

Native Vegetation Clearing Permit - Supporting Document

Murray's Hill Project

Mulga Downs Iron Ore Pty Ltd
ACN 080 659 150

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Revision Register

REV	DATE	NAME	DESCRIPTION OF CHANGES
0	25/03/2025	JBS&G	First draft for client review.
1	12/05/2025	JBS&G	Final revision incorporating client comments.
2	28/01/2026	HanRoy	Submission to DMPE.

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1 Permit Application Details

1.1 Background

Mulga Downs Iron Ore Proprietary Limited (**MDIO**) (the **Proponent**) intends to construct and operate the Murray's Hill Project and associated supporting infrastructure (the **Project**). The Project is situated approximately 230 kilometres (**km**) south of Port Hedland and 100 km north-east of Tom Price (**Figure 1-1**).

This Native Vegetation Clearing Permit (**NVCP**) supporting document provides additional information to that included in the NVCP application form NV-F01 for proposed clearing associated with the Project.

The scope of the Project comprises:

- Mining of ore from a single open pit;
- Construction and operation of a 400-person accommodation camp and associated infrastructure.
- Water supply bores and pipeline infrastructure.
- Fuel storage facilities.
- Waste Water Treatment Plants (WWTP), discharging to an irrigation spray field.
- Reverse Osmosis (RO) Plant.
- Communications Services.
- Contractor compounds consisting of:
 - Laydown areas;
 - Workshops; and
 - Office and administration facilities.
- Associated access and internal roads.

The proposed Application Area sits wholly within the Mulga Downs Pastoral Station on the western edge of the Chichester Range. The Pastoral Station has been an active pastoral enterprise since the early 20th century. Mulga Downs Pastoral Lease (Lease N049796 and N020370) is independently owned and operated jointly by Mrs. Gina Rinehart and Hancock Prospecting Pty Ltd (HPPL, the parent company of MDIO); the lease is used for low intensity cattle grazing.

The proposed Application Area is located within the Banjima Native Title determination area (**Figure 1-2**). The Banjima Traditional Owners hold native title rights and interests over approximately 10,185 km² as determined by the Federal Court in September 2018 (WCD 2014/001/WAD6096/1998). The Banjima Traditional Owners are represented by Banjima Native Title Aboriginal Corporation (BNTAC).

The Project seeks to clear up to 394.5 hectares (**ha**) (the **Clearing Area**) of native vegetation within a larger Application Area of 2,160.8 ha. The Application Area has been sized to allow for some flexibility during final detailed design without the need for a revision of the permit.

To support the Project, all relevant baseline surveys and technical investigations are provided as Appendices and are referenced where relevant throughout this supporting document.

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1.2 Approvals Background

The Murray's Hill Project is a stand-alone, 5 Million Tonnes Per Annum (**Mtpa**) direct shipping ore (**DSO**) mine with a life of up to five years (including decommissioning and rehabilitation) proposed by MDIO. The Murray's Hill project involves only above water table (**AWT**) mining of ore from a single open pit, crushing and screening, associated mining infrastructure, accommodation camp and roads.

The Murray's Hill Project was referred to the Environmental Protection Authority (**EPA**) in 2013 (reference number 13-0000243207 EPA 2013). The EPA's decision was that it did not require formal environmental impact assessment under Part IV of the *Environmental Protection Act 1986* (**EP Act**) (Do Not Assess), deferring it to the now named Department of Mines, Petroleum and Exploration (**DMPE**) for assessment under Part V of the EP Act and the Mining Act (Ref Id 13-243207, 12 Aug 2013). The referred Murray's Hill Development Envelope covered a total area of 3,018 ha within which up to 890 ha would be required to implement the Project. As a result of ongoing mine design and with greater knowledge gained from the studies and investigations, the Project has been planned to minimise impacts where possible. As a result, both the Development Envelope (EPA) (Application Area (NVCP)) and Disturbance Footprint (EPA) (Clearing Area (NVCP)) has been significantly reduced.

This NVCP relates only to the development of the Murray's Hill Project, including a pit, a 400-person accommodation camp and associated infrastructure.

The Application Area sits partially within Miscellaneous Licence 45/769 (**L45/769**) which is held by MDIO Pty Ltd. L45/769 co-exists with Retention Licence R47/12 also held by MDIO Pty Ltd which is subject to application for Mining Lease 47/1621 on which both the Mulga Downs Iron Ore Mine (**MDIOM**) and Murray's Hill Project will be located. The Application Area covers an area of 2,160.8 ha, with a conceptual Clearing Area of 394.5 ha (**Figure 1-3**). The Application Area has been sized to allow for some flexibility during final detailed design.

1.2.1 Mulga Downs Iron Ore Mine

The Application Area sits entirely within the MDIOM Development Envelope. The MDIOM is currently under assessment by the EPA under Part IV of the EP Act (**Assessment No. 2326**) and the Commonwealth Department of Climate Change, Energy, the Environment and Water (**DCCEEW**) under the *Environmental Protection Act and Biodiversity Conservation Act 1999* (**EPBC Act, 2022/09255**).

The EPA assessment of the MDIOM excludes the Murray's Hill Project (as detailed above), as the Murray's Hill Project has previously been considered by the EPA. The Commonwealth assessment includes the Murray's Hill Project. HPPL anticipate receiving Commonwealth approval for the MDIOM inclusive of Murray's Hill in early 2026 (this is a key approvals dependency for Project implementation). HPPL proposes to develop the MDIOM and the Murray's Hill Mine in parallel or as a single development.

1.3 Proponent

The Proponent for this NVCP is Mulga Downs Iron Ore Pty Ltd (ACN 080 659 150) (MDIO). MDIO's details are shown in Table 1-1.

HPPL, the parent company of MDIO, is an independent, privately owned Australian company that has a long history within the iron ore sector and Pilbara region of Western Australia. HPPL holds retention, exploration and

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miscellaneous tenements located across the Mulga Downs Pastoral Station and adjacent land in the Central Pilbara region. HPPL has been exploring the tenements held across the Mulga Downs Pastoral Station, and adjacent Mt Florance and Hooley Station Pastoral Stations, since the late 2000s and is currently in the process of applying to convert relevant Mulga Downs project tenure into a mining lease.

HanRoy Iron Ore Projects Pty Limited (HanRoy) is the HPPL subsidiary that undertakes project development activities on behalf of HPPL group companies, including development of the Murray's Hill Project and the Mulga Downs mine. HanRoy undertakes all project development activities in accordance with its Environmental Policy provided Appendix 1. To implement this policy, HanRoy will develop an Environmental Management System (EMS) for the Project and the broader MDIOM, aligned with that of Roy Hill and to the requirements of ISO 14001. The EMS provides a structured, strategic approach to environmental management, and ensures environmental risks and issues are identified and managed, and regulatory obligations are met in accordance with the HanRoy Environment Policy. Both HanRoy and MDIO (HPPL) are committed to minimising potential harm to the natural environment, local visual amenity and biodiversity, as well as preventing pollution whilst implementing its activities.

Table 1-1: Proponent Details

Proponent	Mulga Downs Iron Ore Pty Ltd (ACN 080 659 150)
Contact Person	Brett McGuire Environmental Manager brett.mcguire@hanroy.com.au

1.4 Assessment Process

This supporting document assesses the Application Area by placing it within the broader context of the defined Study Area (**Figure 1-1**). The Study Area is a 40 km buffer from the outer boundary of the Application Area, and includes:

- Department of Biodiversity Conservation and Attractions (DBCA) records; and
- The Biological Survey Boundary: this boundary extends beyond 1 km of the Application Area and provides information additional to the DBCA records within the Study Area. This includes detailed ecological studies which have been completed for the broader MDIOM (including the Mulga Hub and Rail Spur).

The assessment involves a multi-faceted approach, encompassing items such as detailed surveys of flora and fauna, soils and geology, and hydrological analyses. The Application Area's specific characteristics, such as vegetation composition, habitat quality, and potential for rare or endangered species, were compared with the surrounding Study Area.

This comparative analysis allows for a determination of the ecological significance of the Application Area when assessing against the 10 Clearing Principles. For example, the Application Area's contribution to regional biodiversity, and the potential impacts of clearing relative to the overall environmental values of the Study Area. This process ensures a comprehensive understanding of the proposed clearing's implications within the larger ecological framework.

1.5 Alternatives Considered and Actions to Minimise Clearing Impacts

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As noted previously, as a result of ongoing mine design and with greater knowledge gained from the studies and investigations, both the Development Envelope (Application Area) and Disturbance Footprint (Clearing Area) of the original referral Project has been significantly reduced (55.67% reduction to the Disturbance Footprint).

Clearing will be further minimised by:

- Clear demarcation of the area of vegetation required to be cleared prior to works commencing;
- All ground disturbing works will be undertaken in accordance with HPPL's Ground Disturbance Procedure (**GDP**);
- Clearing areas will be surveyed for reporting in accordance with permit requirements;
- Where possible, work will be conducted in existing cleared areas and disturbances to water courses will be minimised; and
- Surface water flow will be considered when clearing native vegetation.

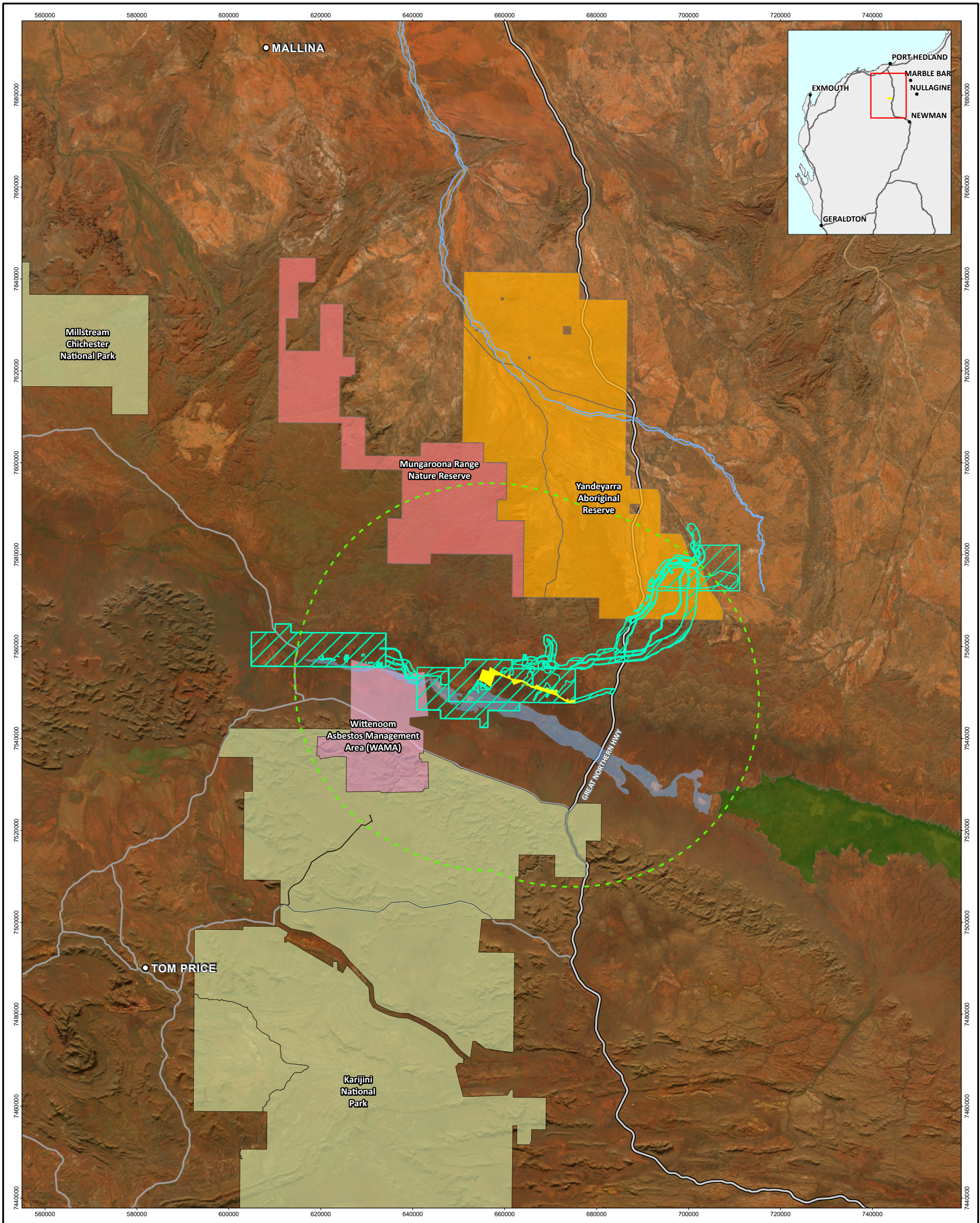
Further information on the measures to further avoid or minimise the extent of clearing is provided in **Section 3 Approvals and Management**.


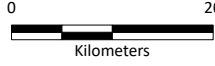

Several management plans have been submitted to EPA and DCCEEW to support the impact assessment of the wider MDIOM under the EP Act and EPBC Act. These management plans are currently in draft form and are under assessment. However, these management plans will be implemented for the Project where applicable. HanRoy will also implement internal standards and procedures to minimise clearing and resulting impacts to the environment.

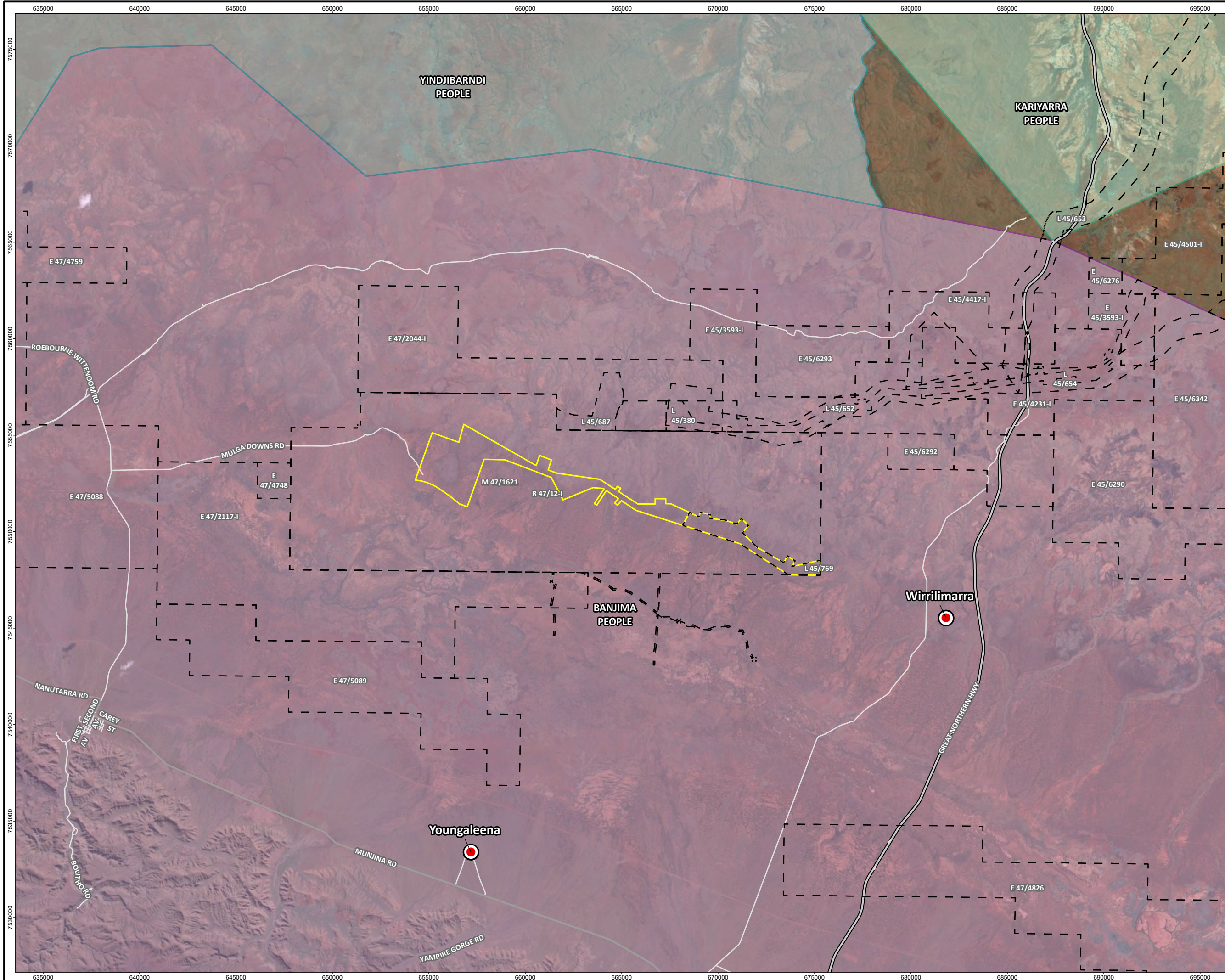
These are further outlined in **Section 3 Approvals and Management**.

