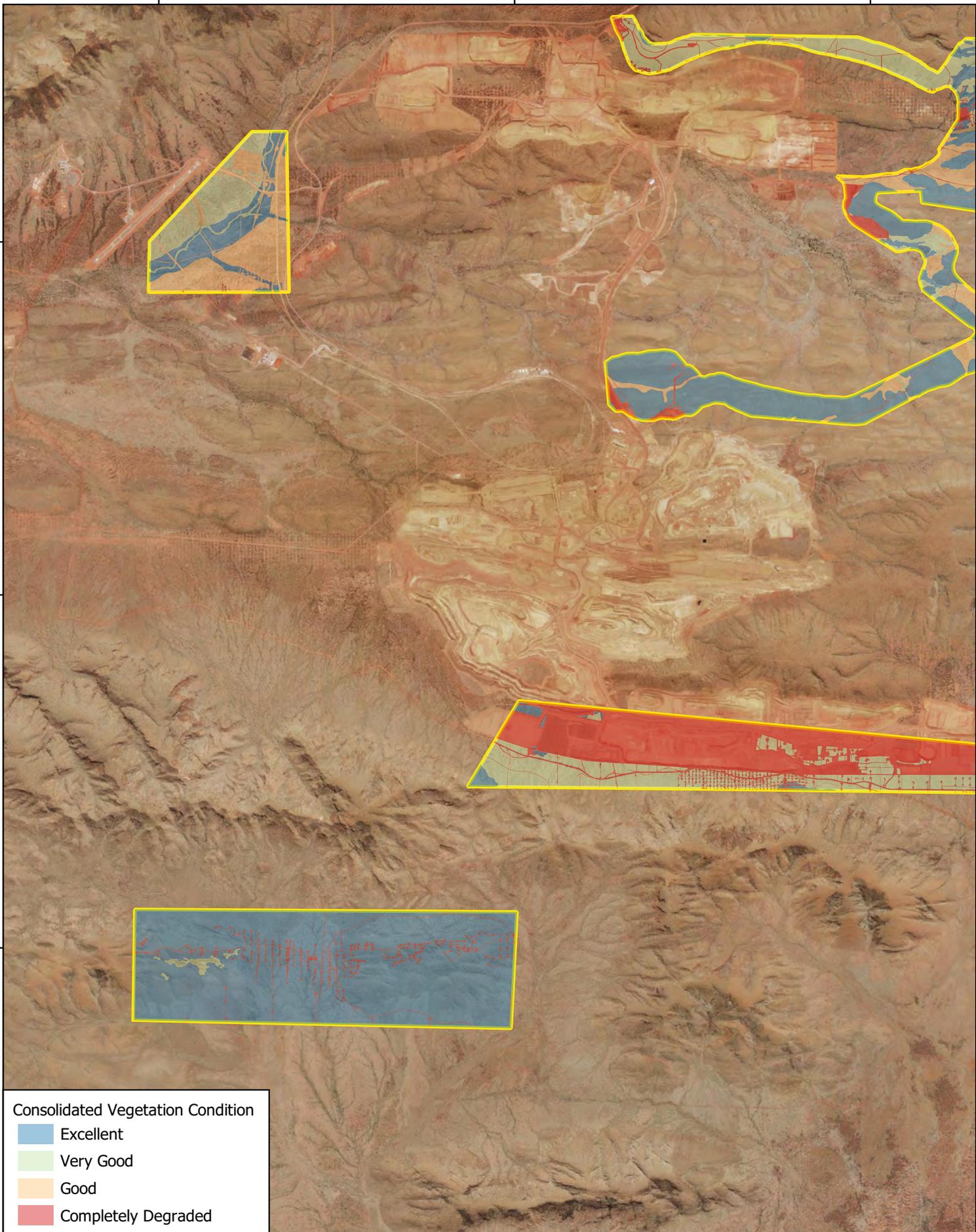
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Consolidated Vegetation Condition

- Excellent
- Very Good
- Good
- Completely Degraded



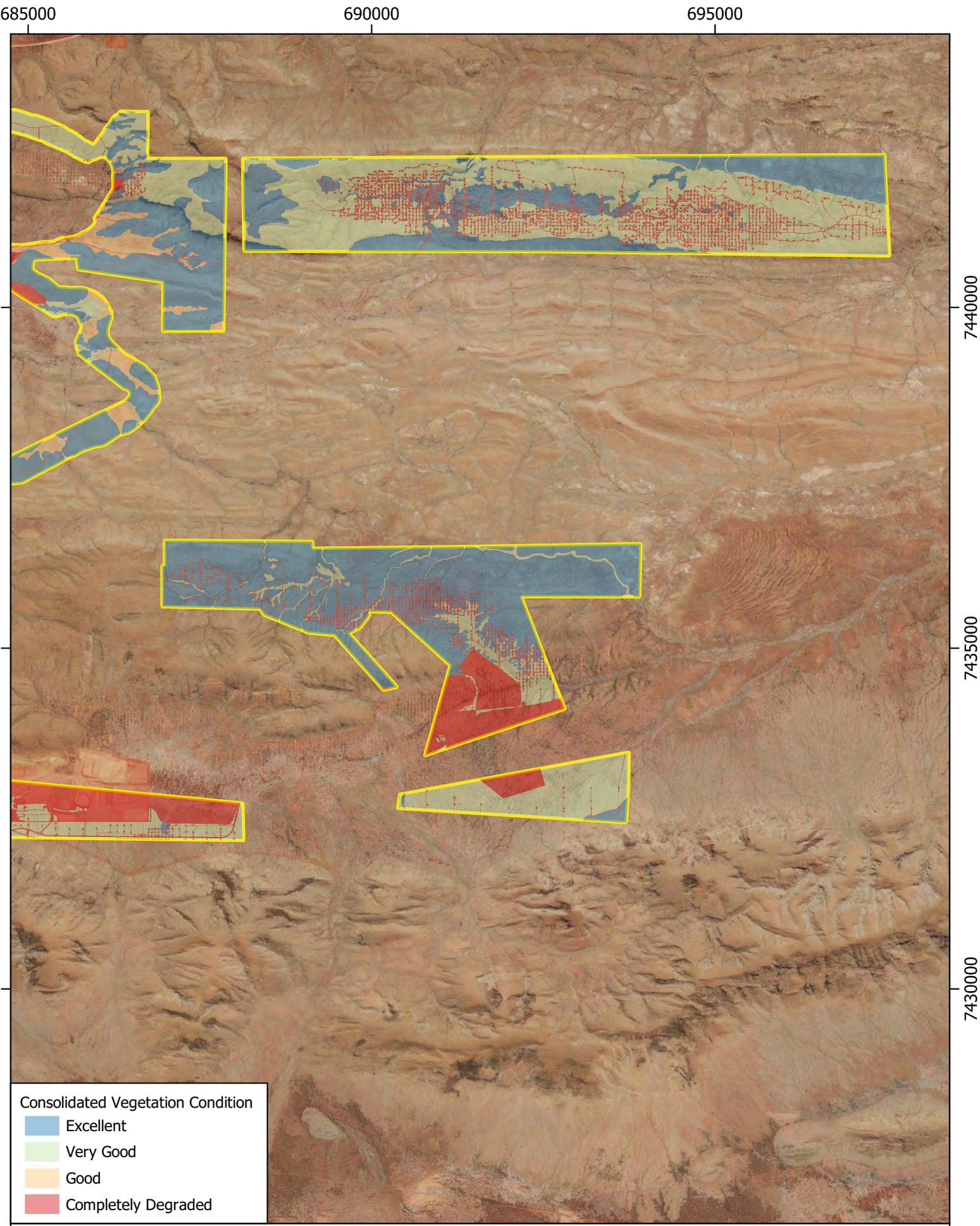
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Rio Tinto Iron Ore
 West Angelas NVCP 1

**Consolidated Vegetation Condition
 FIGURE 10b**

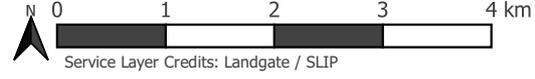


Consolidated Vegetation Condition

- Excellent
- Very Good
- Good
- Completely Degraded



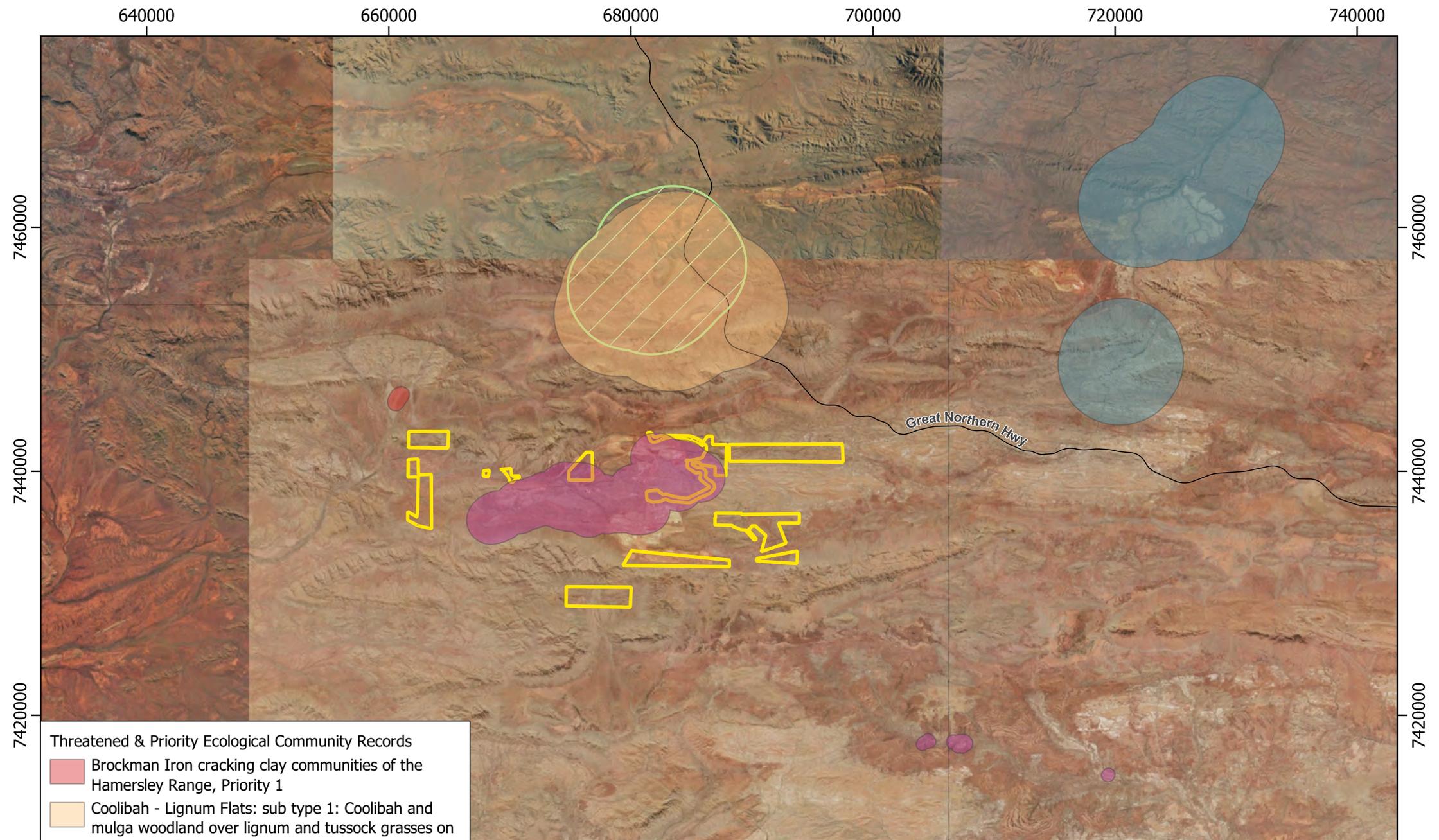
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Rio Tinto Iron Ore
 West Angelas NVCP 1

Consolidated Vegetation Condition
FIGURE 10c



- Threatened & Priority Ecological Community Records**
-  Brockman Iron cracking clay communities of the Hamersley Range, Priority 1
 -  Coolibah - Lignum Flats: sub type 1: Coolibah and mulga woodland over lignum and tussock grasses on clay plains (Coondewanna and Wanamunna flats and Mt Bruce Flats), Priority 3
 -  Coolibah - Lignum Flats: sub type 2: Coolibah woodlands over lignum (*Duma florulenta*) over swamp wanderrie (Lake Robinson), Priority 1
 -  Weeli Wolli Spring Community, Priority 1
 -  West Angelas Cracking-Clays, Priority 1