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Legend <ul style="list-style-type: none"> Application Area 40 km Study Area Biological Survey Area Boundary Wittenoom Asbestos Management Area (WAMA) (DWER-059) 	Legislated Lands and Waters (DBCA-011) <ul style="list-style-type: none"> National Park Nature Reserve Yandeyarra Aboriginal Reserve (LGATE-227) 	<ul style="list-style-type: none"> Upper Fortescue River including the Fortescue Watercourses Highway Major road Town site (LGATE - 013) 	 Job Number: 68676 Client: Hancock Prospecting Pty Ltd (HPPL) Drawn By: droberts Checked By: LL Version: Rev A Date: 25-Mar-2025	 Scale 1:750,000 at A3  Coord. Sys. GDA2020 MGA Zone 50	Murray's Hill Project, Central Pilbara, Western Australia PROJECT LOCATION, BIOLOGICAL SURVEY BOUNDARY, AND STUDY AREA FIGURE: 1.1
	<ul style="list-style-type: none"> Directory of important wetlands (DBCA-045) Lower Fortescue River 				

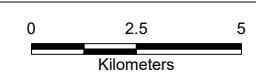


- Legend**
- Application Area
 - Mining Tenements (DMIRS-003 Native Title Determination)
 - Banjima People
 - Kariyarra People
 - Yindjibarndi People
 - Roads (LGATE - 195)
 - Highway
 - Major road
 - Minor road
 - Remote Aboriginal Community



Job No: 68677
 Client: Hancock Prospecting Pty Ltd (HPPL)
 Version: A Date: 25-Mar-2025
 Drawn By: droberts Checked By: LL

Scale 1:180,000 at A3



Coord. Sys. GDA2020 MGA Zone 50

**Murray's Hill Project,
 Central Pilbara, Western Australia**

SENSITIVE RECEPTORS

FIGURE 1.2

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 Image Reference: World Imagery: Earthstar Geographics www.nearmap.com© - Imagery Date: 28. May 2022.



- Legend**
- Application Area
 - Mining Tenements (DMIRS-003)
 - L 45/769
 - M 47/1621
 - R 47/12-I
 - Roads (LGATE - 195)
 - Minor road
 - Track



Job No: 68677
 Client: Hancock Prospecting Pty Ltd (HPPL)
 Version: A Date: 10-Mar-2025
 Drawn By: droberts Checked By: LL

Scale 1:62,000 at A3

Coord. Sys. GDA2020 MGA Zone 50

Murray's Hill Project, Central Pilbara, Western Australia

TENEMENTS

FIGURE 1.3

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Murray's Hill Project

2 Site Description

2.1 Regional Context

The Project is located within Central Pilbara region of Western Australia. Specifically, it is located within the Chichester Range to the west of the Great Northern Highway. The Chichester Range comprises low-lying hills, which rise to approximately 30 to 40 m above the level of the adjacent flood plains for the Fortescue River to the south and Yule River to the north (or between 406 m Australian Height Datum (**AHD**) and 490 mAHD) (MWH, 2012).

The Pilbara region of Western Australia spans an area greater than 178,000 km². It is bordered to the west and east by the more recent sedimentary Carnarvon and Canning basins respectively. The southern boundary of the Pilbara region is the biogeographic boundary known as the Acacia-Triodia line. This line, or more accurately transition zone, is where woody Acacia vegetation that dominates the landscape to the south transitions to the north where spinifex vegetation dominates (Beard, 1975; Beard, 1990; Maslin, van Leeuwen, & Pinder, 2008).

The Pilbara region may be more accurately delineated or spatially defined with respect to characteristics including geology, landforms, climate and vegetation as described by Thackway and Cresswell (1995).

The Pilbara craton comprises Archaean and Proterozoic rocks eroded to form the classic landforms observed today, for example the Hamersley Ranges and gorges and the Fortescue River valley (Pepper, Doughty, & Keogh, 2013).

The region is characterised by hot summers with cyclonic activity and thunderstorms and long dry seasons during winter.

The Pilbara is located in the Eremaean Province and is typified by vegetation of the Fortescue, Chichester and Hamersley botanical districts (Beard, 1990).

2.2 Land Systems

The Application Area lies within the Newman and Jamindie land systems (GIS Database – DPIRD-063). These land systems have been mapped and described in technical bulletins produced by the former Department of Agriculture (now the Department of Primary Industries and Regional Development (**DPIRD**)).

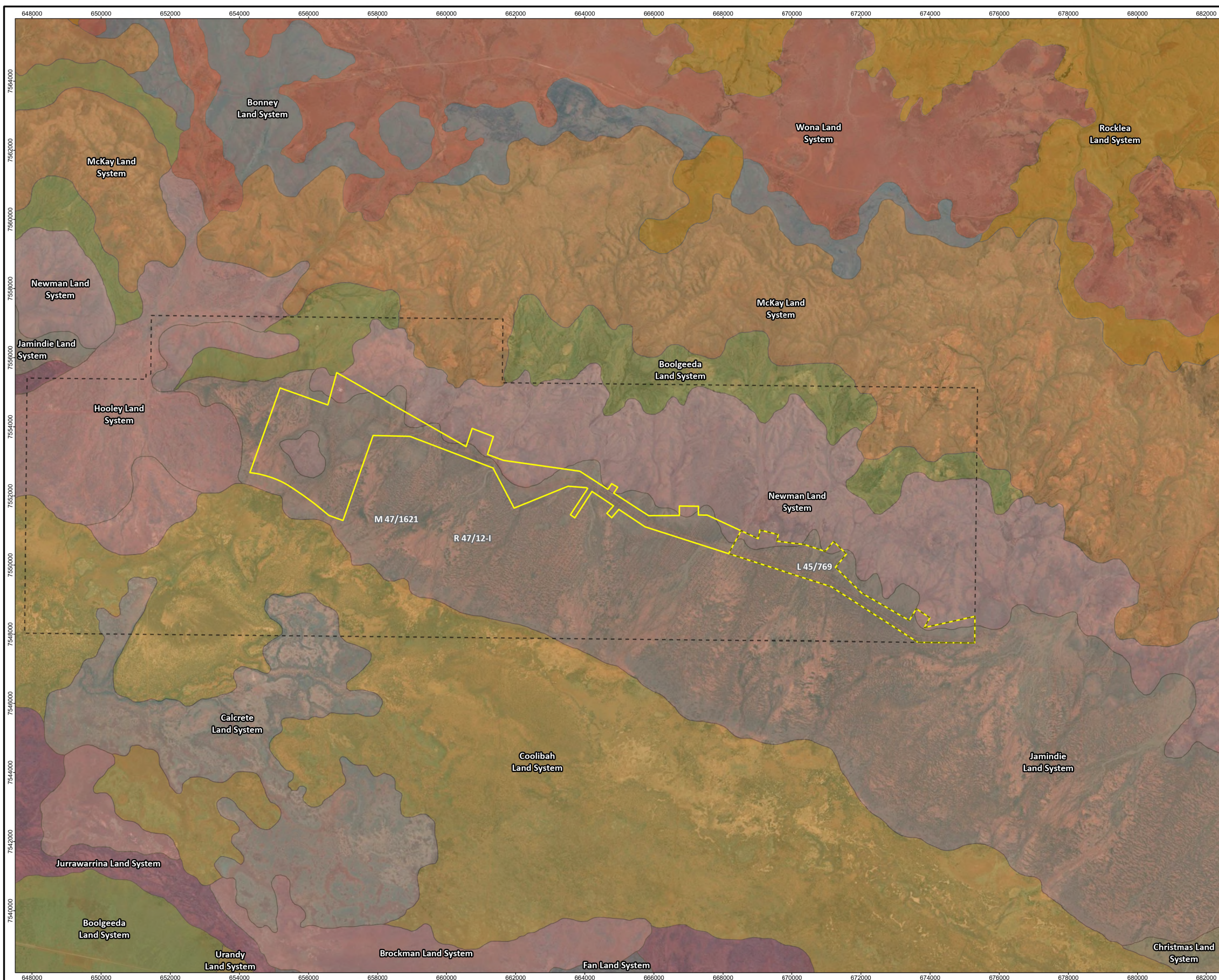
The Jamindie land system is described as stony hardpan plains and rises supporting groved mulga shrublands, occasionally with spinifex understorey. This land system has a low water / wind erosion hazard due to stony mantle and rock outcrop (van Vreeswyk, Leighton, Payne, & Hennig, 2004).

The Newman land system is described as rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands. This land system also has a low water / wind erosion hazard due to stony mantle and rock outcrop (van Vreeswyk, Leighton, Payne, & Hennig, 2004).

These land systems are displayed in **Figure 2-1**.

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- Legend**
- Application Area
 - Mining Tenements (DMIRS-003)
 - Landsystems (DPIRD-063)**
 - Bonney Land System
 - Boolgeeda Land System
 - Brockman Land System
 - Calcrete Land System
 - Christmas Land System
 - Coolibah Land System
 - Fan Land System
 - Hooley Land System
 - Jamindie Land System
 - Jurrawarrina Land System
 - McKay Land System
 - Newman Land System
 - Rocklea Land System
 - Urandy Land System
 - Wona Land System



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**Murray's Hill Project,
 Central Pilbara, Western Australia**

LAND SYSTEMS

FIGURE 2.1

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 Image Reference: World Imagery: Earthstar Geographics

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2.3 Soils and Geology

The Pilbara region occupies the northern most portion of the ancient Western Shield (Beard, 1990). It is a distinct geological entity which is very different from the surrounding regions (Pepper, Doughty, & Keogh, 2013). The region is defined by the underlying sedimentary, volcanic and igneous rocks of the Pilbara craton, some of which are up to 3.72 billion years old (Pepper, Doughty, & Keogh, 2013).

To the north, the Archaean granites and metamorphosed volcanic rocks of the Pilbara Block form the undulating hills and plains observed throughout the Abydos Plain and Yule and De Grey River catchments. To the south these older rocks are stratigraphically overlain by Archaean and Proterozoic basalts and iron rich sedimentary rocks (Banded Iron Formation – BIF) that comprise the Hamersley Basin (Beard, 1990; van Vreeswyk, Leighton, Payne, & Hennig, 2004; van Kranendonk, Hickman, Smithies, & Nelson, 2002; Pepper, Doughty, & Keogh, 2013). The Fortescue Valley forms part of the larger Hamersley Basin.

The Project is located along the northern boundary of the Hamersley Basin Province and within the Pilbara Terrain to the north. **Figure 2-2** illustrates the spatial area occupied by these geological provinces.

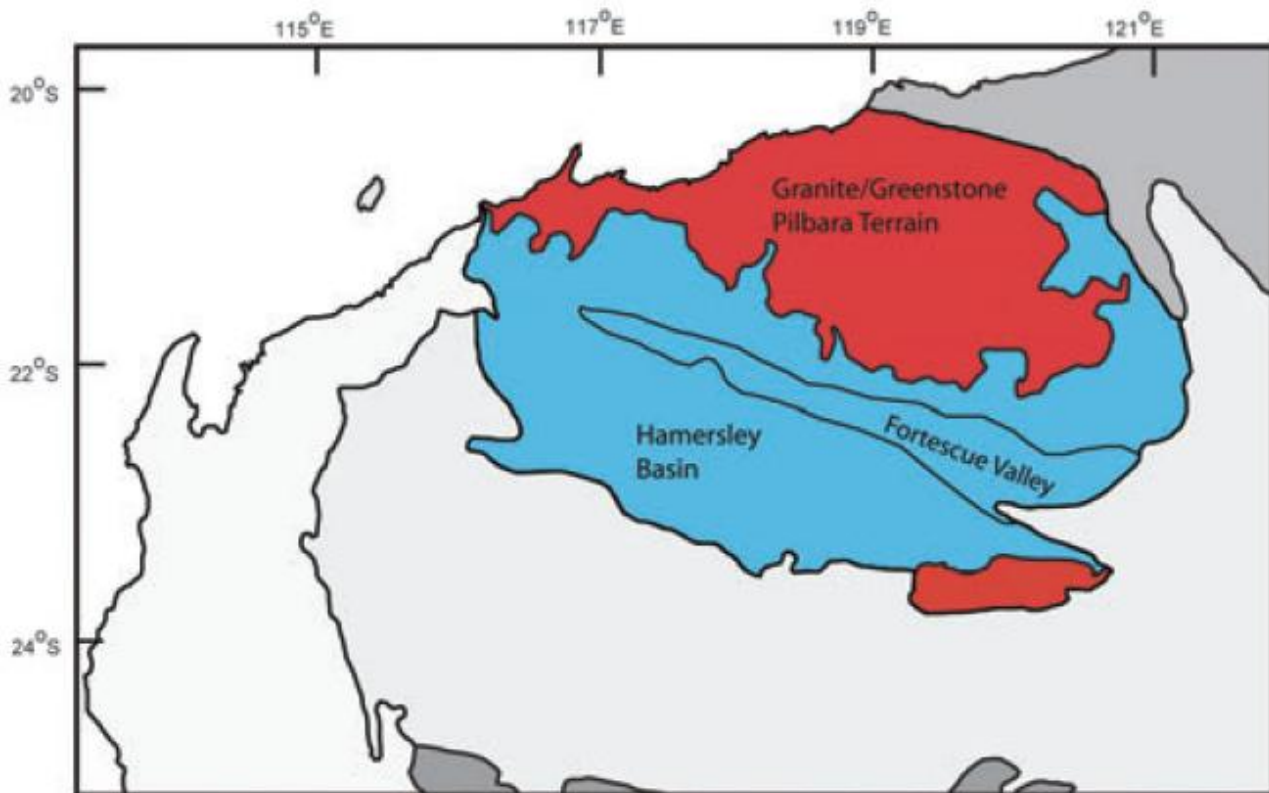


Figure 2-2: Simplified Pilbara Geology (Pepper, Doughty, & Keogh, 2013)

2.4 Australia's Interim Biogeographic Regionalisation for Australia Subregion

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies the land surface of Australia from a range of environmental attributes into bioregions. The bioregions have been developed at the national level to

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assess and plan for the protection of biological diversity (Thackway & Cresswell, 1995). IBRA defines 89 bioregions and 419 subregions in Australia.

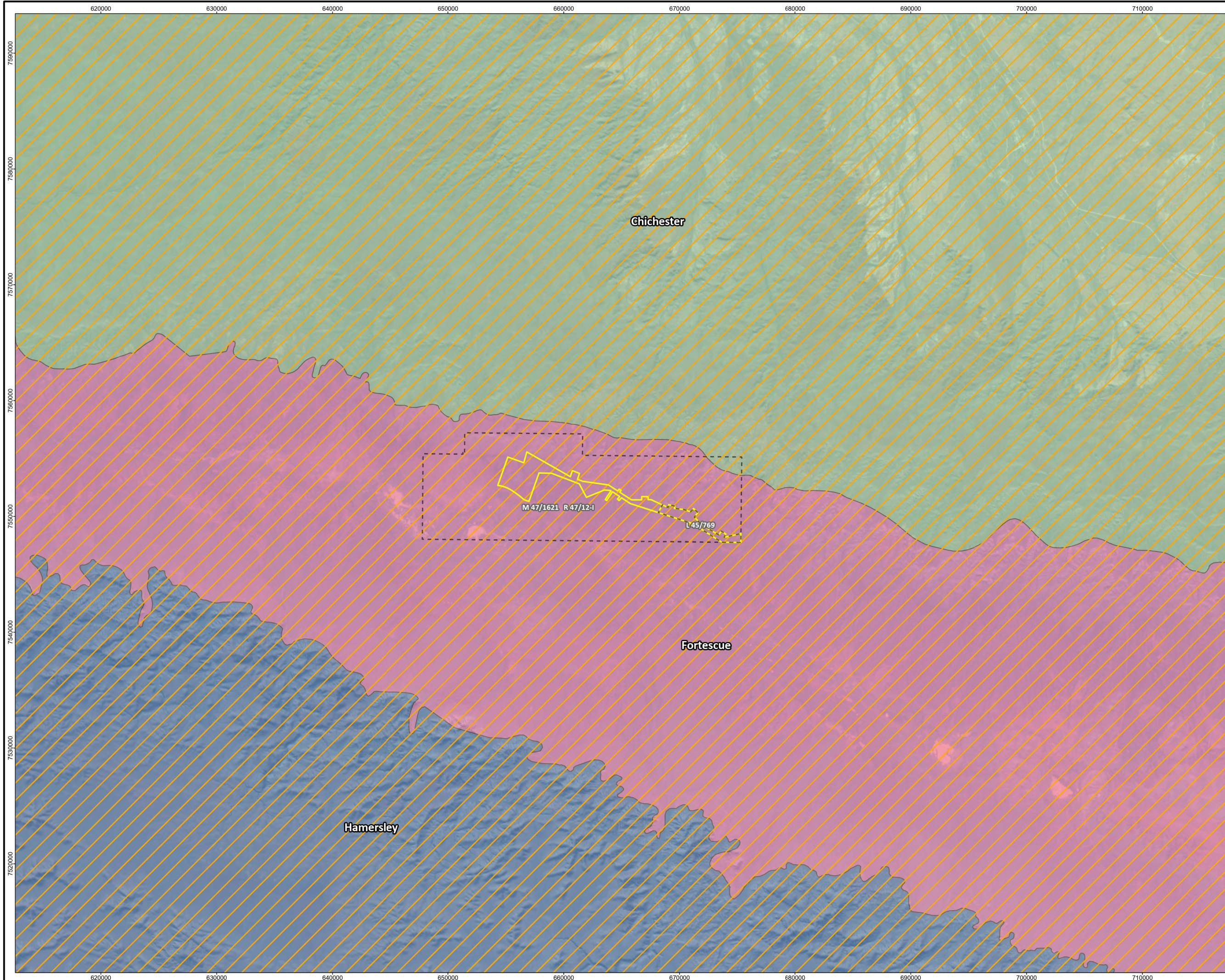
Twenty-six bioregions occur in Western Australia, which are then further defined into subregions. Subregions may be defined based on finer differences in geology, vegetation and other landform patterns which are related systems within each bioregion.

The Application Area is within the Fortescue Plains subregion (**Figure 2-3**), which can be classified as alluvial with river frontages, extensive salt marsh, mulga-bunch grass, and short grass communities on the plains in the east. River gum woodlands fringe the drainage lines and extensive calcrete aquifer feeds numerous permanent springs in the central part of the region. The area supports a large permanent wetland with extensive stands of river gum and cajuput (Kendrick, 2001).

The Fortescue Plains sub-region occupies an area of 1,951,434.93 ha, with the dominant land uses being grazing of native pastures, conservation areas, Unallocated Crown Land (**UCL**), Crown reserves and Aboriginal land. The Fortescue Marsh is located within the Fortescue Plains sub-region and is described as an episodically inundated samphire marsh. The marsh covers an area of approximately 1,000 km² and is about 100 km long by 10 km wide. The marsh contains various wetland types, including riverine floodplains, river flats, flooded river basins, seasonally flooded grassland, savannah, and palm savannah. The site also consists of seasonal or intermittent freshwater and floodplain lakes (Maia Environmental, 2022).

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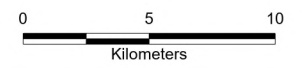


- Legend**
- Application Area
 - Mining Tenements (DMIRS-003)
 - IBRA regions (DCCEEW)
 - Pilbara IBRA Region
 - IBRA subregions (DCCEEW)
 - Chichester
 - Fortescue
 - Hamersley



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**Murray's Hill Project,
 Central Pilbara, Western Australia**

BIOGEOGRAPHIC REGION

FIGURE 2.3

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Murray's Hill Project

2.5 Climate

The Project is located within the inland portion of the Pilbara region of Western Australia. The climate can be described as semi-desert tropical climate with high summer temperatures, low rainfall and high evaporation. Two distinct seasons comprising a hot summer extending from October to April where maximum daily temperatures can exceed 35 degrees Celsius (°C) and a mild winter from May to September. The region may often experience up to twelve (12) months of dry weather with hot dry summers and mild winters. Rainfall is typically associated with cyclonic and storm weather systems (van Vreeswyk, Leighton, Payne, & Hennig, 2004).

The closest Bureau of Meteorology (BoM) weather station with climate recording data is Wittenoom (station number 005026) (Figure 2-4), approximately 35 km south-west of the south-western section of the Application Area. Wittenoom station closed in 2019. Karijini North (station number 005098) (Figure 2-5), approximately 13 km southeast of Wittenoom and 32 km south-west of the Application Area, is now the closest and used for the most recent climate trends in the region. The Karijini North station began recording in 2018. Data from both stations was used to provide climate statistics for the Project.

According to climate data, highest temperatures occur in December, with average monthly maximum reaching 40.7°C while lowest temperatures occur in July, which has an average monthly minimum of 11.6°C. Average yearly rainfall is approximately 457mm (BoM, 2025a; BoM, 2025b).

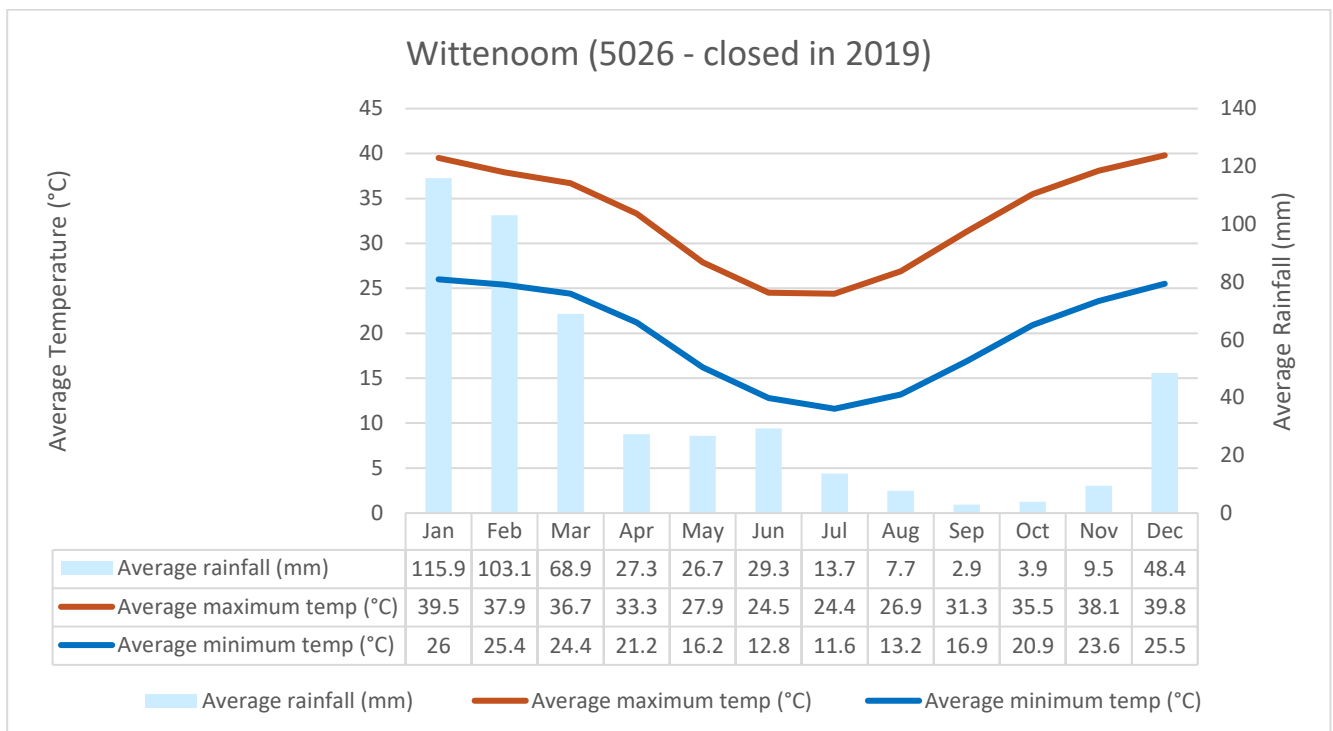


Figure 2-4: Mean Monthly Climatic Data (temperature and rainfall) for Wittenoom (since 1950) (BoM, 2025a)

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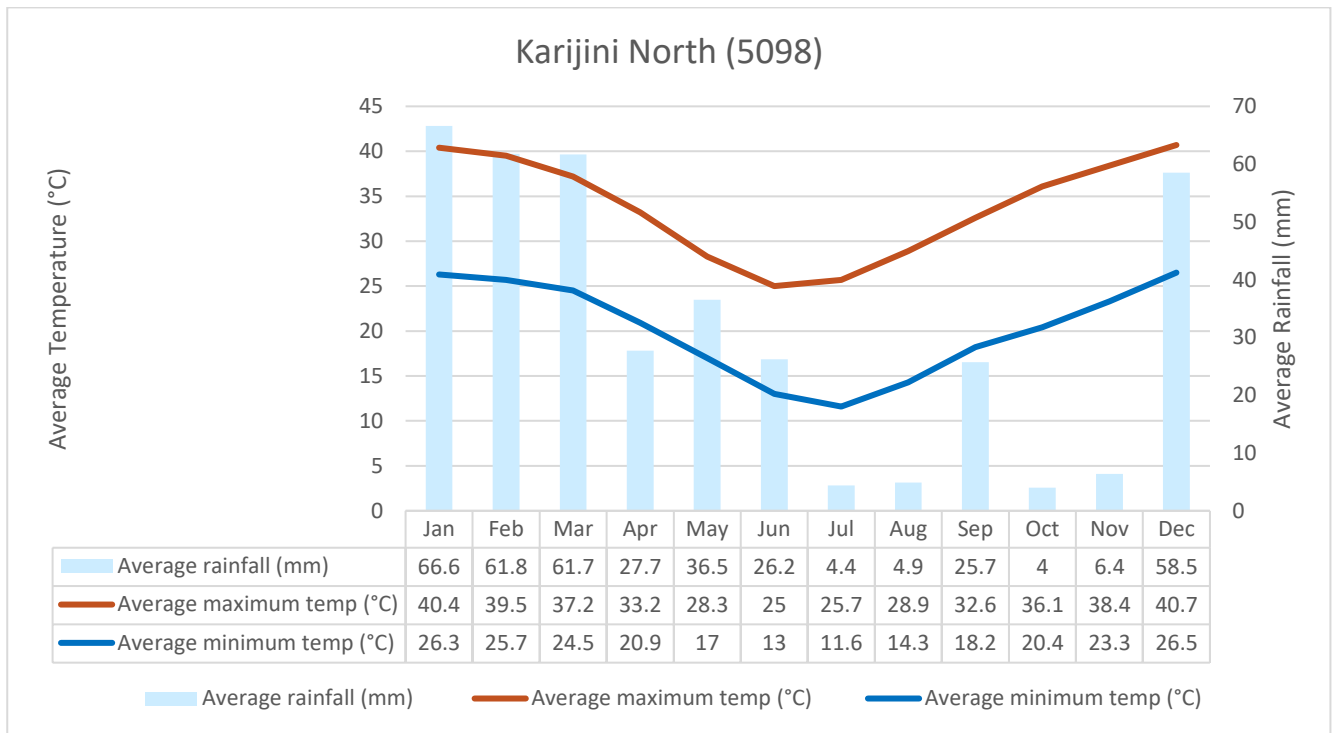


Figure 2-5: Mean Monthly Climatic Data (temperature and rainfall) for Karijini North (since 2020) (BoM, 2025b)

2.6 Hydrology and Hydrogeology

2.6.1 Surface Hydrology

The Project is located within the Pilbara Surface Water Area, a Surface Water Proclaimed Area under the Western Australian *Rights in Water and Irrigation Act 1914 (RiWI Act)*. The Project is within the Goodiadarrie Swamp sub catchment of the Lower Fortescue River catchment which has a total area of approximately 4,138 km², (**Figure 2-6**). The Clearing Area represents less than 0.01% of the overall catchment of the Goodiadarrie Swamp catchment.

There are no Ramsar listed wetlands or wetlands listed in the Directory of Important Wetlands in Australia (National) (**DIWA**) occurring within the Application Area. The nearest DIWA listed wetland is the Fortescue Marsh, located approximately 1 km south of the Application Area. This wetland is also listed as a Proposed Ramsar Addition. The Fortescue Marsh Nature Reserve is approximately 40 km south west of the Application Area.

The Application Area has limited through-flow of surface water (refer to **Figure 2-6**) and therefore, minimal surface water diversion will be necessary and the effects on the modifications of flows are insignificant (MWH, 2012). Storm and flood risk mapping have been considered when designing the hydraulic structures for the Project.

Surface water studies conducted have determined that there will be no upstream ponding or downstream shadowing from the Project as minimal surface water diversion will be necessary (MWH, 2012). The camp access road will be constructed at grade and will not significantly interrupt or modify any existing drainage patterns (MWH, 2012).