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Rio Tinto Iron Ore
 West Angelas NVCP 1
 Threatened and Priority Ecological
 Community Records
 FIGURE 11

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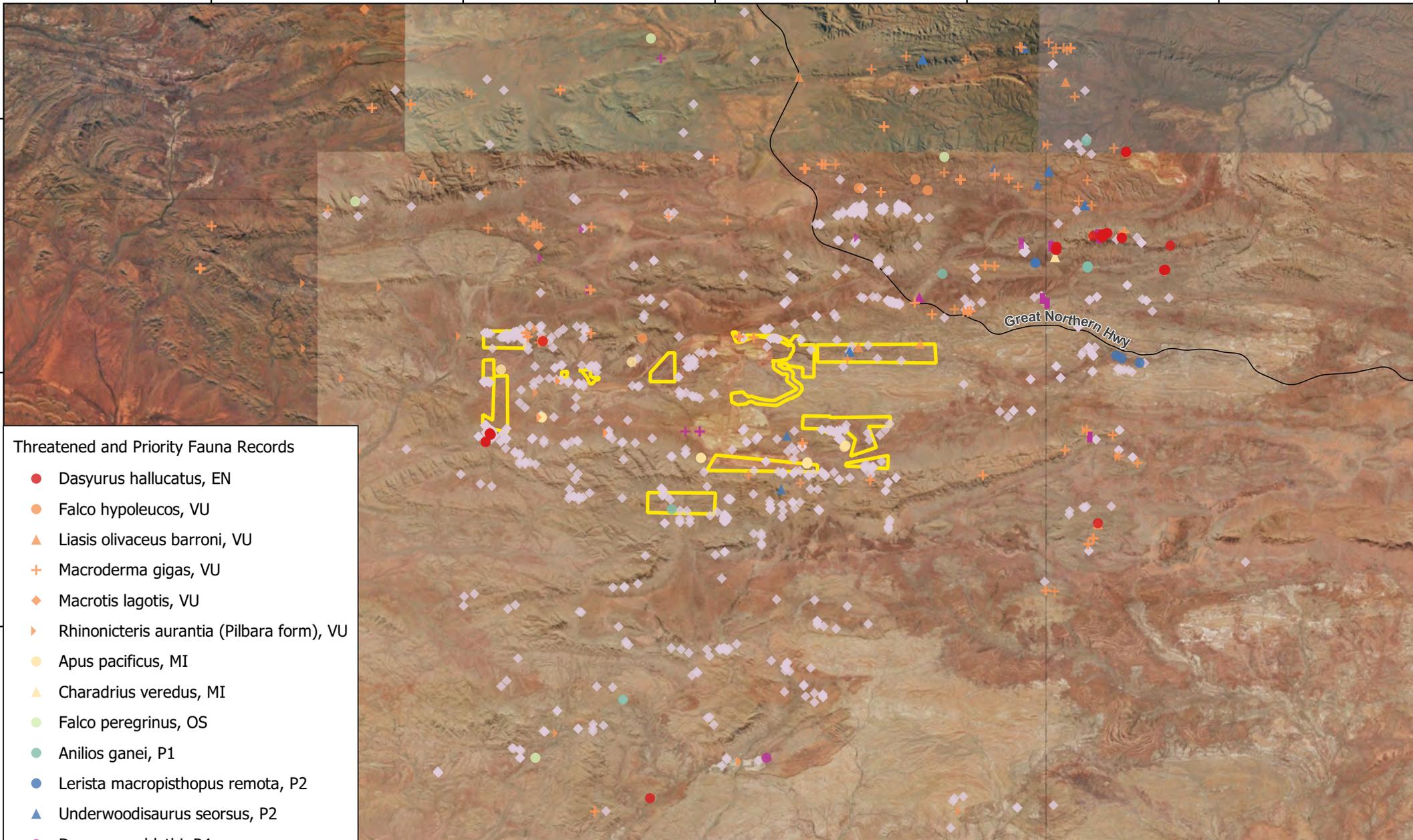
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Threatened and Priority Fauna Records

- *Dasyurus hallucatus*, EN
- *Falco hypoleucos*, VU
- ▲ *Liasis olivaceus barroni*, VU
- ⊕ *Macroderma gigas*, VU
- ◆ *Macrotis lagotis*, VU
- ▶ *Rhinonictes aurantia (Pilbara form)*, VU
- *Apus pacificus*, MI
- ▲ *Charadrius veredus*, MI
- *Falco peregrinus*, OS
- *Anilius ganeii*, P1
- *Lerista macropisthopus remota*, P2
- ▲ *Underwoodisaurus seorsus*, P2
- *Dasyercus blythii*, P4
- ▲ *Elanus scriptus*, P4
- ⊕ *Leggadina lakedownensis*, P4
- ▶ *Rhinonictes aurantia*, P4
- *Amytornis whitei whitei*, P4
- ◆ *Pseudomys chapmani*, P4



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Rio Tinto Iron Ore
 West Angelas NVCP 1

**Threatened and Priority Fauna
 Records (DBCA and RTIO)
 FIGURE 12**

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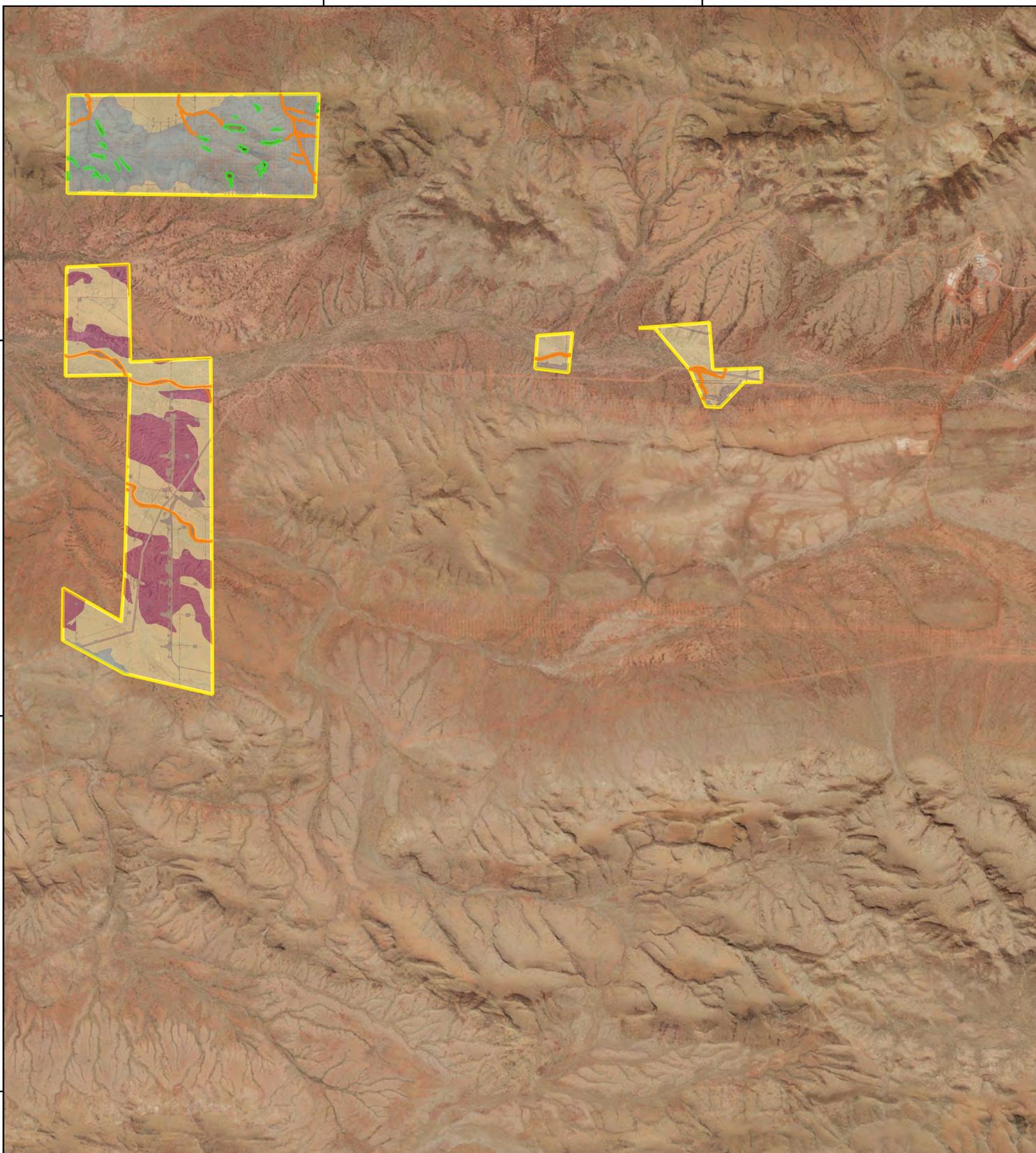
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Consolidated Fauna Habitat

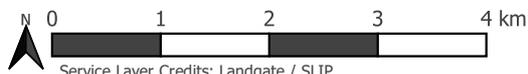
- Footslopes and Plains
- Hillcrest and Hillslope
- Mixed Acacia Woodland
- Disturbed

Consolidated Fauna Habitat of Significance

- Drainage Line
- Gorge/Gully



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Rio Tinto Iron Ore
 West Angelas NVCP 1

Consolidated Fauna Habitat
 FIGURE 13a

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Consolidated Fauna Habitat

- Cracking Clay
- Footslopes and Plains
- Hillcrest and Hillslope
- Mixed Acacia Woodland
- Disturbed

Consolidated Fauna Habitat of Significance

- Drainage Line
- Gorge/Gully



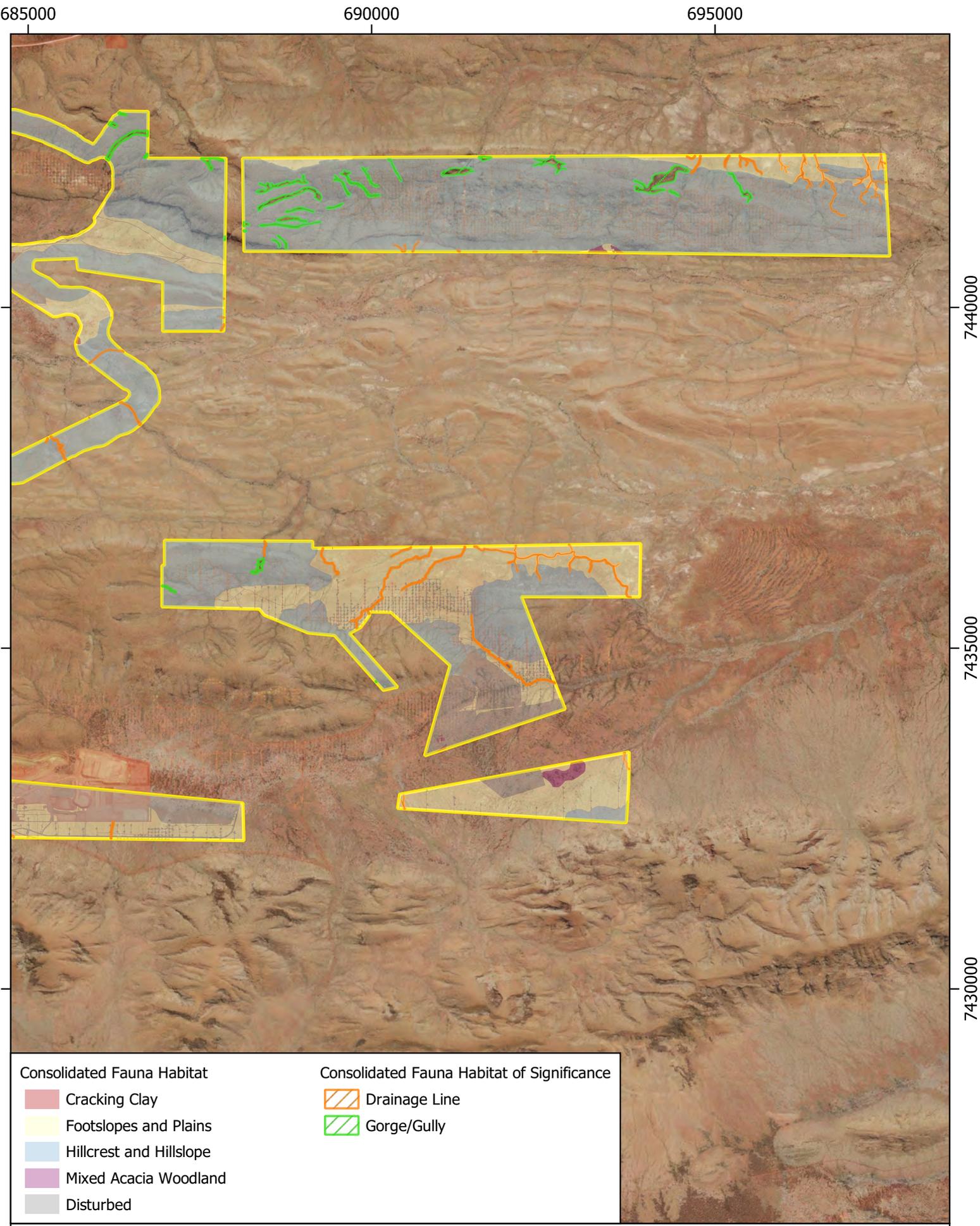
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 Reviewed By: SG