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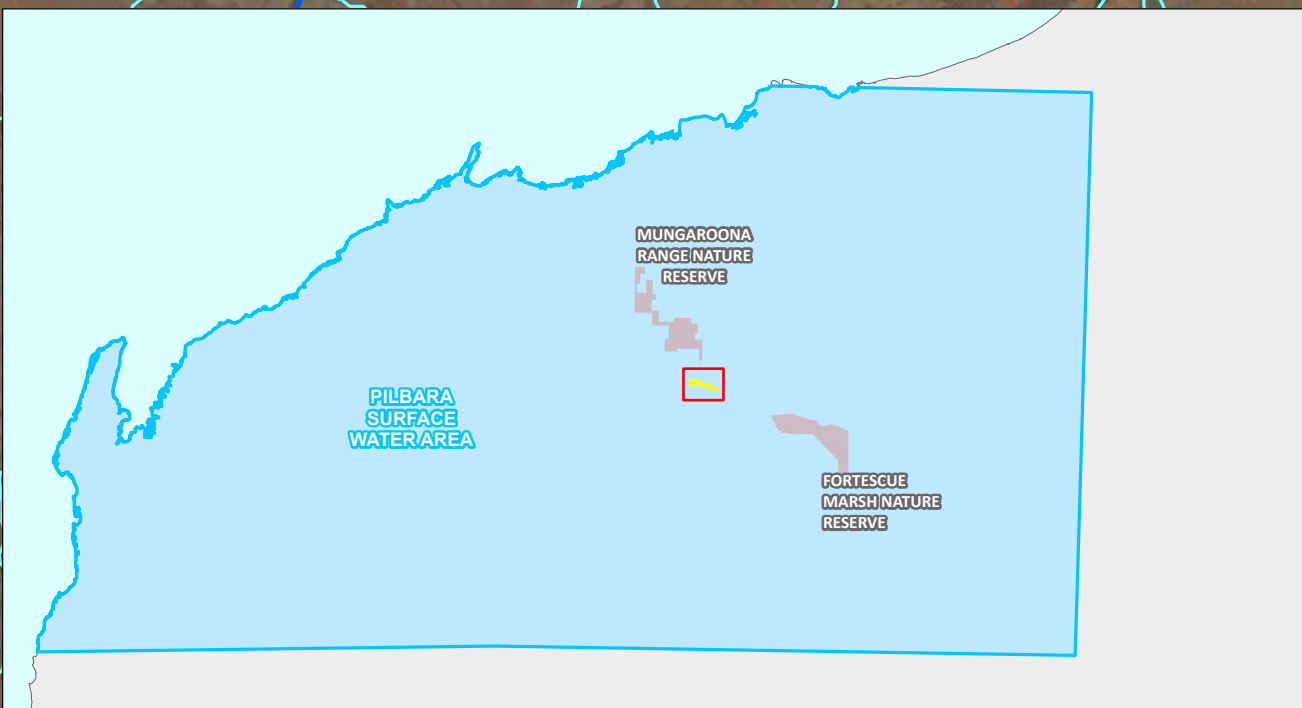
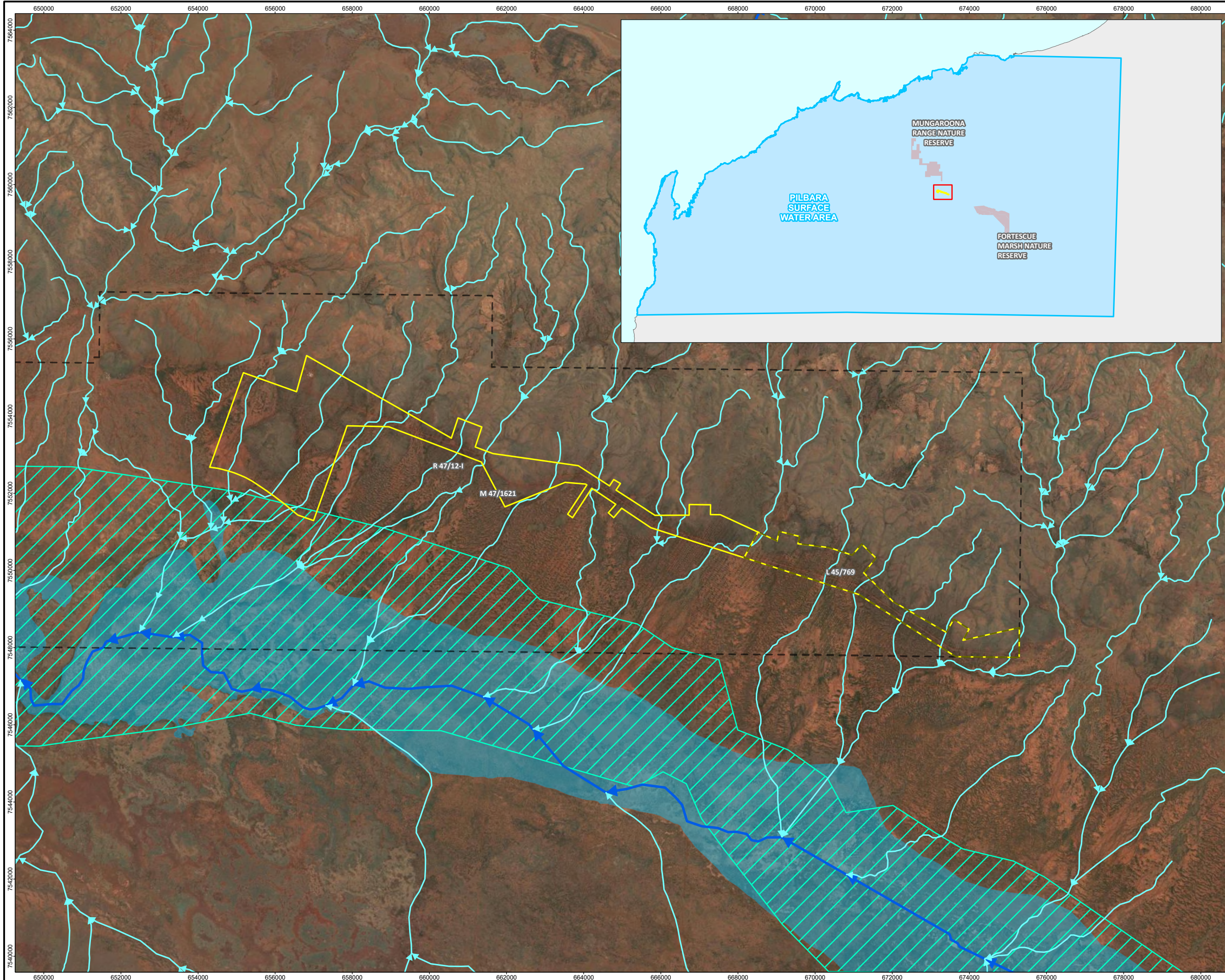
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An increase in sediment runoff and scour may occur due to ground disturbance and vegetation removal. Surface water quality in the Pilbara tends to be dominated by high sediment loads caused by the large runoff events generated by significant rainfall events and cyclones. Diversion of flows into defined channels (diversion channels) have the potential to concentrate flood flows and increase flood velocities, thereby increasing the potential for scour. The extent of these effects will be minimised through the engineering design of the diversion channels, and implementation of a Water Management Plan (**WMP**). The WMP has been prepared for the wider MDIOM and will be in place for the Project, where relevant.

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- Legend**
- Application Area
 - Mining Tenements (DMIRS-003)
 - Directory of Important Wetlands in Australia - Western Australia (DBCAs-045)
 - Goodiadarrie Swamp
 - ▶ Watercourses (GA Australia)
 - ▶ Major (non-perennial)
 - ▶ Minor ((non-perennial)



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Murray's Hill Project, Central Pilbara, Western Australia

SURFACE WATER

FIGURE 2.6

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2.6.2 Groundwater Hydrogeology

The groundwater level within the Application Area varies from approximately 403 mAHD to 405 mAHD. Groundwater flows are from the topographically higher areas in the north and north-east to the river valley in the south, which in turn flows in a westerly direction along the valley (MWH, 2012).

The generalised hydrostratigraphy across the Application Area consists of Quaternary, Tertiary and Fractured Rock/Bedrock sediments. The Quaternary/Tertiary sediments form an unconfined, unconsolidated sedimentary aquifer, which is highly transmissive and continuous (MWH, 2012).

Recharge of groundwater in the area occurs from infiltration of rainfall into the aquifer, and subsequently into the underlying Marra Mamba Iron Formations.

Groundwater across the wider area ranges from fresh (180 mg/L Total Dissolved Solids (TDS)) in the upper reaches of the groundwater system, to saline (17,000 mg/L TDS) across the valley area, with salinity profiling data confirming saline groundwater originating from the claypans and extending along the valley, (AQ2, 2025). Groundwater pH levels generally range between 5.9 and 7.9 however, in the northeastern most bores, the groundwater seems more acidic with values of pH 4.3 and 4.4 recorded at depth (AQ2, 2025).

2.7 Conservation Areas and Environmentally Sensitive Areas

Two land areas managed by the DBCA occur within 30 km proximity of the Application Area and are outlined in **Table 2-1**.

Table 2-1: Reserves in close proximity to the Application Area

Type	Name	Description	Consideration
National Park	Karrijini	Karrijini National Park occupies an area of 627,422 ha. The park comprises a high plateau with mountains and escarpments, and which is dissected by steep sided, deep gorges.	35.0 km south of Application Area boundary. No impacts anticipated as a result of the Project.
Nature Reserve	Mungaroona Range	The Mungaroona Range occupies an area of 105,842 ha.	23.4 km to the north of the Application Area boundary. No impacts anticipated as a result of the Project.

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2.8 Flora and Vegetation

2.8.1 Baseline Studies and Surveys

The Application Area has been fully surveyed to understand the flora and vegetation values of the area. These surveys commenced in 2008 and include regional, site-specific and targeted flora surveys. Studies relevant to the Application Area are described in **Table 2-2**.

Table 2-2: Flora and Vegetation Surveys

Consultant	Title	Description	Guidance / Methodology
Maia Environmental	Mulga Downs Project Preliminary Vegetation and Flora Impact Assessment (Maia Environmental, 2022)	Level 2 Flora and Vegetation Survey (Phase 1) Area 1 (Jun+Jul, 2021): Mulga East (R47/12-1, M47/1621 and L45/380) and Mulga Well (E47/2117-1) Area 3 (Aug, 2012): Hester Peak South-East (L45/316) Area 6 (Aug, 2012): Hester Peak (E47/1315-I)	Environmental Factor Guideline: Flora and Vegetation (EPA, 2016a) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b) Terrestrial Biological Surveys as an Element of Biodiversity Protection, Position Statement No. 3 (EPA, 2002)
	Mulga East Iron Ore Project Mine and Borefield Study Area Detailed Flora and Vegetation Assessment 2019-2022 (Maia Environmental, 2022)	Baseline flora and vegetation (multi-phase) Area 1 (May, Aug, Sep, 2019 and May, Jul, Sep, 2021): Mulga East (R47/12-1, M47/1621 and L45/380) and Mulga Well (E47/2117-I) Area 2 (Mar, 2022): Mulga West (E47/1315-1) Area 3 (Mar, 2022): Hester Peak South-East (L45/316) Area 4 (Mar, 2022): Mulga West to Mulga East linking corridor Area 5 (Mar, 2022): Two Mile Well (E47/4264) Area 6 (Mar, 2022): Hester Peak (E47/1315-I) Area 7 (Mar, 2022): Hester Peak East (L45/384 and E47/2044-I)	Environmental Factor Guideline: Flora and Vegetation (EPA, 2016a) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b)
	Mulga Downs West Flora and Vegetation Desktop Study (Maia Environmental, 2022)	Targeted flora surveys to support exploration activity Phase 1 (2012-2015, 2018-2020): Mulga West Borefield (E47/1315-I)	Environmental Factor Guideline: Flora and Vegetation (EPA, 2016a) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b)
AQ2	Mulga Downs Groundwater, Surface Water and Ecohydrological Studies – Baseline Assessment (AQ2, 2025)	Identifies and characterises key ecohydrological receptors proximal to the Project area and evaluates the potential response of key ecohydrological receptors to modified hydrological regimes.	Not applicable.
Spectrum	Memo: Data Reconciliation	Memo to address the discrepancies between the Maia 2022 and IBSA data package for 2019-2022 survey.	Not applicable.

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Consultant	Title	Description	Guidance / Methodology
	Report – Mulga Downs Iron Ore Mine – Targeted Hibiscus Survey (Spectrum, 2025)	Targeted <i>Hibiscus</i> sp. Mulga Downs (S. Hitchcock SH 638) survey over mapped occurrences of the Jamindie Land System. Traverses between 25 m and 50 m spacing within suitable habitat of selected Jamindie Land system mapped polygons.	Environmental Factor Guideline: Flora and Vegetation (EPA, 2016a) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b)

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2.8.2 Pre-European Vegetation

Remnant vegetation within the Application Area is mapped as belonging to the Fortescue Valley Vegetation Association. Two sub-associations are present within the Application Area, as outlined following:

- **Fortescue Valley 562:** Mosaic: Low woodland; mulga in valleys/Hummock grasslands, open low tree-steppe; snappy gum over T. wiseana
- **Fortescue Valley 29:** Sparse low woodland; mulga, discontinuous in scattered groups

Only negligible amounts of the Pre-European extent of these vegetation associations have been cleared. The Pre-European and current extent of the vegetation associations mapped, and the extent of these vegetation associations within the Application Area are outlined in **Table 2-3** and **Figure 2-7**.

Table 2-3: Pre-European Vegetation Associations

System Association	Pre-European Extent in Pilbara IBRA (ha)	Current Extent Remaining in Pilbara IBRA (ha)	Percentage of Current Extent Remaining (%)	Extent within the Application Area (ha)	
				Application Area	L 45/769 Only
Fortescue Valley 562	103,606.82	103,606.82	100	74.1	15.7
Fortescue Valley 29	1,133,219.76	1,131,712.01	99.87	2,086.72	488.0
Total				2,160.8	503.7

2.8.3 Vegetation Types

Nine (9) vegetation types (excluding cleared areas) were mapped within the Application Area, based on the results of the field surveys undertaken. The vegetation types within the Application Area are provided in **Table 2-4** and shown in **Figure 2-8**.

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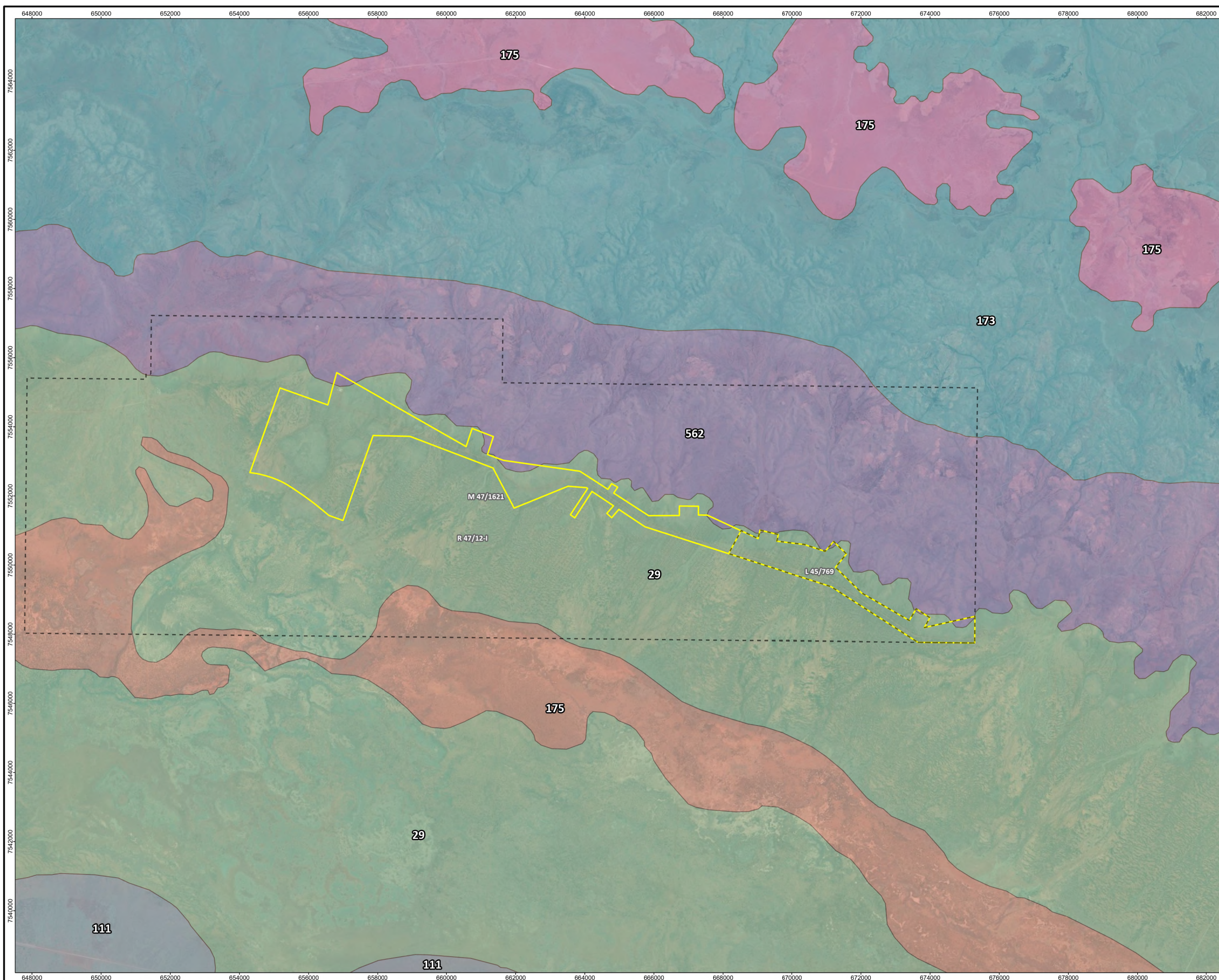
Murray's Hill Project

Table 2-4: Vegetation Types

Vegetation Type	Description	Extent within the Application Area (ha and %)			
		Application Area (ha)	Application Area (%)	L 45/769 Only (ha)	L 45/769 Only (%)
AaAxSL	Tall Sparse Shrubland of <i>Acacia aneura</i> (alliance) and <i>A. xiphophylla</i> with a Low Sparse Shrubland of <i>Eremophila cuneifolia</i> and a Sparse Hummock Grassland of <i>Triodia epactia</i> and/or <i>T. basedowii</i> .	3.3	0.2	0.2	0.04
AdEvWL	Low Open Woodland to Low Woodland of <i>Acacia distans</i> and <i>Eucalyptus victrix</i> sometimes with a Tall Sparse Shrubland of <i>Acacia stenophylla</i> or <i>A. tetragonophylla</i> and a Shrubland to a Sparse Shrubland of <i>Duma florulenta</i>	4.9	0.2	0	0
ASL (1)	Tall Sparse to Open mixed Shrubland mainly of <i>Acacia synchronicia</i> , <i>A. tetragonophylla</i> , <i>A. xiphophylla</i> with a mixed Sparse Chenopod Shrubland mainly of <i>Sclerolaena densiflora</i> , <i>S. cuneata</i> and <i>S. costata</i> and Isolated mixed Tussock Grasses mainly of <i>Sporobolus australasicus</i> , <i>Enneapogon polyphyllus</i> and <i>Dactyloctenium radulans</i>	156.9	7.3	0	0
ASL (2)	Mixed Tall <i>Acacia</i> Shrubland mainly of <i>Acacia tumida</i> var. <i>pilbarensis</i> , <i>A. pyrifolia</i> and <i>A. maitlandii</i> with a Sparse Tussock Grassland of <i>Themeda triandra</i> and Low Isolated Trees of <i>Corymbia hamersleyana</i> and / or <i>Eucalyptus victrix</i>	125.3	5.8	75.0	14.9
AWL (1)	Low Woodland / Tall Shrubland to Low Isolated Trees / Shrubs of <i>Acacia aneura</i> (complex) with a mixed Low Sparse Shrubland mainly of <i>Dodonaea petiolaris</i> , <i>Eremophila forrestii</i> and <i>Abutilon otocarpum</i> and Isolated Low Trees of <i>A. pruinocarpa</i> .	963.6	44.6	289.2	57.4
AWL (2)	Low Woodland / Tall Shrubland to Low Isolated Trees / Tall Shrubs of <i>Acacia aneura</i> (complex) <i>A. synchronicia</i> and <i>A. tetragonophylla</i> with a mixed Low Sparse Shrubland mainly of <i>Solanum lasiophyllum</i> , <i>Abutilon otocarpum</i> and <i>Sida platycalyx</i> and a Sparse Tussock Grassland to Isolated Tussock Grasses mainly of <i>Sporobolus australasicus</i> , <i>Enneapogon cylindricus</i> and <i>Aristida contorta</i>	93.2	4.3	0	0
AxAsSL	Tall Sparse Shrubland of <i>Acacia xiphophylla</i> and / or <i>A. synchronicia</i> with a mixed Sparse Chenopod Shrubland mainly of <i>Sclerolaena cuneata</i> , <i>S. bicornis</i> , <i>S. cornishiana</i> and a Sparse Tussock Grassland of <i>Eragrostis xerophila</i>	0.011	0.001	0	0
THG (1)	Mixed Hummock Grassland mainly of <i>Triodia basedowii</i> , <i>Triodia brizoides</i> and <i>T. vanleeuwenii</i> with a Tall Sparse Shrubland of mixed <i>Acacia</i> species mainly <i>Acacia atkinsiana</i> , <i>A. maitlandii</i> , <i>A. ancistrocarpa</i> with Low Isolated Trees of <i>Eucalyptus leucophloia</i> .	348.4	16.1	84.9	16.9
THG (2)	Mixed Hummock Grassland mainly of <i>Triodia basedowii</i> , <i>T. epactia</i> and <i>T. pungens</i> with a Sparse mixed Shrubland of mulga species mainly <i>Acacia aneura</i> , <i>A. aptaneura</i> and <i>A. incurvaneura</i> and Isolated Low Trees of <i>Eucalyptus leucophloia</i> subsp. <i>Leucophloia</i> .	372.1	17.2	43.0	8.5
Cleared	Areas that have been cleared for exploration or station tracks and fencelines.	93.0	4.3	11.3	2.2
Total		2,160.8	100	503.7	100

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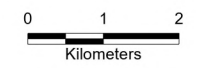


- Legend**
- Application Area
 - Mining Tenements (DMIRS-003)
 - Pre-European Vegetation (DPIRD-006)
 - CHICHESTER PLATEAU_173
 - CHICHESTER PLATEAU_175
 - FORTESCUE VALLEY_111
 - FORTESCUE VALLEY_175
 - FORTESCUE VALLEY_29
 - FORTESCUE VALLEY_562



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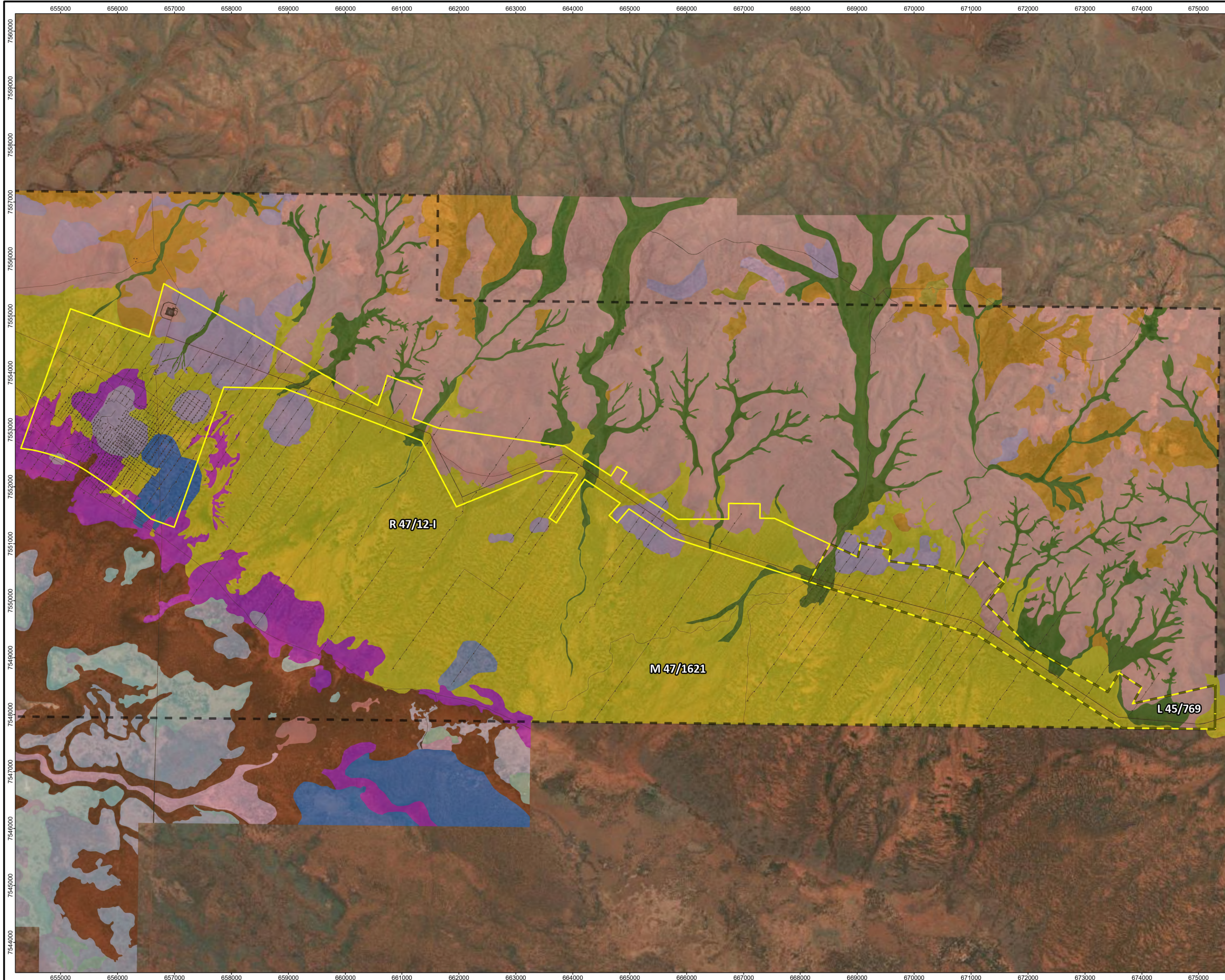


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**Murray's Hill Project,
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PRE-EUROPEAN VEGETATION

FIGURE 2.7



- Legend**
- Application Area
 - Tenements_NVCP
 - Vegetation type
 - AaAxSL
 - AdEvWL
 - ASL (1)
 - ASL (2)
 - AWL (1)
 - AWL (2)
 - AWL (3)
 - AxAsSL
 - EfEbTG
 - Mosaic of AdEvWL /BpoFL
 - MSL (1)
 - MSL (2)
 - MTG (2)
 - THG (1)
 - THG (2)
 - TvHG
 - Cleared/Disturbed



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**Murray's Hill Project,
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VEGETATION TYPE

FIGURE 2.8

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2.8.4 Threatened and Priority Ecological Communities

No Threatened Ecological Communities (TECs) listed under the EPBC Act or protected under the *Biodiversity Conservation Act 2016* (BC Act) occur within the Application Area or Study Area.

A total of six Priority Ecological Communities (PEC) were recorded within the Study Area:

- Brockman Iron cracking clay communities of the Hamersley Range (Priority 1);
- Fortescue Marsh (Marsh Land System) (Priority 1);
- Four plant assemblages of the Wona Land System (previously 'Cracking clays of the Chichester and Mungaroo Range') (Priority 1);
- Freshwater claypans downstream of the Fortescue Marsh - Goodiadarrie Hills on Mulga Downs Station (Priority 1);
- Riparian flora and plant communities of springs and river pools with high water permanence of the Pilbara Region (Priority 2); and
- Kumina Land System (Priority 3).

No PECs have been recorded within the Application Area.

2.8.5 Groundwater Dependent Vegetation and Sheet Flow Dependent Vegetation

Based on the ecohydrological assessment conducted to date, results conclude that no groundwater dependent vegetation occurs, or is likely to occur, within the Application Area. Vegetation within the Application Area is inferred to be disconnected from the groundwater system (AQ2, 2025).

Acacia aneura and closely related co-occurring species are commonly referred to as Mulga vegetation (**Mulga**) (Page & Grierson, 2010). Mulga has been found to be highly dependent on sheet flow (Winkworth, 1973; Tongway & Hindley, 2004; Saco, Willgoose, & Hancock, 2007) and sensitive to any changes to sheet flow. The changes can be natural, such as following rainfall events where the natural fluvial channels may be altered from erosional processes.

Vegetation types listed in **Table 2-5**, which may represent sheet flow dependent vegetation types, have been mapped within the Application Area. They are identified as potential sheet flow vegetation because the Mulga species *Acacia aneura* are dominant (Maia Environmental, 2022). A total of 1,217.01 ha of these vegetation types occurs within the Application Area.