Rio Tinto Iron Ore
 West Angelas NVCP 1

**Consolidated Fauna Habitat
 FIGURE 13b**



Consolidated Fauna Habitat		Consolidated Fauna Habitat of Significance	
	Cracking Clay		Drainage Line
	Footslopes and Plains		Gorge/Gully
	Hillcrest and Hillslope		
	Mixed Acacia Woodland		
	Disturbed		



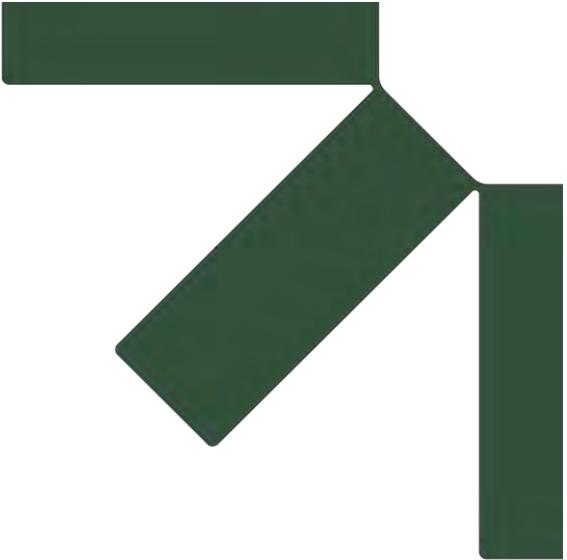
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Rio Tinto Iron Ore
 West Angelas NVCP 1

**Consolidated Fauna Habitat
 FIGURE 13c**



Appendix B Flora inventory

West Angelas NVCP 1

Flora, Vegetation, and Fauna Desktop Assessment

Rio Tinto Iron Ore

SLR Project No.: 675.072156.00001

15 April 2024

Table 1 Floristic diversity

Taxon	Status	RTIO 20km	Application Area
Acanthaceae			
<i>Dicladantha forrestii</i>		X	X
<i>Dipteracanthus australasicus</i>		X	
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>		X	X
<i>Harnieria kempeana</i> subsp. <i>muelleri</i>		X	X
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	P3	X	X
Aizoaceae			
<i>Trianthera glossostigmum</i>		X	X
<i>Trianthera pilosum</i>		X	
<i>Trianthera triquetrum</i>		X	
Amaranthaceae			
<i>Achyranthes aspera</i>		X	X
<i>Alternanthera angustifolia</i>		X	
<i>Alternanthera denticulata</i> var. <i>denticulata</i>		X	
<i>Alternanthera nana</i>		X	X
<i>Alternanthera nodiflora</i>		X	
<i>Amaranthus cuspidifolius</i>		X	X
<i>Amaranthus interruptus</i>		X	
<i>Amaranthus mitchellii</i>		X	
<i>Amaranthus undulatus</i>		X	X
<i>Gomphrena affinis</i> subsp. <i>pilbarensis</i>		X	X
<i>Gomphrena canescens</i>		X	X
<i>Gomphrena canescens</i> subsp. <i>canescens</i>		X	X
<i>Gomphrena cunninghamii</i>		X	X
<i>Gomphrena kanisii</i>		X	X
<i>Gomphrena lanata</i>		X	
<i>Ptilotus aevoides</i>		X	X
<i>Ptilotus astrolasius</i>		X	X
<i>Ptilotus auriculifolius</i>		X	X
<i>Ptilotus axillaris</i>		X	
<i>Ptilotus calostachyus</i>		X	X
<i>Ptilotus carinatus</i>		X	X
<i>Ptilotus clementii</i>		X	X
<i>Ptilotus divaricatus</i>		X	X
<i>Ptilotus exaltatus</i>		X	X
<i>Ptilotus fusiformis</i>		X	X
<i>Ptilotus gaudichaudii</i>		X	X
<i>Ptilotus gomphrenoides</i>		X	X
<i>Ptilotus helipteroides</i>		X	X
<i>Ptilotus incanus</i>		X	
<i>Ptilotus mollis</i>	P4	X	
<i>Ptilotus obovatus</i>		X	X
<i>Ptilotus obovatus</i> var. <i>obovatus</i>		X	X
<i>Ptilotus polystachyus</i>		X	X
<i>Ptilotus roei</i>		X	X
<i>Ptilotus rotundifolius</i>		X	X
<i>Ptilotus schwartzii</i>		X	
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>		X	X
<i>Ptilotus xerophilus</i>		X	
Apocynaceae			
<i>Cynanchum floribundum</i>		X	X

<i>Cynanchum pedunculatum</i>		X	
<i>Cynanchum viminale</i>		X	X
<i>Cynanchum viminale</i> subsp. <i>australe</i>		X	X
<i>Gymnanthera cunninghamii</i>	P3	X	
<i>Leichhardtia australis</i>		X	X
<i>Vincetoxicum flexuosum</i>		X	
<i>Vincetoxicum lineare</i>		X	X
Araliaceae			
<i>Astrotricha hamptonii</i>		X	X
<i>Trachymene oleracea</i>		X	X
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>		X	X
<i>Trachymene pilbarensis</i>		X	
Asparagaceae			
<i>Thysanotus exiliflorus</i>		X	
Aspleniaceae			
<i>Asplenium subglandulosum</i>		X	
Asteraceae			
<i>Blumea tenella</i>		X	
<i>Brachyscome ciliaris</i>		X	
<i>Brachyscome iberidifolia</i>		X	X
<i>Brachyscome rudallensis</i>		X	
<i>Calocephalus beardii</i>		X	
<i>Calocephalus knappii</i>		X	X
<i>Calocephalus pilbarensis</i>		X	
<i>Calotis hispidula</i>		X	
<i>Calotis latiuscula</i>		X	
<i>Calotis multicaulis</i>		X	
<i>Calotis plumulifera</i>		X	
<i>Calotis porphyroglossa</i>		X	
<i>Centipeda minima</i>		X	
<i>Centipeda minima</i> subsp. <i>macrocephala</i>		X	
<i>Centipeda minima</i> subsp. <i>minima</i>		X	
<i>Chrysocephalum apiculatum</i>		X	X
<i>Chrysocephalum apiculatum</i> subsp. <i>pilbarensis</i>		X	X
<i>Chrysocephalum eremaeum</i>		X	
<i>Chrysocephalum gilesii</i>		X	X
<i>Chrysocephalum pterochaetum</i>		X	X
<i>Gnephosis arachnoidea</i>		X	
<i>Leiocarpa semicalva</i>		X	X
<i>Leiocarpa semicalva</i> subsp. <i>semicalva</i>		X	X
<i>Minuria integerrima</i>		X	
<i>Myriocephalus oldfieldii</i>		X	
<i>Myriocephalus rudallii</i>		X	
<i>Olearia fluvialis</i>		X	X
<i>Olearia mucronata</i>	P3	X	
<i>Olearia stuartii</i>		X	X
<i>Olearia xerophila</i>		X	X
<i>Pentalepis trichodesmoides</i> subsp. <i>hispida</i>	P2	X	
<i>Pentalepis trichodesmoides</i> subsp. <i>trichodesmoides</i>		X	
<i>Peripleura arida</i>		X	X
<i>Peripleura hispidula</i> var. <i>setosa</i>		X	X
<i>Peripleura obovata</i>		X	X
<i>Peripleura virgata</i>		X	X
<i>Pilbara trudgenii</i>	P3	X	
<i>Pluchea dentex</i>		X	X

<i>Pluchea dunlopia</i>		X	X
<i>Pluchea rubelliflora</i>		X	
<i>Pluchea tetranthera</i>		X	
<i>Pseudognaphalium luteoalbum</i>		X	
<i>Pterocaulon serrulatum</i>		X	X
<i>Pterocaulon serrulatum</i> var. <i>velutinum</i>		X	
<i>Pterocaulon sphacelatum</i>		X	X
<i>Pterocaulon sphaeranthoides</i>		X	
<i>Rhodanthe charsleyae</i>		X	X
<i>Rhodanthe citrina</i>		X	
<i>Rhodanthe floribunda</i>		X	
<i>Rhodanthe humboldtiana</i>		X	
<i>Rhodanthe margarethae</i>		X	X
<i>Rhodanthe polakii</i>		X	
<i>Roebuckiella similis</i>		X	
<i>Rutidosis helichrysoides</i> subsp. <i>helichrysoides</i>		X	
<i>Senecio hamersleyensis</i>		X	X
<i>Streptoglossa adscendens</i>		X	
<i>Streptoglossa bubakii</i>		X	X
<i>Streptoglossa decurrens</i>		X	X
<i>Streptoglossa liatroides</i>		X	X
<i>Streptoglossa macrocephala</i>		X	
<i>Streptoglossa odora</i>		X	
<i>Streptoglossa</i> sp. Cracking clays (S. van Leeuwen et al. PBS 7353)	P3	X	
<i>Streptoglossa tenuiflora</i>		X	
<i>Taplinia saxatilis</i>		X	
<i>Vittadinia dissecta</i> var. <i>hirta</i>		X	X
<i>Vittadinia eremaea</i>		X	X
<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)	P3	X	
<i>Xerochrysum interiore</i>		X	
Bignoniaceae			
<i>Pandorea doratoxylon</i>		X	
Boraginaceae			
<i>Ehretia saligna</i> var. <i>saligna</i>		X	X
<i>Euploca chrysocarpa</i>		X	X
<i>Euploca conocarpa</i>		X	
<i>Euploca cunninghamii</i>		X	X
<i>Euploca heterantha</i>		X	
<i>Euploca inexplicita</i>		X	X
<i>Euploca ovalifolia</i>		X	X
<i>Euploca pachyphylla</i>		X	X
<i>Euploca tanythrix</i>		X	
<i>Euploca tenuifolia</i>		X	X
<i>Halgania cyanea</i>		X	
<i>Halgania cyanea</i> var. Allambi Stn (B.W. Strong 676)		X	
<i>Halgania gustafsenii</i>		X	X
<i>Halgania gustafsenii</i> var. <i>gustafsenii</i>		X	X
<i>Halgania gustafsenii</i> var. Mid West (G. Perry 370)		X	X
<i>Heliotropium crispatum</i>		X	X
<i>Trichodesma zeylanicum</i>		X	X
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>		X	X
Brassicaceae			
<i>Lepidium catapycnon</i>	P4	X	X
<i>Lepidium echinatum</i>		X	
<i>Lepidium muelleri-ferdinandi</i>		X	

<i>Lepidium oxytrichum</i>		X	
<i>Lepidium pedicellosum</i>		X	X
<i>Lepidium phlebopetalum</i>		X	X
<i>Lepidium pholidogynum</i>		X	X
<i>Lepidium platypetalum</i>		X	
<i>Menkea villosula</i>		X	
<i>Stenopetalum anfractum</i>		X	
<i>Stenopetalum decipiens</i>		X	X
<i>Stenopetalum nutans</i>		X	
<i>Stenopetalum pedicellare</i>		X	
<i>Stenopetalum velutinum</i>		X	X
Campanulaceae			
<i>Lithotoma petraea</i>		X	
<i>Lobelia heterophylla</i>		X	
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i>		X	X
<i>Wahlenbergia gracilentia</i>		X	
<i>Wahlenbergia tumidifruca</i>		X	
Capparaceae			
<i>Capparis lasiantha</i>		X	X
<i>Capparis mitchellii</i>		X	X
<i>Capparis spinosa</i> subsp. <i>nummularia</i>		X	X
<i>Capparis umbonata</i>		X	
Caryophyllaceae			
<i>Polycarpaea corymbosa</i>		X	X
<i>Polycarpaea corymbosa</i> var. <i>corymbosa</i>		X	X
<i>Polycarpaea holtzei</i>		X	X
<i>Polycarpaea longiflora</i>		X	X
Celastraceae			
<i>Maytenus</i> sp. Mt Windell (S. van Leeuwen 846)		X	X
<i>Stackhousia intermedia</i>		X	X
<i>Stackhousia muricata</i>		X	
<i>Stackhousia muricata</i> subsp. <i>annual</i> (W.R. Barker 2172)		X	
<i>Stackhousia</i> sp. swollen gynophore (W.R. Barker 2041)		X	
Chenopodiaceae			
<i>Atriplex codonocarpa</i>		X	
<i>Chenopodium gaudichaudianum</i>		X	X
<i>Dissocarpus paradoxus</i>		X	
<i>Dysphania glomulifera</i> subsp. <i>eremaea</i>		X	X
<i>Dysphania kalpari</i>		X	X
<i>Dysphania melanocarpa</i>		X	
<i>Dysphania melanocarpa</i> forma <i>leucocarpa</i>		X	
<i>Dysphania melanocarpa</i> forma <i>melanocarpa</i>		X	
<i>Dysphania plantaginella</i>		X	
<i>Dysphania pumilio</i>		X	
<i>Dysphania rhadinostachya</i>		X	X
<i>Dysphania rhadinostachya</i> subsp. <i>inflata</i>		X	
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>		X	X
<i>Dysphania saxatilis</i>		X	X
<i>Enchylaena tomentosa</i>		X	X
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>		X	X
<i>Maireana carnosia</i>		X	
<i>Maireana eriosphaera</i>		X	
<i>Maireana georgei</i>		X	X
<i>Maireana lanosa</i>		X	
<i>Maireana melanocoma</i>		X	