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Table 2-5: Potential Sheet Flow Vegetation

Potential Sheet Flow Vegetation	Extent within the Application Area (ha)	
	Application Area	L 45/769 Only
AaAxSL: Acacia Tall Sparse Shrubland	3.3	0.2
ASL (1): Acacia Tall Sparse to Open Shrubland	156.9	0.0
AWL (1): Acacia Low Woodland or Tall Shrubland	963.6	289.2
AWL (2): Acacia Low Woodland or Tall Shrubland	93.2	0.0
AxAsSL: Acacia Tall Shrubland	0.01	0.0
Total	1217.01	289.4

2.8.6 Vegetation Condition

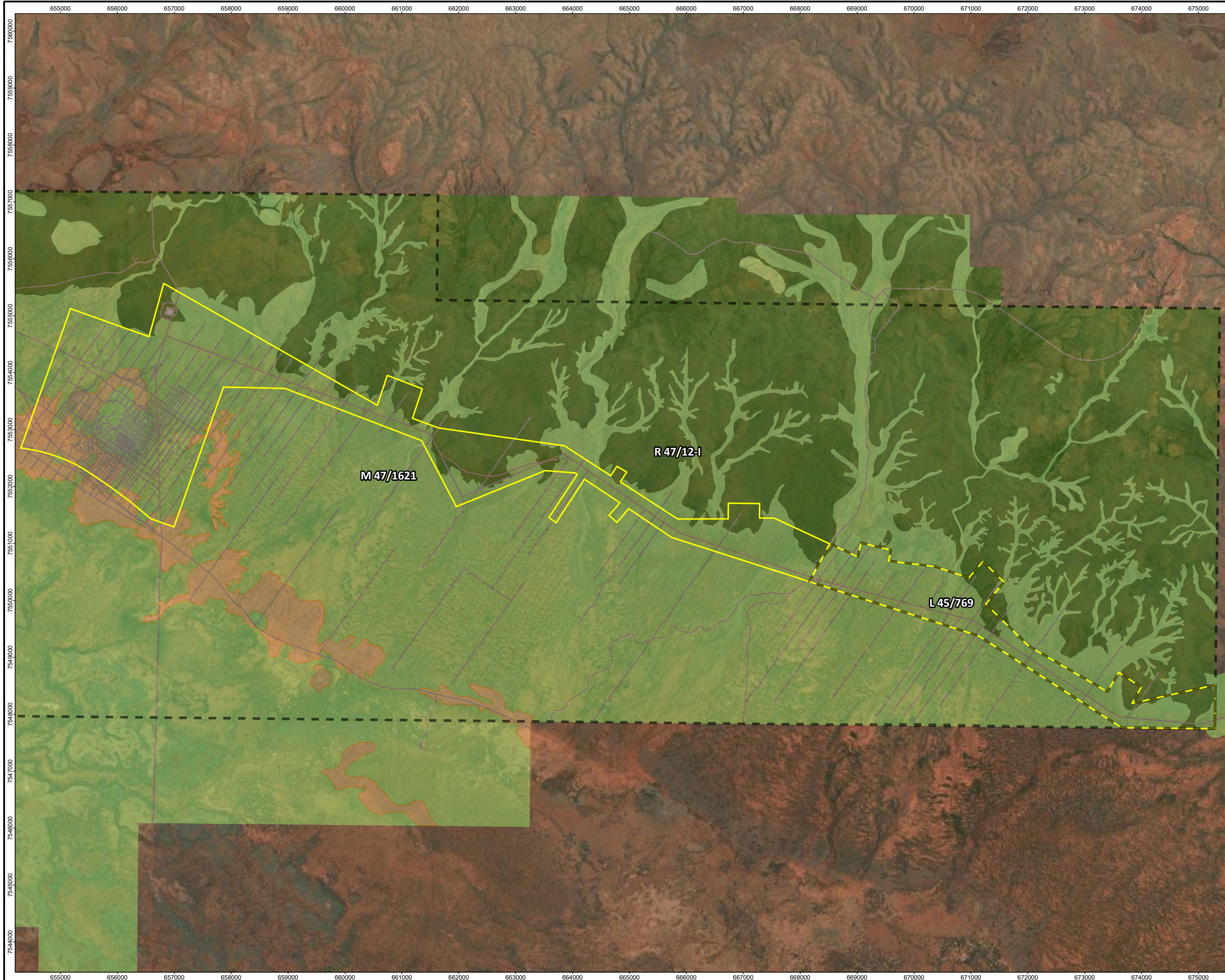
Vegetation condition in the Application Area was generally mapped 'Very Good' refer to Table 2-6 and Figure 2-9).

Table 2-6: Vegetation Condition

Vegetation Condition	Extent within the Application Area (ha)	
	Application Area	L 45/769 Only
'Excellent': no obvious signs of disturbance	351.8	85.1
'Very Good': Area with increased potential for edge effects from adjacent clearing; drainage lines as they often contain higher diversity and cover of weed species.	1,559.1	407.3
'Good': Areas with obvious debris from adjacent clearing	156.9	0.0
'Degraded': Minor clearing and areas that appear to have been rehabilitated with rip lines on the surface.	93.0	11.3
Total	2,160.8	503.7

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Legend

- Application Area
- Tenements_NVCP

Vegetation condition

- Excellent
- Very Good
- Good
- Degraded



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**Murray's Hill Project,
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VEGETATION CONDITION

FIGURE 2.9

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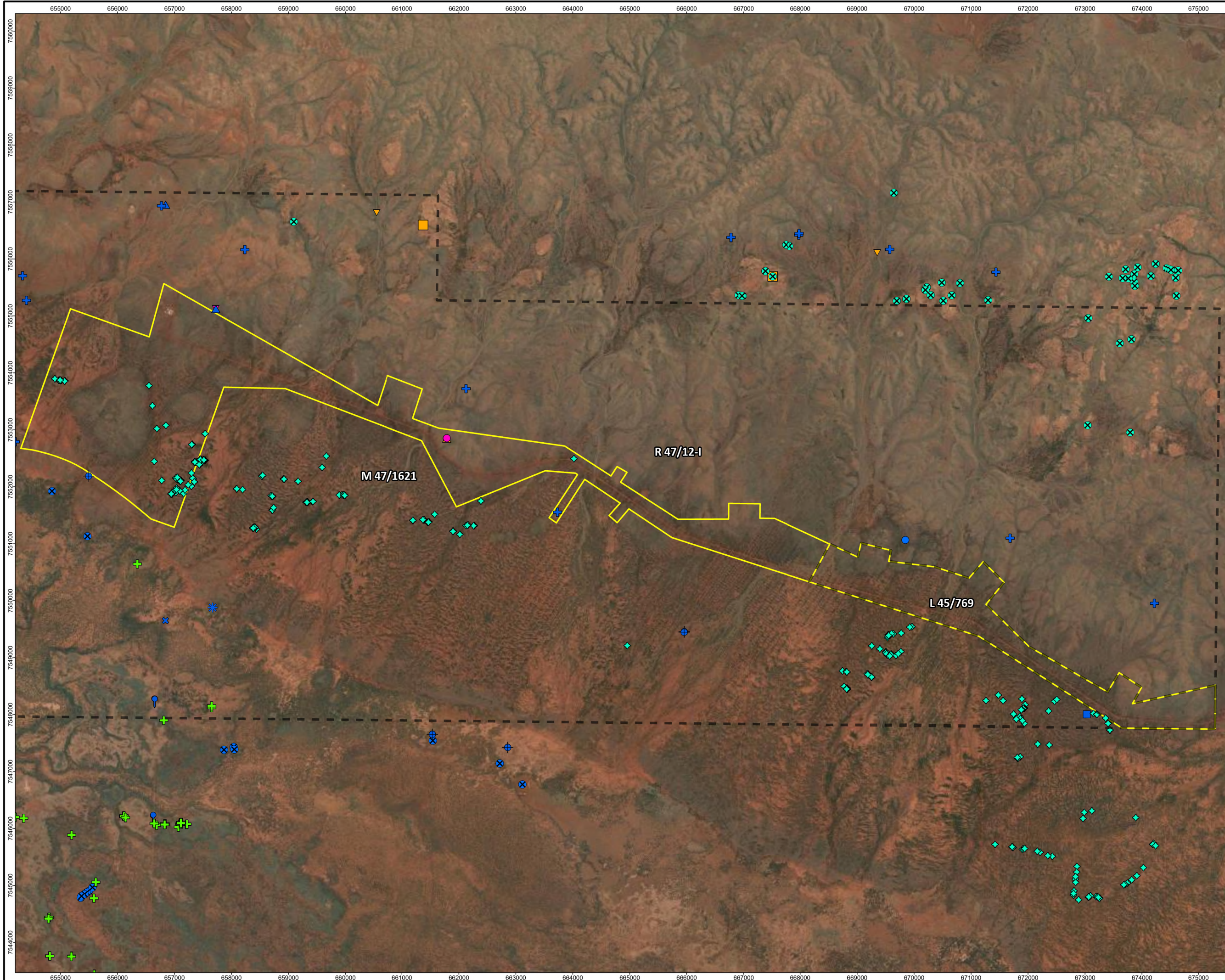
2.8.7 Conservation Significant Flora

No Threatened flora species listed under the EPBC Act or BC Act were recorded within the Application Area. The following taxa listed as Priority by the DBCA were recorded within the western portion of the Application Area (**Figure 2-10**):

- Numerous individual *Hibiscus* sp. Mulga Downs (Priority 1);
- One (1) individual *Dolichocarpa* sp. Hamersley Station (Priority 3); and
- One (1) individual *Bulbostylis burbidgeae* (Priority 4).

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- Legend**
- Application Area
 - Tenements_NVCP
 - Priority 1
 - ◆ *Hibiscus* sp. Mulga Downs
 - ✕ *Triodia veniciae*
 - Priority 2
 - + *Teucrium pilbaranum*
 - Priority 3
 - *Abutilon* sp. Pritzelianum
 - ▲ *Aristida ?jerichoensis* var. *subspinulifera*
 - *Aristida jerichoensis* var. *subspinulifera*
 - + *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479)
 - ✱ *Eragrostis* sp. Erect spikelets (P.K. Latz 2122)
 - ✕ *Euphorbia australis* var. *glabra*
 - ✕ *Goodenia ?lyrata*
 - + *Rostellularia adscendens* var. *latifolia*
 - *Themeda* sp. Hamersley Station (M.E. Trudgen 11431)
 - Priority 4
 - *Bulbostylis burbidgeae*
 - ▼ *Rhynchosia bungarensis*
 - TOI (Taxon Of Interest)
 - *Acacia* sp. Nov
 - ▲ *Bulbostylis burbidgeae*-like (atypical form)
 - ▼ *Santalum spicatum*



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THREATENED AND PRIORITY FLORA

FIGURE 2.10

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2.9 Terrestrial Fauna

2.9.1 Baseline Studies and Surveys

Detailed and targeted fauna surveys were completed within and surrounding the Application Area, which provide an understanding of the terrestrial fauna and short-range endemic (SRE) values of the area. Studies relevant to the Application Area are described in **Table 2-7**.

Table 2-7: Fauna Surveys

Consultant	Title	Description	
		Survey Type and Area	Survey Effort
Overview			
<i>ecologia</i> (Mulga East Baseline Terrestrial Vertebrate Fauna Assessment, 2021a)	Mulga East Baseline Terrestrial Vertebrate Fauna Assessment	Detailed Phase 1 Vertebrate Fauna Survey (April 2019) <ul style="list-style-type: none"> Mulga East (R47/0012) Malay Wells (E47/2117) Proposed Rail Corridor (E45/380, L45/381, L45/382, L45/447, E47/2044, E45/3593) 	18 Systematic Trap Sites, 5,652 trap nights. 22 Avifauna survey sites. 23.3 hrs surveyed. 21 Acoustic recording sites and 42 recording nights. 12 hrs nocturnal surveyed sites.
		Detailed Phase 2 Vertebrate Fauna Survey (April 2020) <ul style="list-style-type: none"> Mulga East (R47/0012) Malay Wells (E47/2117) Proposed Rail Corridor (E45/380, L45/381, L45/382, L45/447, E47/2044, E45/3593) 	18 Systematic Trap Sites, 6,160 trap nights. 15 Avifauna survey sites. 12.3 hrs surveyed. 25 Acoustic recording sites and 60 recording nights. 36 hrs nocturnal surveyed sites.
Attexo (Consolidated Terrestrial Fauna Report, 2023)	Consolidated Terrestrial Fauna Report	See below for detailed description for specific species.	

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Consultant	Title	Description	
		Survey Type and Area	Survey Effort
Northern Quoll and Pilbara Olive Python			
<i>ecologia</i> (Mulga East Baseline Terrestrial Vertebrate Fauna Assessment, 2021a)	Mulga East Baseline Terrestrial Vertebrate Fauna Assessment	Detailed Phase 1 Vertebrate Fauna Survey (April 2019)	Motion sensor sites for 48 nights. 20 hrs targeted searches
		Phase 1 – Targeted significant fauna survey (July 2019)	42 motion sensor sites for 207 nights. 45 cage traps over 315 trap nights 20 hrs targeted searches, 12 hrs nocturnal searches.
		Detailed Phase 2 Vertebrate Fauna Survey (April 2020)	39 motion sensor sites. 60 hrs targeted searches.
		Phase 2 – Targeted Significant Fauna Survey (July 2020)	39 motion sensor sites for 3,982 nights 100 hrs targeted searches, 36 hrs nocturnal searches. 107 kms of UAV flight pathways.
Ghost Bat and Pilbara Leaf-nosed bat			
<i>ecologia</i> (Mulga East Baseline Terrestrial Vertebrate Fauna Assessment, 2021a)	Mulga East Baseline Terrestrial Vertebrate Fauna Assessment	Detailed Phase 1 Vertebrate Fauna Survey (April 2019)	31 acoustic recording sites over 59 recording nights.
		Phase 1 – Targeted significant fauna survey (July 2019)	57 acoustic recording sites over 75 recording nights.
		Targeted Pilbara Leaf-nosed Bat Survey (December 2019)	70 acoustic recording sites over 70 recording nights.
		Long-term Pilbara Leaf-nosed Bat Survey (March 2020)	6 acoustic recording sites over 212 recording nights.
		Detailed Phase 2 Vertebrate Fauna Survey (April 2020)	18 acoustic recording sites over 18 recording nights. 107km of UAV flight pathways
		Phase 2 – Targeted Significant Fauna Survey (July 2020)	42 acoustic recording sites over 42 recording nights. 81 Cave habitat assessments.
		Targeted Pilbara Leaf-nosed Bat Survey (October 2020)	28 acoustic recording sites over 28 recording nights. 1 cave habitat assessment.
<i>Ecologia</i> (Targeted Pilbara Leaf-nosed Bat Gap Survey, 2021b)	Targeted Pilbara Leaf-nosed Bat Gap Survey	Targeted Pilbara Leaf-nosed Bat Gap Survey (March 2021)	16 acoustic recording sites over 16 recording nights.

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Consultant	Title	Description	
		Survey Type and Area	Survey Effort
<i>Ecologia</i> (Desktop Risk Assessment for the Pilbara Leaf-nosed Bat and Ghost Bat, 2023a)	Desktop Risk Assessment for the Pilbara Leaf-nosed Bat and Ghost Bat	Desktop review (2023)	The review consolidated all relevant survey work. The review included an additional peer review by a specialist bat consultant on the work completed to date, in particular with respect to bat cave categories.
Night Parrot			
<i>ecologia</i> (Mulga East Baseline Terrestrial Vertebrate Fauna Assessment, 2021a)	Mulga East Baseline Terrestrial Vertebrate Fauna Assessment	Detailed Phase 1 Vertebrate Fauna Survey (April 2019)	3 acoustic recording sites over 24 recording nights.
		Detailed Phase 2 Vertebrate Fauna Survey (April 2020)	7 acoustic recording sites over 42 recording nights. 33km of UAV flight pathways.
Greater Bilby			
<i>ecologia</i> (Mulga East Baseline Terrestrial Vertebrate Fauna Assessment, 2021a)	Mulga East Baseline Terrestrial Vertebrate Fauna Assessment	Detailed Phase 1 Vertebrate Fauna Survey (April 2019)	42 targeted habitat assessments undertaken. The targeted surveys involved surveying habitat known to support populations of the Bilby in Western Australia, including <i>Acacia aneura</i> (mulga) woodland/shrubland growing on ridges and rises which was surveyed extensively with a UAV during the survey.
		Detailed Phase 2 Vertebrate Fauna Survey (April 2020)	228 km of UAV flight pathways.
Short-range Endemic Fauna			
<i>ecologia</i> (Mulga East Short-range Endemic Invertebrate Fauna Assessment (Level 1), 2019)	Mulga East Short-range Endemic Invertebrate Fauna Assessment (Level 1)	Level 1 SRE Invertebrate Fauna Survey (April 2019)	18 dry pitfall sites over 1,376 trap nights. 28 active foraging sites over 57 hours of foraging. 18 Leaf litter and soil sampling sites.
<i>Ecologia</i> (Mulga East Short-range Endemic Invertebrate Fauna Assessment (Level 2), 2020a; <i>ecologia</i> , 2020b)	Mulga East Short-range Endemic Invertebrate Fauna Assessment (Level 2)	Level 2 SRE Invertebrate Fauna Survey (March 2020)	Dry pitfall sites over 700 trap nights. 22 active foraging sites over 44 hours of foraging. 10 Leaf litter and soil sampling sites.