<i>Maireana planifolia</i>		X	X
<i>Maireana tomentosa</i>		X	X
<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>		X	
<i>Maireana trichoptera</i>		X	
<i>Maireana triptera</i>		X	X
<i>Maireana villosa</i>		X	X
<i>Rhagodia eremaea</i>		X	X
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	P3	X	X
<i>Salsola australis</i>		X	X
<i>Sclerolaena convexula</i>		X	
<i>Sclerolaena cornishiana</i>		X	X
<i>Sclerolaena costata</i>		X	
<i>Sclerolaena cuneata</i>		X	
<i>Sclerolaena densiflora</i>		X	X
<i>Sclerolaena deserticola</i>		X	X
<i>Sclerolaena diacantha</i>		X	
<i>Sclerolaena eriacantha</i>		X	
<i>Sclerolaena gardneri</i>		X	
<i>Sclerolaena tetragona</i>		X	X
Cleomaceae			
<i>Areocleome oxalidea</i>		X	X
<i>Arivela viscosa</i>		X	X
Commelinaceae			
<i>Commelina ensifolia</i>		X	
Convolvulaceae			
<i>Bonamia erecta</i>		X	
<i>Bonamia pilbarensis</i>		X	X
<i>Convolvulus clementii</i>		X	X
<i>Convolvulus remotus</i>		X	X
<i>Cuscuta victoriana</i>		X	
<i>Duperreya commixta</i>		X	X
<i>Evolvulus alsinoides</i>		X	
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>		X	X
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>		X	X
<i>Ipomoea calobra</i>		X	
<i>Ipomoea lonchophylla</i>		X	
<i>Ipomoea muelleri</i>		X	
<i>Ipomoea plebeia</i>		X	X
<i>Ipomoea polymorpha</i>		X	
<i>Ipomoea racemigera</i>	P2	X	
<i>Operculina aequisejala</i>		X	
<i>Polymeria ambigua</i>		X	
<i>Polymeria longifolia</i>		X	
Cucurbitaceae			
<i>Austrobryonia pilbarensis</i>		X	
<i>Cucumis argenteus</i>		X	X
<i>Cucumis picrocarpus</i>		X	
<i>Cucumis variabilis</i>		X	X
Cupressaceae			
<i>Callitris columellaris</i>		X	
Cyperaceae			
<i>Bulbostylis barbata</i>		X	X
<i>Bulbostylis turbinata</i>		X	X
<i>Cyperus bulbosus</i>		X	
<i>Cyperus cunninghamii</i>		X	

<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>		X	X
<i>Cyperus dactyloides</i>		X	
<i>Cyperus difformis</i>		X	
<i>Cyperus iria</i>		X	
<i>Cyperus rigidellus</i>		X	
<i>Cyperus squarrosus</i>		X	
<i>Cyperus vaginatus</i>		X	
<i>Fimbristylis dichotoma</i>		X	X
<i>Fimbristylis microcarya</i>		X	
<i>Fimbristylis simulans</i>		X	X
<i>Schoenoplectiella laevis</i>		X	
<i>Schoenoplectus subulatus</i>		X	
Dilleniaceae			
<i>Hibbertia glaberrima</i>		X	
Elaeocarpaceae			
<i>Tetradlea fordiana</i>	P2	X	
Elatinaceae			
<i>Bergia pedicellaris</i>		X	
<i>Bergia trimera</i>		X	
Euphorbiaceae			
<i>Adriana tomentosa</i>		X	X
<i>Adriana tomentosa</i> var. <i>tomentosa</i>		X	X
<i>Euphorbia australis</i>		X	X
<i>Euphorbia australis</i> var. <i>australis</i>		X	
<i>Euphorbia australis</i> var. <i>hispidula</i>		X	X
<i>Euphorbia australis</i> var. <i>subtomentosa</i>		X	X
<i>Euphorbia biconvexa</i>		X	X
<i>Euphorbia boophthona</i>		X	X
<i>Euphorbia careyi</i>		X	
<i>Euphorbia clementii</i>	P3	X	
<i>Euphorbia coghlanii</i>		X	
<i>Euphorbia drummondii</i>		X	X
<i>Euphorbia ferdinandi</i>		X	
<i>Euphorbia ferdinandi</i> var. <i>ferdinandi</i>		X	
<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	P2	X	
<i>Euphorbia tannensis</i>		X	
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>		X	X
<i>Euphorbia trigonosperma</i>		X	X
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>		X	
Fabaceae			
<i>Acacia adoxa</i> var. <i>adoxo</i>		X	X
<i>Acacia adsurgens</i>		X	X
<i>Acacia ampliceps</i>		X	
<i>Acacia ancistrocarpa</i>		X	X
<i>Acacia aneura</i>		X	X
<i>Acacia aptaneura</i>		X	X
<i>Acacia arida</i>		X	
<i>Acacia atkinsiana</i>		X	X
<i>Acacia ayersiana</i>		X	X
<i>Acacia bivenosa</i>		X	X
<i>Acacia bromilowiana</i>	P4	X	X
<i>Acacia catenulata</i>		X	X
<i>Acacia catenulata</i> subsp. <i>occidentalis</i>		X	X
<i>Acacia citrinoviridis</i>		X	X
<i>Acacia colei</i>		X	X

<i>Acacia colei</i> var. <i>colei</i>		X	X
<i>Acacia coriacea</i>		X	
<i>Acacia coriacea</i> subsp. <i>pendens</i>		X	
<i>Acacia cowleana</i>		X	X
<i>Acacia dawsoniana</i>	P3	X	
<i>Acacia dictyophleba</i>		X	X
<i>Acacia effusa</i>	P3	X	X
<i>Acacia elachantha</i>		X	X
<i>Acacia eriopoda</i>		X	
<i>Acacia fusca</i>		X	
<i>Acacia hamersleyensis</i>		X	X
<i>Acacia hilliana</i>		X	X
<i>Acacia inaequilatera</i>		X	X
<i>Acacia incurvaneura</i>		X	X
<i>Acacia kempeana</i>		X	X
<i>Acacia macraneura</i>		X	X
<i>Acacia maitlandii</i>		X	X
<i>Acacia marramamba</i>		X	X
<i>Acacia minyura</i>		X	
<i>Acacia monticola</i>		X	X
<i>Acacia mulganeura</i>		X	
<i>Acacia orthocarpa</i>		X	
<i>Acacia pachyacra</i>		X	X
<i>Acacia paraneura</i>		X	
<i>Acacia pruinocarpa</i>		X	X
<i>Acacia pteraneura</i>		X	X
<i>Acacia pyrifolia</i>		X	X
<i>Acacia pyrifolia</i> var. <i>morrisonii</i>		X	
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>		X	X
<i>Acacia rhodophloia</i>		X	X
<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>		X	
<i>Acacia sibirica</i>		X	X
<i>Acacia spondylophylla</i>		X	
<i>Acacia steedmanii</i> subsp. <i>borealis</i>		X	X
<i>Acacia stellaticeps</i>		X	
<i>Acacia subcontorta</i>		X	
<i>Acacia subtiliformis</i>	P3	X	X
<i>Acacia synchronicia</i>		X	X
<i>Acacia tenuissima</i>		X	X
<i>Acacia tetragonophylla</i>		X	X
<i>Acacia trachycarpa</i>		X	
<i>Acacia trudgeniana</i>		X	X
<i>Acacia tumida</i> var. <i>pilbarensis</i>		X	
<i>Acacia victoriae</i>		X	
<i>Acacia wanyu</i>		X	
<i>Acacia wiseana</i>		X	
<i>Aeschynomene indica</i>		X	
<i>Cajanus cinereus</i>		X	
<i>Crotalaria medicaginea</i>		X	
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>		X	X
<i>Crotalaria novae-hollandiae</i> subsp. <i>novae-hollandiae</i>		X	
<i>Cullen cinereum</i>		X	
<i>Cullen graveolens</i>		X	
<i>Cullen lachnostachys</i>		X	
<i>Cullen leucanthum</i>		X	

<i>Cullen leucochaites</i>		X	X
<i>Cullen pogonocarpum</i>		X	X
<i>Gastrolobium grandiflorum</i>		X	X
<i>Glycine canescens</i>		X	X
<i>Gompholobium oreophilum</i>		X	X
<i>Grona muelleri</i>		X	
<i>Indigastrum parviflorum</i>		X	
<i>Indigofera colutea</i>		X	
<i>Indigofera fractiflexa</i> subsp. <i>fractiflexa</i>		X	X
<i>Indigofera georgei</i>		X	X
<i>Indigofera gilesii</i>	P3	X	X
<i>Indigofera linifolia</i>		X	
<i>Indigofera linnaei</i>		X	
<i>Indigofera monophylla</i>		X	X
<i>Indigofera rugosa</i>		X	X
<i>Indigofera trita</i>		X	
<i>Isotropis atropurpurea</i>		X	X
<i>Isotropis forrestii</i>	P1	X	
<i>Isotropis iophyta</i>		X	X
<i>Isotropis parviflora</i>	P3	X	X
<i>Jacksonia aculeata</i>		X	
<i>Lotus cruentus</i>		X	
<i>Mirbelia viminalis</i>		X	X
<i>Neptunia dimorphantha</i>		X	
<i>Petalostylis labicheoides</i>		X	X
<i>Rhynchosia australis</i>		X	X
<i>Rhynchosia minima</i>		X	X
<i>Senna artemisioides</i>		X	
<i>Senna artemisioides</i> subsp. <i>xartemisioides</i>		X	X
<i>Senna artemisioides</i> subsp. <i>xsturtii</i>		X	X
<i>Senna artemisioides</i> subsp. <i>filifolia</i>		X	X
<i>Senna artemisioides</i> subsp. <i>helmsii</i>		X	X
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>		X	X
<i>Senna charlesiana</i>		X	
<i>Senna ferraria</i>		X	X
<i>Senna glaucifolia</i>		X	X
<i>Senna glutinosa</i> subsp. <i>xluerssenii</i>		X	X
<i>Senna glutinosa</i> subsp. <i>chatelainiana</i>		X	
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>		X	X
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>		X	X
<i>Senna hamersleyensis</i>		X	
<i>Senna notabilis</i>		X	X
<i>Senna pleurocarpa</i> var. <i>angustifolia</i>		X	X
<i>Senna pleurocarpa</i> var. <i>pleurocarpa</i>		X	
<i>Senna sericea</i>		X	X
<i>Senna</i> sp. Karijini (M.E. Trudgen 10392)		X	X
<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)		X	X
<i>Senna stricta</i>		X	X
<i>Senna symonii</i>		X	X
<i>Senna venusta</i>		X	X
<i>Swainsona canescens</i>		X	
<i>Swainsona complanata</i>		X	X
<i>Swainsona decurrens</i>		X	X
<i>Swainsona elegantoides</i>		X	
<i>Swainsona formosa</i>		X	

<i>Swainsona kingii</i>		X	
<i>Swainsona leeana</i>		X	
<i>Swainsona maccullochiana</i>		X	X
<i>Swainsona oroboides</i>		X	
<i>Swainsona thompsoniana</i>	P3	X	
<i>Templetonia egena</i>		X	X
<i>Tephrosia clementii</i>		X	
<i>Tephrosia densa</i>		X	
<i>Tephrosia oxalidea</i>		X	X
<i>Tephrosia rosea</i>		X	
<i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186)		X	X
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)		X	
<i>Tephrosia</i> sp. clay soils (S. van Leeuwen et al. PBS 0273)		X	
<i>Tephrosia</i> sp. Newman (A.A. Mitchell PRP 29)		X	
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)		X	X
<i>Tephrosia supina</i>		X	
<i>Vigna lanceolata</i> var. <i>lanceolata</i>		X	X
<i>Vigna</i> sp. Hamersley Clay (A.A. Mitchell PRP 113)		X	X
Gentianaceae			
<i>Schenkia australis</i>		X	
<i>Schenkia clementii</i>		X	
Goodeniaceae			
<i>Brunonia australis</i>		X	X
<i>Brunonia</i> sp. Long hairs (D.E. Symon 2440)		X	X
<i>Dampiera candidans</i>		X	X
<i>Dampiera metallorum</i>	P3	X	
<i>Goodenia connata</i>		X	
<i>Goodenia cusackiana</i>		X	X
<i>Goodenia discophora</i>		X	
<i>Goodenia forrestii</i>		X	
<i>Goodenia lamprosperma</i>		X	X
<i>Goodenia lyrata</i>	P3	X	
<i>Goodenia microptera</i>		X	X
<i>Goodenia muelleriana</i>		X	X
<i>Goodenia nuda</i>		X	X
<i>Goodenia pascua</i>		X	
<i>Goodenia prostrata</i>		X	X
<i>Goodenia scaevolina</i>		X	X
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	P3	X	
<i>Goodenia stellata</i>		X	X
<i>Goodenia stobbsiana</i>		X	X
<i>Goodenia tenuiloba</i>		X	
<i>Goodenia triodiophila</i>		X	X
<i>Scaevola acacioides</i>		X	X
<i>Scaevola amblyanthera</i>		X	X
<i>Scaevola amblyanthera</i> var. <i>amblyanthera</i>		X	
<i>Scaevola amblyanthera</i> var. <i>centralis</i>		X	X
<i>Scaevola browniana</i>		X	X
<i>Scaevola browniana</i> subsp. <i>browniana</i>		X	X
<i>Scaevola parvifolia</i>		X	X
<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>		X	X
<i>Scaevola sericophylla</i>		X	
<i>Scaevola</i> sp. Mt Bruce (M.E. Trudgen 1333)		X	X
<i>Scaevola spinescens</i>		X	X
Gyrostemonaceae			

<i>Codonocarpus cotinifolius</i>		X	X
Haloragaceae			
<i>Haloragis gossei</i>		X	
<i>Haloragis gossei</i> var. <i>gossei</i>		X	X
<i>Haloragis gossei</i> var. <i>inflata</i>		X	X
<i>Haloragis maierae</i>		X	
<i>Haloragis odontocarpa</i>		X	
<i>Haloragis odontocarpa</i> forma <i>rugosa</i>		X	
<i>Haloragis trigonocarpa</i>		X	
Hemerocallidaceae			
<i>Tricoryne</i> sp. Hamersley Range (S. van Leeuwen 915)		X	X
Hydrocharitaceae			
<i>Vallisneria nana</i>		X	
Lamiaceae			
<i>Clerodendrum floribundum</i>		X	X
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>		X	X
<i>Clerodendrum floribundum</i> var. <i>floribundum</i>		X	
<i>Clerodendrum tomentosum</i>		X	
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>		X	
<i>Newcastelia clavipetala</i>		X	X
<i>Prostanthera albiflora</i>		X	X
<i>Prostanthera campbellii</i>		X	
<i>Teucrium disjunctum</i>		X	
<i>Teucrium teucriiflorum</i>		X	X
Lauraceae			
<i>Cassytha capillaris</i>		X	X
<i>Cassytha filiformis</i>		X	X
Loranthaceae			
<i>Amyema fitzgeraldii</i>		X	X
<i>Amyema gibberula</i> var. <i>gibberula</i>		X	
<i>Amyema hilliana</i>		X	
<i>Amyema miquelii</i>		X	
<i>Amyema sanguinea</i> var. <i>pulchra</i>		X	X
<i>Amyema sanguinea</i> var. <i>sanguinea</i>		X	
<i>Diplatia grandibractea</i>		X	X
Lythraceae			
<i>Ammannia baccifera</i>		X	
<i>Ammannia multiflora</i>		X	
<i>Rotala diandra</i>		X	
Malvaceae			
<i>Abutilon amplum</i>		X	X
<i>Abutilon cryptopetalum</i>		X	X
<i>Abutilon cunninghamii</i>		X	X
<i>Abutilon fraseri</i>		X	X
<i>Abutilon fraseri</i> subsp. <i>fraseri</i>		X	X
<i>Abutilon lepidum</i>		X	X
<i>Abutilon leucopetalum</i>		X	X
<i>Abutilon macrum</i>		X	X
<i>Abutilon malvifolium</i>		X	
<i>Abutilon otocarpum</i>		X	X
<i>Abutilon oxycarpum</i>		X	
<i>Abutilon oxycarpum</i> subsp. <i>Prostrate</i> (A.A. Mitchell PRP 1266)		X	
<i>Abutilon</i> sp. <i>Dioicum</i> (A.A. Mitchell PRP 1618)		X	X
<i>Abutilon</i> sp. <i>Pilbara</i> (W.R. Barker 2025)		X	X
<i>Androcalva luteiflora</i>		X	X

<i>Brachychiton acuminatus</i>		X	
<i>Brachychiton gregorii</i>		X	X
<i>Corchorus crozophorifolius</i>		X	X
<i>Corchorus lasiocarpus</i>		X	X
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>		X	X
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>		X	X
<i>Corchorus sidoides</i>		X	
<i>Corchorus sidoides</i> subsp. <i>sidoides</i>		X	X
<i>Corchorus tectus</i>		X	X
<i>Corchorus tridens</i>		X	X
<i>Corchorus trilocularis</i>		X	
<i>Gossypium australe</i>		X	X
<i>Gossypium robinsonii</i>		X	X
<i>Gossypium sturtianum</i>		X	
<i>Gossypium sturtianum</i> var. <i>sturtianum</i>		X	
<i>Hannafordia bissillii</i> subsp. <i>bissillii</i>		X	
<i>Hibiscus arenicola</i>		X	
<i>Hibiscus brachychlaenus</i>		X	X
<i>Hibiscus brachysiphonius</i>		X	
<i>Hibiscus burtonii</i>		X	X
<i>Hibiscus coatesii</i>		X	X
<i>Hibiscus leptocladus</i>		X	
<i>Hibiscus</i> sp. Gardneri (A.L. Payne PRP 1435)		X	X
<i>Hibiscus</i> sp. Gurinbiddy Range (M.E. Trudgen MET 15708)	P2	X	X
<i>Hibiscus</i> sp. Mt Brockman (E. Thoma ET 1354)	P1	X	
<i>Hibiscus</i> sp. Mt Robinson (G. Byrne 3537)		X	
<i>Hibiscus sturtii</i>		X	X
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>		X	X
<i>Hibiscus sturtii</i> var. <i>grandiflorus</i>		X	X
<i>Hibiscus sturtii</i> var. <i>platychlamys</i>		X	X
<i>Hibiscus sturtii</i> var. <i>truncatus</i>		X	X
<i>Hibiscus verdcourtii</i>		X	
<i>Melhania oblongifolia</i>		X	X
<i>Seringia exastia</i>	CE	X	X
<i>Seringia nephrosperma</i>		X	X
<i>Sida arenicola</i>		X	X
<i>Sida arsinata</i>		X	X
<i>Sida calyxhymenia</i>		X	
<i>Sida cardiophylla</i>		X	X
<i>Sida echinocarpa</i>		X	X
<i>Sida ectogama</i>		X	X
<i>Sida fibulifera</i>		X	X
<i>Sida laevis</i>		X	
<i>Sida platycalyx</i>		X	
<i>Sida rohlenae</i>		X	X
<i>Sida rohlenae</i> subsp. <i>rohlenae</i>		X	
<i>Sida</i> sp. Articulation below (A.A. Mitchell PRP 1605)		X	X
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	P4	X	X
<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)		X	X
<i>Sida</i> sp. Excedentifolia (J.L. Egan 1925)		X	X
<i>Sida</i> sp. Golden calyces glabrous (H.N. Foote 32)		X	X
<i>Sida</i> sp. Hamersley Range (K. Newbey 10692)	P3	X	X
<i>Sida</i> sp. L (A.M. Ashby 4202)		X	X
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)		X	X
<i>Sida</i> sp. Shovelanna Hill (S. van Leeuwen 3842)		X	X

<i>Sida</i> sp. spiciform panicles (E. Leyland s.n. 14/8/90)		X	X
<i>Sida</i> sp. Supplejack Station (T.S. Henshall 2345)		X	X
<i>Sida spinosa</i>		X	
<i>Sida trichopoda</i>		X	X
<i>Triumfetta appendiculata</i>		X	
<i>Triumfetta chaetocarpa</i>		X	
<i>Triumfetta clementii</i>		X	
<i>Triumfetta leptacantha</i>		X	X
<i>Triumfetta maconochieana</i>		X	
<i>Waltheria indica</i>		X	X
Marsileaceae			
<i>Marsilea drummondii</i>		X	
<i>Marsilea hirsuta</i>		X	X
Menispermaceae			
<i>Tinospora smilacina</i>		X	
Molluginaceae			
<i>Trigastrotheca molluginea</i>		X	
Montiaceae			
<i>Calandrinia eremaea</i>		X	X
<i>Calandrinia monosperma</i>		X	
<i>Calandrinia ptychosperma</i>		X	
<i>Calandrinia pumila</i>		X	
<i>Calandrinia stagnensis</i>		X	
Moraceae			
<i>Ficus brachypoda</i>		X	X
<i>Ficus platypoda</i>		X	X
Myrtaceae			
<i>Calytrix carinata</i>		X	X
<i>Corymbia candida</i>		X	X
<i>Corymbia candida</i> subsp. <i>candida</i>		X	
<i>Corymbia deserticola</i>		X	
<i>Corymbia deserticola</i> subsp. <i>deserticola</i>		X	X
<i>Corymbia ferritcola</i>		X	X
<i>Corymbia hamersleyana</i>		X	X
<i>Corymbia opaca</i>		X	
<i>Corymbia zygophylla</i>		X	
<i>Eucalyptus camaldulensis</i>		X	
<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>		X	
<i>Eucalyptus camaldulensis</i> subsp. <i>refulgens</i>		X	
<i>Eucalyptus ewartiana</i>		X	
<i>Eucalyptus gamophylla</i>		X	X
<i>Eucalyptus kingsmillii</i>		X	X
<i>Eucalyptus leucophloia</i>		X	X
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		X	X
<i>Eucalyptus pilbarensis</i>		X	
<i>Eucalyptus repullulans</i>		X	X
<i>Eucalyptus socialis</i>		X	
<i>Eucalyptus socialis</i> subsp. <i>eucentrica</i>		X	X
<i>Eucalyptus trivalva</i>		X	X
<i>Eucalyptus victrix</i>		X	X
<i>Eucalyptus xerothermica</i>		X	X
<i>Melaleuca bracteata</i>		X	
<i>Melaleuca eleuterostachya</i>		X	
<i>Melaleuca glomerata</i>		X	
Nyctaginaceae			

<i>Boerhavia burbridgeana</i>		X	
<i>Boerhavia coccinea</i>		X	X
<i>Boerhavia gardneri</i>		X	
<i>Boerhavia paludosa</i>		X	X
<i>Boerhavia repleta</i>		X	X
<i>Commicarpus australis</i>		X	
Oleaceae			
<i>Jasminum didymum</i>		X	X
<i>Jasminum didymum</i> subsp. <i>lineare</i>		X	X
Onagraceae			
<i>Ludwigia perennis</i>		X	
Ophioglossaceae			
<i>Ophioglossum lusitanicum</i>		X	
Orobanchaceae			
<i>Striga curviflora</i>		X	
<i>Striga squamigera</i>		X	
Oxalidaceae			
<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	P2	X	
Pedaliaceae			
<i>Josephinia eugeniae</i>		X	
Phrymaceae			
<i>Mimulus gracilis</i>		X	
<i>Peplidium aithocheilum</i>		X	
<i>Peplidium muelleri</i>		X	
<i>Peplidium</i> sp. C Evol. Fl. Fauna Arid Aust. (N.T. Burbidge & A. Kanis 8158)		X	
Phyllanthaceae			
<i>Cathetus exilis</i>		X	
<i>Dendrophyllanthus erwinii</i>		X	
<i>Nellica maderaspatensis</i>		X	X
<i>Notoleptopus decaisnei</i>		X	
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i> (A.B. Craig 428)		X	X
<i>Synostemon rhytidospermus</i>		X	
Pittosporaceae			
<i>Pittosporum angustifolium</i>		X	X
Plantaginaceae			
<i>Stemodia grossa</i>		X	
<i>Stemodia viscosa</i>		X	
Plumbaginaceae			
<i>Plumbago zeylanica</i>		X	X
Poaceae			
<i>Acrachne racemosa</i>		X	X
<i>Amphipogon caricinus</i>		X	
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		X	
<i>Amphipogon sericeus</i>		X	X
<i>Aristida burbridgeae</i>		X	X
<i>Aristida contorta</i>		X	X
<i>Aristida holathera</i>		X	X
<i>Aristida holathera</i> var. <i>holathera</i>		X	X
<i>Aristida inaequiglumis</i>		X	X
<i>Aristida ingrata</i>		X	X
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	P3	X	X
<i>Aristida latifolia</i>		X	X
<i>Aristida lazaridis</i>	P2	X	X
<i>Aristida nitidula</i>		X	X
<i>Aristida obscura</i>		X	X