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Consultant	Title	Description	
		Survey Type and Area	Survey Effort
Grey Falcon			
<i>ecologia</i> (Mulga Downs Iron Ore Project - Desktop Risk Assessment for the Grey Falcon, 2023b)	Mulga Downs Iron Ore Project – Desktop Risk Assessment for the Grey Falcon	Desktop review (2023)	The desktop reviewed the surveys undertaken for the Project and identified potential nesting habitat for the Grey Falcon.
Spectrum (Mulga Downs Iron Ore Mine - Targeted Grey Falcon Survey (Memo), 2023)	Memo: Mulga Downs Iron Ore Mine, Targeted Grey Falcon Survey	Targeted Grey Falcon Survey (August 2023)	Individual searches and suitable nests within potential nesting habitat during the nesting/breeding season

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2.9.2 Fauna Habitat

Four (4) major fauna habitats were identified and mapped within the Application Area, based on field survey data (Table 2-8 and Figure 2-11). These comprise:

- **Drainage Lines:** vegetation comprised of *Eucalyptus camaldulensis*, *Eucalyptus victrix*, *Acacia citrinoviridis* and *Melaleuca* sp. Over mixed *Triodia* sp., sedges and grasses. The majority of the drainage lines had a sandy substrate with abundant creek stones, however, some areas had continuous rock formations. Conservation significant fauna which may utilise this habitat includes:
 - Northern Quoll (*Dasyurus hallucatus*);
 - Pilbara Leaf-nosed Bat (*Rhinonictoris aurantia*);
 - Peregrine Falcon (*Falco peregrinus*);
 - Grey Falcon (*Falco hypoleucos*);
 - Pilbara Olive Python (*Liasis olivaceus barroni*); and
 - Ghost Bat (*Macroderma gigas*).

- **Mulga Woodland:** comprised of an open woodland of *Acacia aneura*, *A. xiphophylla* with isolated *A. pruinocarpa* over *Acacia* spp., *Eremophila* spp., *Dodonaea petiolaris* and *Hakea* sp. Over sparse soft grasses or *Triodia* hummock grasslands. Conservation significant fauna which may utilise this habitat includes:
 - Gane's blind snake (Priority 3)

- **Rocky Hills:** small mesas and breakaways with isolated *Eucalyptus leucophloia* and/or *Corymbia hamersleyana* over sparse shrubland of mixed *Acacia* spp., *Grevillea wickhamii*, *Hakea lorea* and over open *Triodia* sp. Hummock grassland. Conservation significant fauna which may utilise this habitat includes:
 - Northern Quoll (*Dasyurus hallucatus*);
 - Pilbara Leaf-nosed Bat (*Rhinonictoris aurantia*);
 - Pilbara Olive Python (*Liasis olivaceus barroni*); and
 - Ghost Bat (*Macroderma gigas*).

- **Stony Spinifex Plains and Hillslopes** consists of isolated *Eucalyptus leucophloia* over sparse shrubland of mixed *Acacia* spp. Over open spinifex hummock grassland. Conservation significant fauna which may utilise this habitat includes:
 - Northern Quoll (*Dasyurus hallucatus*);
 - Pilbara Leaf-nosed Bat (*Rhinonictoris aurantia*); and
 - Ghost Bat (*Macroderma gigas*).

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Table 2-8: Fauna Habitat Types

Habitat Type	Extent within the Application Area (ha and %)			
	Application Area (ha)	Application Area (%)	L 45/769 Only (ha)	L 45/769 Only (%)
Drainage Line	24.5	1.1	3.9	0.8
Mulga Woodland	1,512.9	70.0	400.8	79.6
Rocky Hills	174.4	8.1	4.4	0.9
Stony Spinifex Plains and Hillslopes	449.0	20.8	94.6	18.8
Total	2,160.8	100	503.7	100

2.9.3 Conservation Significant Fauna

Based on known species distribution, previous records and desktop study of the Study Area, the following conservation significant species have the potential to occur:

- Thirty-two (32) native fauna species:
 - eight (8) mammals;
 - twenty-one (21) birds; and
 - three (3) reptiles.

Of these records, the likelihood of these species occurring was:

- 'Known': six (6) species;
- 'High': two (1) species;
- 'Medium': two (2) species; and
- 'Low' to 'Very Low': twenty-three (23) species.

Based on field surveys, three (3) species of conservation significance were recorded in the Application Area:

- Two (2) BC Act/EPBC Act 'Vulnerable' species:
 - Pilbara Leaf-nosed Bat (*Rhinonictis aurantia*); and
 - Pilbara Olive Python (*Liasis olivaceus barroni*).
- One (1) DBCA listed 'Priority 1' species:
 - Gane's Blind Snake (*Anilius ganei*).

These results are available for viewing in **Table 2-9**, with locations of recorded conservation significant fauna shown in **Figure 2-11**.

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Table 2-9: Potential Conservation Significant Fauna within the Study Area (Spectrum, 2024) and Record Status (Attexo, 2023)

Species	Conservation Status			Likelihood of Occurrence	Record Status in Application Area	Recorded By
	EPBC Act	BC Act	DBCA-listed			
Mammals						
Northern Quoll (<i>Dasyurus hallucatus</i>)	EN	EN		Known		
Bilby (<i>Macrotis lagotis</i>)	VU	VU		Low		
Pilbara Leaf-nosed Bat (<i>Rhinonicteris aurantia</i>)	VU	VU		Known	Recorded	ecologia (2021a)
Ghost Bat (<i>Macroderma gigas</i>)	VU	VU		Known		
Brush-tailed Mulgara (<i>Dasyercus blythi</i>)			P4	Medium		
Spectacled Hare-wallaby (<i>Lagorchestes conspicillatus leichardti</i>)			P4	Low		
Short-tailed Mouse (<i>Leggadina lakedownensis</i>)			P4	Low		
Western Pebble-mound Mouse (<i>Pseudomys chapmani</i>)			P4	Known		
Birds						
Curlew Sandpiper (<i>Calidris ferruginea</i>)	CR/MI	CR		Very Low		
Night Parrot (<i>Pezoporus occidentalis</i>)	EN	CR		Low		
Australian Painted Snipe (<i>Rostratula australis</i>)	EN	EN		Very Low		
Common Greenshank (<i>Tringa nebularia</i>)	EN/MI	MI		Very Low		
Common Sandpiper (<i>Actitis hypoleucos</i>)	MI	MI		Very Low		
Pacific Swift (<i>Apus pacificus</i>)	MI	MI		Low		
Glossy Ibis (<i>Plegadis falcinellus</i>)	MI	MI		Low		
Grey Wagtail (<i>Motacilla cinerea</i>)	MI	MI		Very Low		
Red-necked Stint (<i>Calidris ruficollis</i>)	MI	MI		Very Low		
Oriental Plover (<i>Charadrius veredus</i>)	MI	MI		Low		
Pectoral Sandpiper (<i>Calidris melanotos</i>)	MI	MI		Very Low		
Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	VU/MI	MI		Very Low		
Wood Sandpiper (<i>Tringa glareola</i>)	MI	MI		Very Low		

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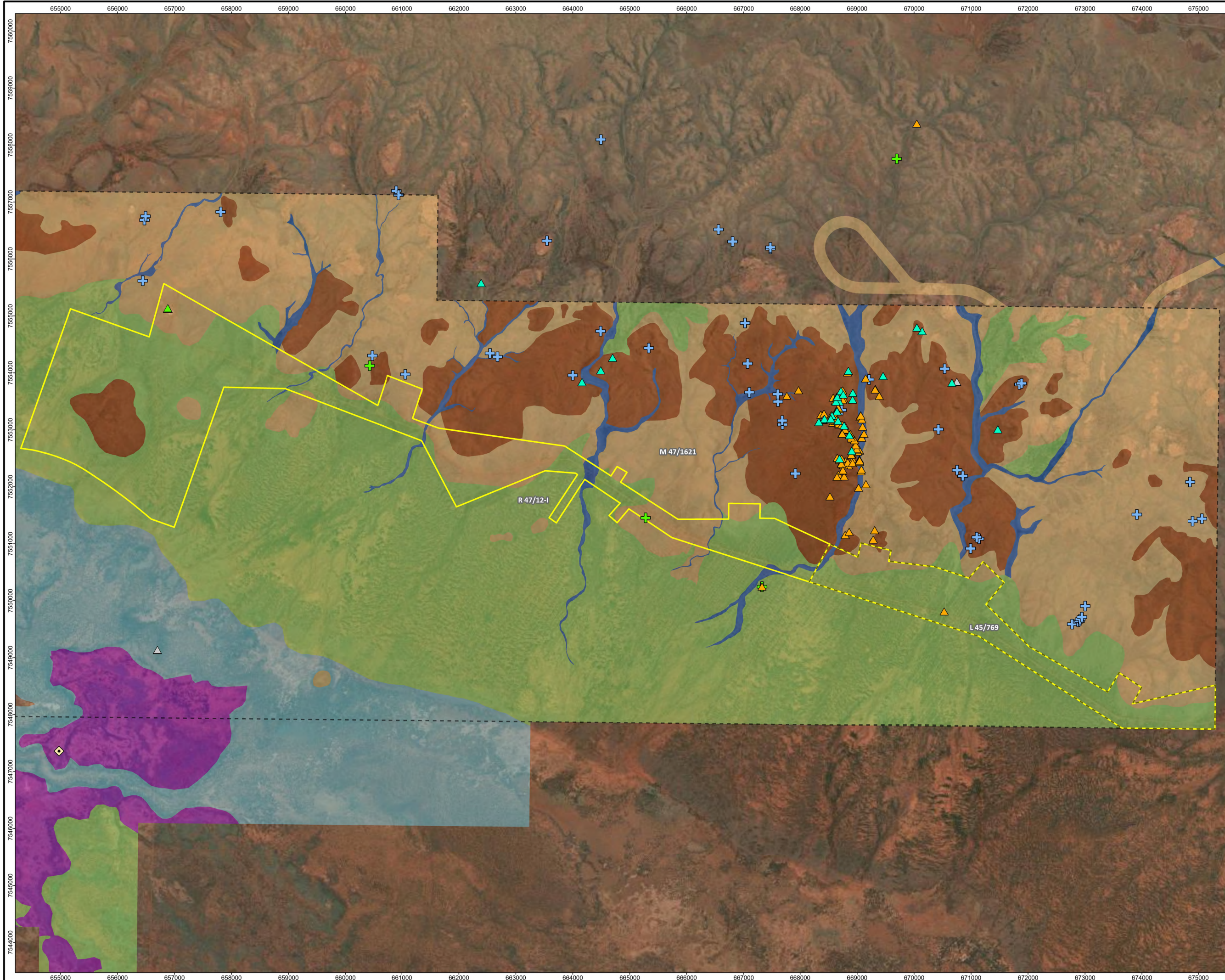
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Species	Conservation Status			Likelihood of Occurrence	Record Status in Application Area	Recorded By
	EPBC Act	BC Act	DBCA-listed			
Osprey (<i>Pandion haliaetus</i>)	MI	MI		Very Low		
Gull-billed Tern (<i>Gelochelidon nilotica</i>)	MI	MI		Very Low		
Caspian Tern (<i>Hydroprogne caspia</i>)	MI	MI		Very Low		
Little Tern (<i>Sternula albifrons</i>)	MI	MI		Very Low		
Barn Swallow (<i>Hirundo rustica</i>)	MI	MI		Very Low		
Eastern Yellow Wagtail (<i>Motacilla tschutschensis</i>)	MI	MI		Very Low		
Peregrine Falcon (<i>Falco peregrinus</i>)	OS	OS		Medium		
Grey Falcon (<i>Falco hypoleucos</i>)	VU	VU		High		
Reptiles						
Pilbara Olive Python (<i>Liasis olivaceus barroni</i>)	VU	VU		Known	Recorded	ecologia (2021a)
Pin-striped Ctenotus (<i>Ctenotus nigrilineatus</i>)			P1	Low		
Gane's Blind Snake (<i>Anilius ganei</i>)			P1	Known	Recorded	ecologia (2021a)

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- Legend**
- Application Area
 - Mining Tenements (DMIRS-003)
 - Fauna habitat**
 - Calcrete Stony Plain
 - Drainage Lines/Floodplains
 - Mixed Eucalypt/ Mulga Floodplain
 - Mulga Woodland
 - Rocky Hills
 - Stony Spinifex Plains and Hillslopes
 - BC Act Status**
 - ▲ Northern Quoll (EN)
 - ▲ Ghost Bat (VU)
 - ▲ Pilbara Leaf-nosed Bat (VU)
 - ▲ Pilbara olive python (VU)
 - DBCAs listing**
 - + Gane's Blind Snake (P1)
 - + Western Pebble-mound Mouse (P4)
 - BC Act (Migratory)**
 - ◇ Little Curlew (MI)



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FAUNA HABITATS AND RECORDS

FIGURE 2.11

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2.9.4 Short-range Endemic Invertebrates

Habitat assessment and mapping was undertaken across the Application Area following detailed SRE desktop assessments, with broad SRE habitats mapped based on aerial imagery, previous survey data and then confirmed during surveys. The broad scale mapping, continuity of habitat types and the habitat naming conventions reflecting those previously mapped. It was noted that Mulga Woodland, Mixed Eucalypt/Mulga Floodplain provide favourable SRE habitat types. These habitat types and their likely supported SRE's are listed in **Table 2-10**.

No confirmed or potential SRE invertebrate taxa have been recorded within the Application Area. A total of fifteen (15) confirmed and ninety-one (91) potential SRE invertebrate taxa have been recorded within a 40 km radius of the Application Area.

Table 2-10: SRE Habitats and Species

Habitat Type	SRE Invertebrate Taxa
Mulga Woodland	Mygalomorphs Scorpions Millipedes Snails Pseudoscorpions
Mixed Eucalypt / Mulga Woodland	Scorpions Pseudoscorpions Isopods Mygalomorph spiders Millipedes Snails

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2.10 Aboriginal Heritage

The Application Area occurs entirely within the Banjima People Native Title Determination Area (WAD6096/1998). The *Native Title Act 1993* recognises the rights and interests of Aboriginal and Torres Strait Islander people in land and waters, according to their traditional laws and customs. The Banjima Traditional Owners are represented by the Banjima Native Title Aboriginal Corporation (**BNTAC**). The known archaeological record of the inland Pilbara region within the respective Traditional Owner Countries extends back to over 43,000 years before the present day (Cropper & Law, 2018). Banjima Traditional Owners maintain day-to-day cultural connections with the land which covers more than 1 million hectares.

HPPL has undertaken and continues to undertake detailed consultation with the Banjima Traditional Owners and BNTAC, including ongoing agreement negotiation meetings, Heritage and Environment Reference Committee Meetings (**HERCs**), technical workshops and on-country consultations with consultation continuing throughout the Project lifecycle.

The Aboriginal Cultural Heritage Inquiry System (**ACHIS**) maintained by the Department of Planning, Lands and Heritage (**DPLH**) was utilised to research and determine which historical heritage survey reports and site files held by the DPLH may be relevant to the Project. The Application Area does not contain any registered or lodged sites.