<i>Aristida pruinosa</i>		X	X
<i>Astrebla elymoides</i>		X	X
<i>Astrebla pectinata</i>		X	X
<i>Bothriochloa ewartiana</i>		X	X
<i>Chloris pectinata</i>		X	
<i>Chrysopogon fallax</i>		X	X
<i>Cymbopogon ambiguus</i>		X	X
<i>Cymbopogon obtectus</i>		X	X
<i>Cynodon convergens</i>		X	X
<i>Cynodon dactylon</i>		X	
<i>Cynodon prostratus</i>		X	X
<i>Dactyloctenium radulans</i>		X	X
<i>Dichanthium fecundum</i>		X	
<i>Dichanthium sericeum</i>		X	
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>		X	X
<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>		X	
<i>Digitaria ammophila</i>		X	X
<i>Digitaria brownii</i>		X	X
<i>Digitaria coenicola</i>		X	
<i>Digitaria ctenantha</i>		X	X
<i>Diplachne fusca</i>		X	X
<i>Elytrophorus spicatus</i>		X	
<i>Enneapogon avenaceus</i>		X	
<i>Enneapogon caerulescens</i>		X	X
<i>Enneapogon cylindricus</i>		X	
<i>Enneapogon lindleyanus</i>		X	X
<i>Enneapogon pallidus</i>		X	
<i>Enneapogon polyphyllus</i>		X	X
<i>Enneapogon robustissimus</i>		X	X
<i>Enteropogon ramosus</i>		X	X
<i>Eragrostis cumingii</i>		X	X
<i>Eragrostis desertorum</i>		X	X
<i>Eragrostis dielsii</i>		X	
<i>Eragrostis elongata</i>		X	
<i>Eragrostis eriopoda</i>		X	X
<i>Eragrostis exigua</i>		X	X
<i>Eragrostis falcata</i>		X	X
<i>Eragrostis leptocarpa</i>		X	X
<i>Eragrostis pergracilis</i>		X	X
<i>Eragrostis setifolia</i>		X	X
<i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109)	P2	X	
<i>Eragrostis tenellula</i>		X	X
<i>Eragrostis xerophila</i>		X	X
<i>Eriachne aristidea</i>		X	X
<i>Eriachne benthamii</i>		X	X
<i>Eriachne ciliata</i>		X	
<i>Eriachne flaccida</i>		X	
<i>Eriachne helmsii</i>		X	X
<i>Eriachne lanata</i>		X	X
<i>Eriachne mucronata</i>		X	X
<i>Eriachne obtusa</i>		X	X
<i>Eriachne pulchella</i>		X	X
<i>Eriachne pulchella</i> subsp. <i>dominii</i>		X	X
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>		X	X
<i>Eriachne tenuiculmis</i>		X	

<i>Eulalia aurea</i>		X	X
<i>Eulalia simonii</i>		X	
<i>Ischaemum albobillosum</i>		X	X
<i>Iseilema dolichotrichum</i>		X	X
<i>Iseilema eremaeum</i>		X	X
<i>Iseilema macratherum</i>		X	
<i>Iseilema membranaceum</i>		X	X
<i>Iseilema vaginiflorum</i>		X	X
<i>Leptochloa digitata</i>		X	
<i>Monachather paradoxus</i>		X	
<i>Panicum australiense</i>		X	X
<i>Panicum australiense</i> var. <i>australiense</i>		X	
<i>Panicum decompositum</i>		X	X
<i>Panicum effusum</i>		X	X
<i>Panicum laevinode</i>		X	X
<i>Paraneurachne muelleri</i>		X	X
<i>Paspalidium basicladum</i>		X	X
<i>Paspalidium clementii</i>		X	X
<i>Paspalidium constrictum</i>		X	
<i>Paspalidium jubiflorum</i>		X	
<i>Paspalidium rarum</i>		X	X
<i>Paspalidium tabulatum</i>		X	
<i>Perotis rara</i>		X	X
<i>Schizachyrium fragile</i>		X	X
<i>Setaria dielsii</i>		X	X
<i>Setaria surgens</i>		X	X
<i>Sorghum plumosum</i>		X	
<i>Sorghum plumosum</i> var. <i>plumosum</i>		X	
<i>Sorghum timorense</i>		X	
<i>Sporobolus actinocladus</i>		X	
<i>Sporobolus australasicus</i>		X	X
<i>Themeda avenacea</i>		X	
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3	X	X
<i>Themeda</i> sp. Mt Barricade (M.E. Trudgen 2471)		X	X
<i>Themeda triandra</i>		X	X
<i>Tragus australianus</i>		X	X
<i>Triodia angusta</i>		X	X
<i>Triodia basedowii</i>		X	X
<i>Triodia brizoides</i>		X	X
<i>Triodia epactia</i>		X	X
<i>Triodia longiceps</i>		X	X
<i>Triodia melvillei</i>		X	X
<i>Triodia pungens</i>		X	X
<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)	P3	X	X
<i>Triodia vanleeuwenii</i>		X	X
<i>Triodia wiseana</i>		X	X
<i>Tripogonella loliiformis</i>		X	X
<i>Triraphis mollis</i>		X	X
<i>Urochloa occidentalis</i>		X	
<i>Urochloa occidentalis</i> var. <i>ciliata</i>		X	
<i>Urochloa occidentalis</i> var. <i>occidentalis</i>		X	
<i>Urochloa piligera</i>		X	
<i>Urochloa subquadripara</i>		X	
Polygalaceae			
<i>Polygala glaucifolia</i>		X	

<i>Polygala isingii</i>		X	X
Polygonaceae			
<i>Duma florulenta</i>		X	
Portulacaceae			
<i>Portulaca australis</i>		X	
<i>Portulaca filifolia</i>		X	
<i>Portulaca intraterranea</i>		X	
Proteaceae			
<i>Grevillea berryana</i>		X	X
<i>Grevillea saxicola</i>	P3	X	
<i>Grevillea stenobotrya</i>		X	X
<i>Grevillea striata</i>		X	
<i>Grevillea wickhamii</i>		X	X
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>		X	X
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>		X	X
<i>Grevillea wickhamii</i> subsp. <i>macrodonga</i>		X	
<i>Hakea chordophylla</i>		X	X
<i>Hakea leucoptera</i> subsp. <i>sericipes</i>		X	
<i>Hakea lorea</i>		X	X
<i>Hakea lorea</i> subsp. <i>lorea</i>		X	X
<i>Hakea rhombales</i>		X	X
Pteridaceae			
<i>Cheilanthes austrotenuifolia</i>		X	X
<i>Cheilanthes brownii</i>		X	X
<i>Cheilanthes lasiophylla</i>		X	X
<i>Cheilanthes sieberi</i>		X	X
<i>Cheilanthes sieberi</i> subsp. <i>pseudovellea</i>		X	
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>		X	X
<i>Pellaea reynoldsii</i>		X	
Rhamnaceae			
<i>Cryptandra monticola</i>		X	X
<i>Stenanthemum petraeum</i>		X	
<i>Ventilago viminalis</i>		X	X
Rubiaceae			
<i>Dolichocarpa crouchiana</i>		X	X
<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	X	
<i>Pomax rupestris</i>		X	
<i>Psydrax latifolia</i>		X	X
<i>Psydrax rigidula</i>		X	X
<i>Psydrax suaveolens</i>		X	X
<i>Spermacoce brachystema</i>		X	X
<i>Synaptantha tillaeacea</i>		X	
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>		X	
Rutaceae			
<i>Geijera salicifolia</i>	P3	X	
Santalaceae			
<i>Anthobolus leptomerioides</i>		X	X
<i>Exocarpos sparteus</i>		X	X
<i>Santalum acuminatum</i>		X	
<i>Santalum lanceolatum</i>		X	X
<i>Santalum spicatum</i>		X	
Sapindaceae			
<i>Atalaya hemiglauca</i>		X	X
<i>Diplopeltis stuartii</i> var. <i>stuartii</i>		X	X
<i>Dodonaea coriacea</i>		X	X

<i>Dodonaea lanceolata</i>		X	X
<i>Dodonaea lanceolata</i> var. <i>lanceolata</i>		X	X
<i>Dodonaea pachyneura</i>		X	X
<i>Dodonaea petiolaris</i>		X	X
<i>Dodonaea viscosa</i> subsp. <i>angustissima</i>		X	
<i>Dodonaea viscosa</i> subsp. <i>mucronata</i>		X	X
<i>Dodonaea viscosa</i> subsp. <i>spatulata</i>		X	
Scrophulariaceae			
<i>Eremophila accrescens</i>		X	
<i>Eremophila caespitosa</i>		X	X
<i>Eremophila canaliculata</i>		X	
<i>Eremophila clarkei</i>		X	X
<i>Eremophila compacta</i>		X	
<i>Eremophila cuneifolia</i>		X	
<i>Eremophila exilifolia</i>		X	X
<i>Eremophila forrestii</i>		X	X
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>		X	X
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>		X	X
<i>Eremophila galeata</i>		X	X
<i>Eremophila glabra</i> subsp. <i>Albicans</i>		X	
<i>Eremophila jucunda</i> subsp. <i>jucunda</i>		X	
<i>Eremophila jucunda</i> subsp. <i>pulcherrima</i>		X	X
<i>Eremophila lachnocalyx</i>		X	X
<i>Eremophila lanceolata</i>		X	X
<i>Eremophila latrobei</i>		X	X
<i>Eremophila latrobei</i> subsp. <i>filiformis</i>		X	X
<i>Eremophila latrobei</i> subsp. <i>glabra</i>		X	X
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>		X	X
<i>Eremophila longifolia</i>		X	X
<i>Eremophila maculata</i> subsp. <i>maculata</i>		X	
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	P4	X	X
<i>Eremophila magnifica</i> subsp. <i>velutina</i>	P3	X	
<i>Eremophila naaykensis</i>	P3	X	X
<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>		X	
<i>Eremophila pendulina</i>		X	
<i>Eremophila petrophila</i> subsp. <i>petrophila</i>		X	
<i>Eremophila phyllopoda</i> subsp. <i>obliqua</i>		X	X
<i>Eremophila phyllopoda</i> subsp. <i>phyllopoda</i>		X	X
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>		X	X
<i>Eremophila pusilliflora</i>	P2	X	X
<i>Eremophila</i> sp. West Angelas (S. van Leeuwen 4068)	P2	X	
<i>Eremophila tietkensii</i>		X	
Solanaceae			
<i>Nicotiana benthamiana</i>		X	X
<i>Nicotiana heterantha</i>		X	
<i>Nicotiana ingulba</i>		X	
<i>Nicotiana obliqua</i>		X	
<i>Nicotiana occidentalis</i>		X	X
<i>Nicotiana rosulata</i>		X	
<i>Nicotiana simulans</i>		X	X
<i>Solanum ashbyae</i>		X	
<i>Solanum centrale</i>		X	X
<i>Solanum chippendalei</i>		X	
<i>Solanum cleistogamum</i>		X	X
<i>Solanum elatius</i>		X	

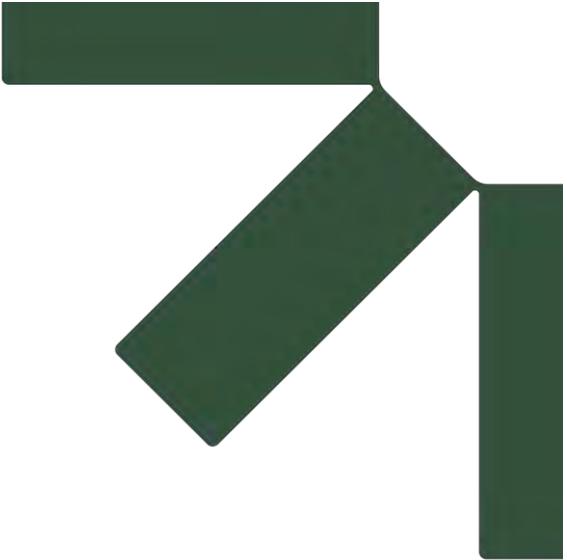
<i>Solanum esuriale</i>		X	
<i>Solanum ferocissimum</i>		X	X
<i>Solanum gabrielae</i>		X	X
<i>Solanum horridum</i>		X	X
<i>Solanum kentrocaule</i>	P3	X	X
<i>Solanum lasiophyllum</i>		X	X
<i>Solanum phlomoides</i>		X	X
<i>Solanum piceum</i>		X	X
Surianaceae			
<i>Stylobasium spathulatum</i>		X	X
Thymelaeaceae			
<i>Pimelea microcephala</i> subsp. <i>microcephala</i>		X	
Typhaceae			
<i>Typha domingensis</i>		X	
Urticaceae			
<i>Parietaria cardiostegia</i>		X	
Violaceae			
<i>Afrohybanthus aurantiacus</i>		X	X
Zygophyllaceae			
<i>Roepera eichleri</i>		X	
<i>Roepera iodocarpa</i>		X	
<i>Tribulus astrocarpus</i>		X	
<i>Tribulus hirsutus</i>		X	
<i>Tribulus macrocarpus</i>		X	
<i>Tribulus occidentalis</i>		X	
<i>Tribulus platypterus</i>		X	X
<i>Tribulus suberosus</i>		X	X
Grand Total		883	517

Table 2 Omitted Entities

* <i>Aerva javanica</i>	<i>Euphorbia alsiniflora</i>
* <i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>	<i>Euphorbia biconvexa/coghlanii/trigonosperma</i> (sterile indet.)
* <i>Bidens bipinnata</i>	<i>Euphorbia boophthona/tannensis</i> (sterile indet.)
* <i>Brassica tournefortii</i>	<i>Euphorbia schultzei</i>
* <i>Cenchrus ciliaris</i>	<i>Euphorbia</i> sp.
* <i>Cenchrus setiger</i>	<i>Euphorbia</i> sp. (<i>biconvexa/coghlanii/trigonosperma</i> ; sterile)
* <i>Chloris barbata</i>	<i>Euphorbia</i> sp. (<i>biconvexa/coghlanii/trigonosperma</i> ; sterile)
* <i>Chloris virgata</i>	<i>Euphorbia</i> sp. (indet.)
* <i>Citrullus amarus</i>	<i>Euphorbia</i> sp. indet.
* <i>Citrullus colocynthis</i>	<i>Euploca</i> sp. indet.
* <i>Cucumis melo</i>	<i>Ficus</i> sp. indet.
* <i>Datura leichhardtii</i> subsp. <i>leichhardtii</i>	<i>Fimbristylis leucocolea</i>
* <i>Echinochloa colona</i>	<i>Fimbristylis</i> sp.
* <i>Erigeron bonariensis</i>	<i>Gompholobium</i> sp.
* <i>Euphorbia hirta</i>	<i>Gomphrena</i> sp.
* <i>Flaveria trinervia</i>	<i>Goodenia</i> sp.
* <i>Hibiscus tridactylites</i>	<i>Goodenia</i> sp. (of interest)
* <i>Lactuca serriola</i>	Hairy maireana
* <i>Malvastrum americanum</i>	<i>Haloragis</i> sp.
* <i>Melinis repens</i>	<i>Heliotropium</i> sp.
* <i>Oxalis corniculata</i>	<i>Hibiscus</i> sp.
* <i>Portulaca oleracea</i>	<i>Hibiscus</i> sp. indet.
* <i>Portulaca pilosa</i>	<i>Indigofera brevidens</i>
* <i>Rumex vesicarius</i>	<i>Ipomoea</i> sp.
* <i>Setaria verticillata</i>	<i>Iseilema</i> sp.
* <i>Sigesbeckia orientalis</i>	<i>Iseilema</i> sp. indet.
* <i>Solanum nigrum</i>	<i>Iselema</i> sp.
* <i>Sonchus oleraceus</i>	<i>Lamiaceae</i> sp. indet.
* <i>Tribulus terrestris</i>	<i>Lepidium</i> sp.
* <i>Urochloa mosambicensis</i>	<i>Lepidium</i> sp. (indet.)
* <i>Vachellia farnesiana</i>	<i>Lepidium</i> sp. indet.
? ?	<i>Lysiandra arida</i>
? <i>Ammannia</i> sp.	<i>Lysiana</i> sp. indet.
? <i>Convolvulaceae</i> sp.	<i>Macrophyte</i> sp.
? <i>Glycine</i> sp.	<i>Maireana planifolia x villosa</i>
? <i>Ruppia</i> sp.	<i>Maireana</i> sp.
<i>Abutilon dioicum</i>	<i>Maireana</i> sp. (indet.)
<i>Abutilon</i> sp.	<i>Maireana</i> sp. Indet
<i>Abutilon</i> sp. (indet.)	<i>Malvaceae</i> sp.
<i>Abutilon</i> sp. indet.	<i>Malvaceae</i> sp. indet.
<i>Acacia adoxa</i>	<i>Marsdenia</i> sp.
<i>Acacia aneura x</i>	<i>Nicotiana</i> sp.
<i>Acacia aptaneura</i> hybrid	<i>Nicotiana</i> sp. indet.
<i>Acacia aptaneura x</i>	<i>Paspalidium</i> sp.
<i>Acacia aptaneura x aneura</i>	<i>Pandorea pandorana</i>
<i>Acacia aptaneura x paraneura</i>	<i>Peripleura hispidula</i> var. <i>hispidula</i>
<i>Acacia arida x</i>	<i>Peripleura</i> sp.
<i>Acacia ayersiana x</i>	<i>Physalis</i> sp.
<i>Acacia ayersiana x aneura</i>	<i>Pisolithus</i> sp.
<i>Acacia ayersiana x incurvaneura</i>	<i>Pluchea</i> sp.
<i>Acacia bivenosa</i> hybrid	<i>Poaceae</i> sp.
<i>Acacia hilliana x hamersleyensis</i>	<i>Poaceae</i> sp. indet.
<i>Acacia pteraneura x aptaneura</i>	<i>Podaxis pistillaris</i>
<i>Acacia rhodophloia x sibirica</i>	<i>Polygala</i> sp.

<i>Acacia</i> sp.	<i>Portulaca intraterranea/oleracea</i>
<i>Acacia</i> sp. indet.	<i>Portulaca oleracea/intraterranea</i>
<i>Acacia validinervia</i>	<i>Portulaca oleraceae</i>
<i>Acacia viscosa</i>	<i>Pterocaulon</i> sp.
<i>Alternanthera</i> sp.	<i>Ptilotus macrocephalus</i>
<i>Alyxia buxifolia</i>	<i>Ptilotus nobilis</i>
<i>Amaranthus</i> sp.	<i>Ptilotus</i> sp.
<i>Amaranthus</i> sp. indet.	<i>Ptilotus</i> sp.
<i>Amphipogon sericeus</i> (Newman form BR2-21)	<i>Ptilotus</i> sp. (indet.)
<i>Amyema</i> sp.	<i>Ptilotus</i> sp. indet.
<i>Aristida</i> sp.	<i>radinostachya</i> subsp. ?
<i>Aristida</i> sp. indet.	<i>Rhagodia</i> sp.
Asteraceae sp.	<i>Rhodanthe</i> sp. indet.
Asteraceae sp. (indet.)	<i>Rhynchosia</i> sp.
Asteraceae sp. indet. ?	<i>Roebuckiella</i> sp. indet.
<i>Astrebala</i> sp.	<i>Ruppia</i> sp.
<i>Atriplex</i> sp.	<i>Sclerolaena</i> sp.
<i>Boerhavia</i> sp.	<i>Senna artemisioides</i> subsp. <i>oligophylla</i> (thinly sericeous form MET 15,035)
<i>Boerhavia</i> sp. indet.	<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>
<i>Bonamia</i> sp.	<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>S. ferraria</i>
<i>Bothriochloa</i> sp.	<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>S. stricta</i>
<i>Calandrinia</i> sp.	<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x subsp. <i>helmsii</i>
<i>Calandrinia</i> sp. indet.	<i>Senna artemisioides</i> subsp. x <i>artemisioides</i> x <i>S. stricta</i>
<i>Calotis</i> sp.	<i>Senna artemisioides</i> subsp. x <i>artemisioides</i> x subsp. <i>helmsii</i>
<i>Cassytha</i> sp.	<i>Senna ferraria</i> x <i>S. artemisioides</i> subsp. <i>oligophylla</i>
<i>Cassytha</i> sp. indet.	<i>Senna ferraria</i> x <i>S. glutinosa</i> subsp. <i>glutinosa</i>
<i>Cheilanthes</i> sp.	<i>Senna glaucifolia</i> x <i>S. artemisioides</i> subsp. <i>helmsii</i>
Chenopodiaceae sp. indet.	<i>Senna glaucifolia</i> x <i>S. glutinosa</i> subsp. <i>glutinosa</i>
<i>Chloris</i> sp. indet.	<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>S. glaucifolia</i>
<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>	<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>S. glutinosa</i> subsp. x <i>luerssenii</i>
<i>Corchorus</i> sp.	<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>S. stricta</i>
<i>Corchorus</i> sp. indet.	<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x subsp. <i>pruinosa</i>
<i>Corymbia</i> sp.	<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x subsp. x <i>luerssenii</i>
<i>Corynotheca micrantha</i>	<i>Senna glutinosa</i> subsp. <i>pruinosa</i> x <i>S. glaucifolia</i>
Creepers sp.	<i>Senna glutinosa</i> subsp. <i>pruinosa</i> x subsp. x <i>luerssenii</i>
<i>Cucumis</i> sp. (indet.)	<i>Senna</i> sp.
<i>Cullen</i> sp.	<i>Senna</i> sp. Meekatharra (E. Bailey 1-26) x <i>glaucifolia</i>
<i>Cymbopogon</i> sp.	<i>Senna stricta</i> x <i>S. glutinosa</i> subsp. x <i>luerssenii</i>
<i>Cynanchum</i> sp. indet.	<i>Seringia</i> sp.
<i>Cyperus</i> sp.	<i>Setaria</i> ? <i>dielsii</i>
<i>Denhamia cunninghamii</i>	<i>Sida</i> sp.
<i>Dichanthium</i> sp.	<i>Sida</i> sp. (indet.)
<i>Dodonaea amblyophylla</i>	<i>Sida</i> sp. indet.
<i>Dodonaea</i> sp. indet.	<i>Sida</i> sp. nov.
<i>Dodonaea polyzyga</i>	<i>Solanum</i> sp.
<i>Dolichocarpa</i> sp.	<i>Solanum</i> sp. (indet.)
<i>Dolichocarpa</i> sp. nov.	<i>Solanum</i> sp. indet.
<i>Duperreya sericea</i>	<i>Solanum sturtianum</i>
<i>Dysphania</i> sp.	sp. Ident
<i>Dysphania</i> sp. (indet.)	sp. Indet
<i>Enneapogon</i> sp.	<i>Stackhousia</i> sp.
<i>Enneopogon</i> sp.	<i>Stemodia</i> sp. indet.
<i>Eragrostis</i> sp.	<i>Streptoglossa</i> sp.

<i>Eragrostis</i> sp. indet.	<i>Swainsona</i> sp.
<i>Eremophila forrestii</i> x <i>latrobei</i>	<i>Tephrosia</i> sp.
<i>Eremophila latrobei</i> x <i>forrestii</i>	<i>Tephrosia</i> sp. (indet.)
<i>Eremophila macmillaniana</i>	<i>Themeda</i> sp.
<i>Eremophila</i> sp.	<i>Tribulus</i> sp.
<i>Eremophila</i> sp. hybrid	<i>Tricoryne corynothecoides</i>
<i>Eriachne</i> sp.	<i>Triodia</i> sp.
<i>Eriachne</i> sp. (indet.)	<i>Triodia</i> sp. indet.
<i>Eriachne</i> sp. indet.	<i>Vallisneria</i> sp.
<i>Eriochloa</i> sp.	<i>Vincetoxicum</i> sp. indet.
<i>Eucalyptus</i> sp.	<i>Wahlenbergia</i> sp.
<i>Eucalyptus</i> sp. indet.	white flower herb
<i>Eucalyptus xerothermica</i> x <i>Eucalyptus tephrodes</i>	<i>Xerochrysum bracteatum</i>
<i>Eulalia</i> sp.	<i>Zygophyllum</i> sp.



Appendix C Flora database search results

West Angelas NVCP 1

Flora, Vegetation, and Fauna Desktop Assessment

Rio Tinto Iron Ore

SLR Project No.: 675.072156.00001

15 April 2024

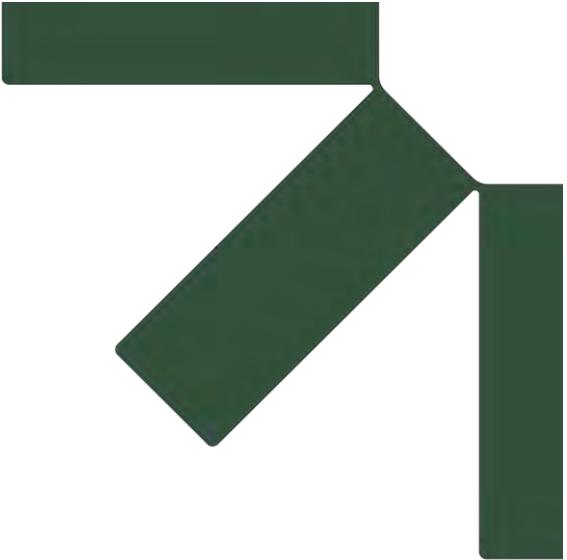
Flora Database Search Results

Conservation Status: State - Listed under Biodiversity Conservation Act 2016 or Department of Biodiversity, Conservation and Attractions Conservation, Federal - Listed under Environmental Protection and Biodiversity Conservation Act 1999. CR - Critically Endangered, EN - Endangered, VU - Vulnerable, P - Listed as Priority by DBCA.

Species	Conservation Status		Source				
	State	Federal	NM	PMST	DBCA	RTIO	Literature
<i>Seringia exastia</i>	-	CR	X			X	X
<i>Thryptomene wittweri</i>	T	VU	X	X	X		
<i>Dicrasyllis mitchellii</i>	P1		X		X		
<i>Eremophila tenella</i>	P1		X				
<i>Hibiscus</i> sp. Mt Brockman (E. Thoma ET 1354)	P1					X	X
<i>Isotropis forrestii</i>	P1					X	X
<i>Rhodanthe ascendens</i>	P1		X		X		
<i>Sida</i> sp. Turee Creek (P.-L.de Kock PLDK1116)	P1		X		X		
<i>Aristida lazaridis</i>	P2		X		X	X	X
<i>Arthropodium vanleeuwenii</i>	P2		X		X		
<i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109)	P2		X		X	X	X
<i>Eremophila pusilliflora</i>	P2		X		X	X	X
<i>Eremophila</i> sp. West Angelas (S. van Leeuwen 4068)	P2		X		X	X	X
<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	P2					X	X
<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i>	P2		X		X		
<i>Hibiscus</i> sp. Gurinbiddy Range (M.E. Trudgen MET 15708)	P2		X		X	X	X
<i>Ipomoea racemigera</i>	P2					X	X
<i>Neptunia longipila</i>	P2		X		X		
<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	P2		X		X	X	X
<i>Pentalepis trichodesmoides</i> subsp. <i>hispida</i>	P2					X	X
<i>Tetradlea fordiana</i>	P2		X		X	X	X
<i>Teucrium pilbaranum</i>	P2		X				
<i>Triodia karijini</i>	P2		X		X		
<i>Acacia dawweana</i>	P3		X		X	X	X
<i>Acacia effusa</i>	P3		X		X	X	X
<i>Acacia subtiliformis</i>	P3		X		X	X	X
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	P3		X		X	X	X
<i>Dampiera metallorum</i>	P3		X		X	X	X
<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3				X	X	X
<i>Eremophila magnifica</i> subsp. <i>velutina</i>	P3		X		X	X	X
<i>Eremophila naaykensis</i>	P3		X		X	X	X
<i>Eremophila rigida</i>	P3		X		X		
<i>Euphorbia clementii</i>	P3		X			X	X
<i>Euphorbia stevenii</i>	P3		X		X		
<i>Fimbristylis sieberiana</i>	P3						X
<i>Geijera salicifolia</i>	P3					X	X
<i>Goodenia lyrata</i>	P3		X		X	X	X

Flora Database Search Results

Species	Conservation Status		Source				
	State	Federal	NM	PMST	DBCA	RTIO	Literature
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	P3		X		X	X	X
<i>Grevillea saxicola</i>	P3		X		X	X	X
<i>Gymnanthera cunninghamii</i>	P3					X	X
<i>Indigofera gilesii</i>	P3		X		X	X	X
<i>Isotropis parviflora</i>	P3		X		X	X	X
<i>Nicotiana umbratica</i>	P3						X
<i>Olearia mucronata</i>	P3		X		X	X	X
<i>Pilbara trudgenii</i>	P3		X		X	X	X
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	P3		X		X	X	X
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	P3		X		X	X	X
<i>Sida</i> sp. Hamersley Range (K. Newbey 10692)	P3		X		X	X	X
<i>Solanum kentrocaule</i>	P3		X		X	X	X
<i>Stackhousia clementii</i>	P3		X		X		
<i>Streptoglossa</i> sp. Cracking clays (S. van Leeuwen et al. PBS 7353)	P3		X		X	X	X
<i>Stylidium weeliwollii</i>	P3		X		X		X
<i>Swainsona thompsoniana</i>	P3		X		X	X	X
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3		X		X	X	X
<i>Triodia basitricha</i>	P3		X		X		
<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)	P3		X		X	X	X
<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)	P3		X		X	X	X
<i>Acacia bromilowiana</i>	P4		X		X	X	X
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	P4		X		X	X	X
<i>Lepidium catapycnon</i>	P4		X		X	X	X
<i>Ptilotus mollis</i>	P4		X		X	X	X
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	P4		X		X	X	X



Appendix D Fauna database search results

West Angelas NVCP 1

Flora, Vegetation, and Fauna Desktop Assessment

Rio Tinto Iron Ore

SLR Project No.: 675.072156.00001

15 April 2024

Conservation Status: State - Listed under Biodiversity Conservation Act 2016 or Department of Biodiversity, Conservation and Attractions Conservation, Federal - Listed under Environmental Protection and Biodiversity Conservation Act 1999. CR - Critically Endangered, EN - Endangered, VU - Vulnerable, MI - Migratory, CD - Conservation Dependent fauna, OS - Other Specially Protected fauna, MA - Marine, P - Listed as Priority by DBCA.

Database: NM - NatureMap, PMST - EPBC Protected Matters Search Tool, DBCA - DBCA Threatened and Priority Fauna database search, Field - Recorded during the current field survey.

Literature: A - Greater West Angelas Terrestrial Fauna Assessment (Ecologia Environment, 2014)
Literature: B - Hope Downs 2 Proposal – Ghost Bat Cave Characteristics, February/March 2020 (Astron Environmental Services, 2020a)
Literature: C - Hope Downs 2 Proposal Fauna Survey (Astron Environmental Services, 2019a)
Literature: D - Flora, Vegetation and Fauna Habitat Assessment at Juna Downs Native Vegetation Clearing Permit – Supporting Report (Rio Tinto Iron Ore, 2016b)
Literature: E - West Angelas - Deposit B and F Ghost Bat Assessment (Biologic Environmental Survey, 2014)
Literature: F - 2017 West Angelas Ghost Bat Monitoring (Biologic Environmental Survey, 2018)
Literature: G - West Angelas Gas Pipeline Native Vegetation Clearing Permit (B-2018-007) (Biota Environmental Services, 2019)
Literature: H - West Angelas Deposit G – Basic and Targeted Fauna Survey 2022 (Biologic Environmental Survey, 2022f)
Literature: I - West Angelas Beyond 2020 Level 2 Vertebrate Fauna, SRE Invertebrate and Fauna Assessment Phase 1 and 2 (Biologic Environmental Survey, 2019b)
Literature: J - West Angelas Beyond 2020: Targeted Vertebrate Fauna Survey
Literature: K - West Angelas Managed Aquifer Targeted Flora and Fauna Survey (Biologic Environmental Survey, 2023b)
Literature: L - West Angelas Beyond 2020 Infrastructure Corridors Reconnaissance and Targeted Survey (Biologic Environmental Survey, 2022c)
Literature: M - West Angelas Beyond 2020 Mt Ella East and Dep J Detailed and Targeted Survey (Biologic Environmental Survey, 2022d)
Literature: N - West Angelas Deposit F North and Deposit H Areas Fauna Survey (Biologic Environmental Survey, 2022e)
Literature: O - Metadata Statement – Beyond 2020 Deposit F and Deposit H Additional Areas (Rio Tinto Iron Ore, 2022)

Family	Scientific Name	Common Name	Conservation Status		Database				Literature															
			State	EPBC	RTIO	DBCA	NM	PMST	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
Amphibians																								
Limnodynastidae	<i>Neobatrachus aquilonius</i>	Northern Burrowing Frog						1																
Limnodynastidae	<i>Neobatrachus sutor</i>	Shoemaker Frog						6																
Myobatrachidae	<i>Pseudophryne douglasi</i>	Gorge Toadlet						2																
Myobatrachidae	<i>Uperoleia russelli</i>	Northwest Toadlet						6																
Pelodyridae	<i>Cyclorana maini</i>	Sheep Frog			14			297				1												
Pelodyridae	<i>Cyclorana occidentalis</i>	Western Water-holding Frog						1																
Pelodyridae	<i>Litoria rubella</i>	Little Red Tree Frog			80			43				1												
Birds																								
Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill, Broadtailed Thornbill			65			113		59		1												
Acanthizidae	<i>Acanthiza chrysorrhoa</i>	Yellowrumped Thornbill			2			16																
Acanthizidae	<i>Acanthiza robustirostris</i>	Slatybacked Thornbill			8			53				1												
Acanthizidae	<i>Acanthiza uropygialis</i>	Chestnutrumped Thornbill			26			93		54		1												
Acanthizidae	<i>Aphelocephala leucopsis</i>	Southern Whiteface		VU				2	1															
Acanthizidae	<i>Aphelocephala nigricincta</i>	Banded Whiteface						1																
Acanthizidae	<i>Gerygone fusca</i>	Western Gerygone			92			157		66		1												
Acanthizidae	<i>Pyrrholaemus brunneus</i>	Redthroat			1			31																
Acanthizidae	<i>Smicromis brevirostris</i>	Weebill			367			656		411		1												
Accipitridae	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk			4			15		2														
Accipitridae	<i>Accipiter fasciatus</i>	Brown Goshawk		MA (overfly marine area)	11			16		1		1												
Accipitridae	<i>Aquila audax</i>	Wedgetailed Eagle			11			34		4		1												
Accipitridae	<i>Circus assimilis</i>	Spotted Harrier			32			30		25		1												
Accipitridae	<i>Elanus axillaris</i>	Blackshouldered Kite			9			9		7		1												
Accipitridae	<i>Elanus scriptus</i>	Letterwinged Kite	P4		2		1	1				1												
Accipitridae	<i>Erythrotriorchis radiatus</i>	Red Goshawk	VU	EN					1															
Accipitridae	<i>Haliastur sphenurus</i>	Whistling Kite		MA (overfly marine area)	23			36		2		1												
Accipitridae	<i>Hamirostra melanostemon</i>	Blackbreasted Buzzard			8			9				1												

Varanidae	<i>Varanus acanthurus</i>	Spinytailed Goanna			73	97	30	1												
Varanidae	<i>Varanus breviceuda</i>	Shorttailed Pygmy Goanna			32	46	14	1												
Varanidae	<i>Varanus bushi</i>	Pilbara Mulga Goanna			13	21	9	1												
Varanidae	<i>Varanus caudolineatus</i>				6	12	1	1												
Varanidae	<i>Varanus eremius</i>	Pygmy Desert Goanna				7														
Varanidae	<i>Varanus giganteus</i>	Perentie			44	6	3	1												
Varanidae	<i>Varanus gilleni</i>	Pygmy Mulga Goanna			1															
Varanidae	<i>Varanus gouldii</i>	Bungarra Or Sand Goanna			12	6		1												
Varanidae	<i>Varanus hamersleyensis</i>	Southern Pilbara Rock Goanna			27															
Varanidae	<i>Varanus panoptes</i>	YellowSpotted Monitor			14	15	5	1												
Varanidae	<i>Varanus pilbarensis</i>	Northern Pilbara Rock Goanna				10														
Varanidae	<i>Varanus tristis</i>	Racehorse Goanna			31	28	10	1												