HPPL has surveyed the entire Application Area for both ethnographic and archaeological heritage values. These surveys have identified additional Aboriginal places of significance within the Application Area.

These places are considered sensitive and will be submitted to DPLH for assessment, at the discretion of the relevant Traditional Owners.

HPPL is aware of its commitments and obligations under the *Aboriginal Heritage Act 1972 (AH Act)*. Construction of the Project will avoid impacts to all sites of heritage significance identified within the Application Area.

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3 Approvals and Management

3.1 Environmental Approvals and Management

The key approvals identified as being required to support the proposed clearing include the following:

- NVCP under s 51E of the EP Act;
- Controlled Action approval under the EPBC Act (EPBC 2022/09255 approval expected early 2026)
- Actual mining activities and supporting infrastructure will require an approved Mining Development and Closure Proposal under the *Mining Act 1978*; and
- The Project has already been referred to the State EPA under the EP Act where it was 'not assessed'.

The assessment against the 10 clearing principles (**Section 4**), including consideration of the proposed mitigation and management measures outlined in **Section 3.2**, concluded that the proposed clearing will not result in a significant impact to any conservation significant flora or fauna species, or ecological communities.

3.2 Environmental Mitigation and Management

Impacts to the environment as a result of clearing will be minimised via the management measures listed in the following sections. Several management plans have been submitted to EPA and DCCEEW to support the assessment of the wider MDIOM under the EP Act and EPBC Act. These management plans are currently in draft form and are under assessment, however, will be implemented for the Project where applicable. HanRoy will also implement internal standards and procedures to minimise clearing and resulting impacts to the environment.

3.2.1 Relevant Management Plans, Standards and Procedures

The following management plans have been prepared to support the assessment of the wider MDIOM:

- Water Management Plan (**WMP**) (currently under assessment);
- Conservation Significant Fauna Management Plan (**CSFMP**) (currently under assessment);
- Environmental Compliance Standard (**ECS**) (**Appendix 7**);
- Spill Response Procedure (**SRP**) (**Appendix 8**);
- Ground Disturbance Permit Procedure (HNR-00000-GD-PRO-0001) (**GDP**) (**Appendix 9**).

3.2.2 Avoid or Minimise

The following mitigation measures will be applied to proposed clearing activities:

- Where possible work should be conducted in already pre-cleared/disturbed areas and avoid disturbance in watercourses;
- The final location of non-fixed elements (i.e. linear / supporting infrastructure) will be designed to minimise impacts to Priority flora species;
- Clearing of vegetation will be kept as minimal as practicable.

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3.2.3 Management Measures

- No clearing will commence prior to the completion of a desktop (and ground based if required) review of Environmental, Heritage, Tenure and Land Access sensitivities and a GDP is issued and accepted by the work package owner.
- Prescriptive clearing related conditions, including environmental or Heritage related supervision will be applied as conditions to the GDP, as required.
- All works must be conducted in accordance with an internal GDP system and must comply with the conditions of the GDP.
- Cleared areas to be surveyed for reporting in accordance with permit requirements.
- Ensure suitably qualified fauna spotter/handler is available on site during clearing works.
- Ensure clean earth-moving machinery prior to entering/leaving clearing area and machinery to be inspected by suitable personnel (consistent with HNR-00000-EN-TEM-0014).
- Restrict the movement of machines and other vehicles within the limits of the clearing areas.
- Ensure record keeping including GDP sign on, weed and seed vehicle inspections.
- Retain the vegetative material and topsoil.
- Topsoil stockpiles will not exceed 2 m in vertical height and will not be compacted during stockpiling activities.
- Efforts will be made to incorporate breaks in clearing to reduce potential impacts on surface hydrology flow.
- Industry standard methods for the storage and handling of hydrocarbons and ensuring the availability of spill response materials.
- Clearing will be prioritised for dry conditions where possible to minimise sedimentation.
- Vegetation clearing and earthworks during high winds (>50 km/hr) will be avoided where possible.
- Dust suppression techniques (e.g. water trucks) shall be used on unsealed roads and access tracks, cleared areas and at locations of high dust risk.
- Implement programs for induction and education of the workforce and contractors with respect to flora and vegetation protection and management.
- An emergency management plan shall be developed and implemented and shall include methods for managing major environmental incidents, including but not limited to fire, fauna awareness and native vegetation.
- All environmental incidents must be reported through the Incident Reporting System.
- Clearly demarcate the area of vegetation required to be cleared prior to works commencing with either physical ground markers or electronic demarcation/ GPS Positioning tool e.g. Geomoby.
- Promote driver awareness and implement appropriate speed limits, prohibition of off-road driving and adherence to vehicle movements on designated tracks.
- Ensure staff and contractors are provided with appropriate training with regard to the protection of significant fauna and associated habitats.
- Use raised blade clearing (a technique designed to clear vegetation with less damage to topsoil) where practical.
- Clearing will only be conducted during daylight hours.

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4 Assessment Against Clearing Principles

4.1 Biodiversity

Clearing Principle	Description	Variance
A	Native vegetation should not be cleared if it comprises a high level of biological diversity	Not likely at Variance

The Application Area is within the Fortescue Plains subregion (1,951,434.93 ha), of which 0.02% is proposed to be cleared (394.5 ha).

The Pre-European vegetation associations 562 (Mosaic: Low woodland; mulga in valleys/Hummock grasslands, open low tree-steppe; snappy gum over *T. wiseana*) and 29 (Sparse low woodland; mulga, discontinuous in scattered groups) occur within the Application Area.

Vegetation association 29 (Fortescue Valley 29), is widespread throughout the Fortescue Plains subregion, covering 45.8% (893,394.62 ha). In contrast, vegetation association 562 (Fortescue Valley 562) covers a smaller area of 5.1% (99,723.21 ha) of the Fortescue Plains subregion. The Project proposes to clear a maximum of 394.5 ha, which is 0.04% of vegetation association 29 and 0.39% of vegetation association 562. Based on this, the clearing would not be considered a significant impact to the Fortescue Plains subregion.

Conservation Significant Flora

No flora taxa listed as threatened under the BC Act were recorded within the Application Area or Study Area.

A total of 65 currently listed DBCA Priority flora species were recorded within the Study Area:

- 12 'Priority 1' species;
- 13 'Priority 2' species;
- 34 'Priority 3' species; and
- 6 'Priority 4' species.

Of these, 3 currently listed DBCA priority flora species were recorded in the Application Area: *Hibiscus* sp. Mulga Downs (Priority 1), *Dolichocarpa* sp. Hamersley Station (Priority 3), and *Bulbostylis burbidgeae* (Priority 4).

Approximately 184 *Hibiscus* sp. Mulga Downs (Priority 1) individuals were recorded in the western portion of the Application Area (Maia Environmental, 2022). This species was submitted to the WA Herbarium for determination, and it was identified as a new species. This species occurs in mulga vegetation types ASL (1), AWL (1), and AWL (2) (referred to as potential habitat), with a known total of 3,912 individuals recorded within the Study Area (Spectrum, 2025). A total of 1,213.7 ha of potential habitat for this species occurs within the Application Area, of which 394.5 ha will have the potential to be impacted (32.50%). The banded mulga formation extends well outside the Application Area (approximately 21,351.58 ha has been mapped through surveys undertaken in the local area) and this species has been recorded along these areas. Given this species is associated with sheet flow vegetation, management measures that ensure that sheetflow is maintained will minimise potential impacts on this species.

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One (1) *Dolichocarpa* sp. Hamersley Station (Priority 3) individual was recorded within the Application Area (Maia Environmental, 2022). This species has 32 records on FloraBase and 4 records on Atlas of Living Australia (ALA). The FloraBase records are all in the Pilbara bioregion (in the four sub-regions). In addition to this, the field survey identified an additional 42 individual plants (making a total of 78 records). A total of 1,120.5 ha of potential habitat for this species occurs within the Application Area, of which no more than 394.5 ha (35.21%) will be impacted. The clearing of up to 1 *Dolichocarpa* sp. Hamersley Station (Priority 3) species will be less than 1.3% of the known recorded individuals of the species and would not be considered significant.

One (1) *Bulbostylis burbidgeae* (Priority 4) species was recorded within the Application Area (Maia Environmental, 2022). This species has 35 records on FloraBase and 37 records on ALA. The records are almost all in the Pilbara bioregion (Chichester, Fortescue and Roebourne subregions), while one record is in the McLarty subregion of the Great Sandy Desert bioregion. In addition to this, the field survey identified an additional 80 individual plants (making a total of 152 records). A total of 348.4 ha of potential habitat for this species occurs within the Application Area, of which 348.4 ha (100%) has potential to be impacted however it is highly unlikely 100% of this habitat will be cleared. The clearing of up to one *Bulbostylis burbidgeae* (Priority 4) species will be less than 0.7% of the known recorded individuals of the species and would not be considered a significant impact.

Threatened Ecological Communities and Priority Ecological Communities

No TECs have been recorded within the Application Area or Study Area.

A total of six PECs were recorded within the Study Area; however, no PECs have been recorded within the Application Area.

Conservation Significant Fauna

A total of eight broad fauna habitats were identified within the Biological Survey Boundary: Claypan, Chenopod/Cracking Clay Floodplain, Drainage Line/Floodplain, Mulga Woodland, Mixed Eucalypt/Mulga Floodplain, Rocky Hills, Stony Spinifex Plains and Hillslopes, and Calcrete Stony Plain.

Of these, four (4) major fauna habitats were identified and mapped within the Application Area. These being Drainage Lines, Mulga Woodland, Rocky Hills, and Stony Spinifex Plains and Hillslopes. These fauna habitats support the following conservation significant species:

- Northern Quoll (*Dasyurus hallucatus*);
- Pilbara Leaf-nosed Bat (*Rhinonictis aurantia*);
- Peregrine Falcon (*Falco peregrinus*);
- Grey Falcon (*Falco hypoleucos*);
- Pilbara Olive Python (*Liasis olivaceus barroni*);
- Ghost Bat (*Macroderma gigas*); and
- Ganes Blind Snake (*Anilius ganei*).

A total of 25 fauna species of conservation significance were recorded within the Study Area during surveys:

- 1 'Endangered' species (Northern Quoll [*Dasyurus hallucatus*]);

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- 5 'Vulnerable' species;
- 2 'Priority 1' species;
- 1 'Priority 2' species;
- 5 'Priority 4' species;
- 10 'Migratory' species; and
- 1 'Otherwise' species.

Of these, 3 fauna species of conservation significance were recorded within the Application Area: Pilbara Leaf-nosed Bat (Vulnerable), Pilbara Olive Python (Vulnerable) and Gane's Blind Snake (Priority 1). The Pilbara Leaf-nosed Bat and Gane's Blind Snake is known from other records in areas adjacent to the Application Area. The Pilbara Olive Python was recorded at the current Mulga Downs Exploration Camp, in a historically disturbed area.

Summary

The proposed clearing of up to 394.5 ha within the 2,160.8 ha Application Area is likely to have minimal impact on overall biodiversity of the Fortescue Plains subregion, due to:

- The clearing represents 0.02% of the total area of the subregion (1,951,434.93 ha);
- The clearing represents 0.04% of vegetation association 29, and 0.39% of vegetation association 562 within the subregion.
- No impacts (direct or indirect) to Threatened flora;
- Less than 5% direct impact to each of *Hibiscus* sp. Mulga Downs (Priority 1), *Dolichocarpa* sp. Hamersley Station (Priority 3) and *Bulbostylis burbridgeae* (Priority 4) individuals, with majority of records and significant amount of potential habitat occurring outside of the Application Area;
- No impacts (direct or indirect) to TEC's;
- No impacts (direct or indirect) to PEC's;
- Drainage Lines, Mulga Woodland, and Stony Spinifex Plains and Hillslopes habitat types within the Application Area (which cover 91.9% of the Application Area) are considered moderate to low value for conservation significant fauna and are common and widespread in the region (Attexo, 2023); and
- Potential indirect impact to three conservation significant fauna species by removal of fauna habitat. No species are at risk of becoming vulnerable or at increased vulnerability due to the loss of the proposed habitat due to:
 - Direct impact is mitigated during the clearing process (refer to sections 3.2.2 and 3.2.3 above);
 - Potential indirect impact to 23 species with 'Low' to 'Very Low' likelihood of occurring;
 - Potential indirect impact to 2 species with 'Medium' likelihood of occurring;
 - Potential indirect impact to 1 species with 'High' likelihood of occurring; and
 - Potential indirect impact to 6 species with 'Known' likelihood of occurring.

Considering the above the proposed clearing is therefore **not likely to be at variance to this principle**.

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4.2 Fauna Habitat

Clearing Principle	Description	Variance
B	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia	Not likely at variance

The vegetation and fauna habitats to be cleared is habitat that is widespread in the local area and region. The habitat within the Application Area with the greatest value for conservation significant fauna is the 'Rocky Hills' habitat type. This habitat provides high value denning or roosting habitats for conservation significant fauna such as Northern Quoll, Pilbara Leaf-nosed Bat and the Pilbara Olive Python (ecologia, 2020b). There is 174.4 ha of 'Rocky Hills' within the Application Area, which covers 8.07% of the Application Area. As the total quantity of habitat is relatively low (in comparison to the total Application Area), for the purposes of this impact assessment this habitat type is assessed as possibly being completely cleared within the application area, however due to the nature of the proposal (mining and infrastructure) and only approximately 18.2% of the Application Area being cleared it's highly unlikely the 'Rocky Hills' habitat will be completely cleared.

The remaining habitat types (i.e. Drainage Lines, Mulga Woodland, and Stony Spinifex Plains and Hillslopes) within the Application Area are considered moderate to low value for conservation significant fauna and are common and widespread in the region (Attexo, 2023).

A total of 25 fauna species of conservation significance were recorded within the Study Area:

- 1 'Endangered' species
 - Northern Quoll (*Dasyurus hallucatus*)
- 5 'Vulnerable' species;
- 2 'Priority 1' species;
- 1 'Priority 2' species;
- 5 'Priority 4' species;
- 10 'Migratory' species; and
- 1 'Otherwise' species.

Of these, the following conservation significant fauna species were recorded within the Application Area:

- A total of 2 'Vulnerable' species:
 - Pilbara Leaf-nosed Bat (*Rhinonictis aurantia*); and
 - Pilbara Olive Python (*Liasis olivaceus barroni*).
- A total of 1 'Priority 1' species:
 - Gane's Blind Snake (*Anilius ganei*).

Northern Quoll (none recorded in Application Area)

The Northern Quoll's range once extended contiguously across the north of Australia but is now restricted to six separate land units including the Pilbara. The Pilbara is regarded as the stronghold population for the species

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given that the cane toad is not expected to make its way across the desert into parts of the Pilbara (Woinarski, Burbridge, & Harrison, 2014).

Northern Quolls do not have highly specific habitat requirements. They occur in a variety of habitats across their range. They are opportunistic foragers that feed on a broad range of items switching dietary resources according to season and availability (Oakwood, 2008; Pollock, 1999; Oakwood, 2000). Daytime den sites provide important shelter and protection for northern quolls from predators and weather. However, shelter sites are also non-specific; rocky outcrops, tree hollows, hollow logs, termite mounds, goanna burrows and human dwellings have all been recorded (Dixon & Huxley, 1985; Braithwaite, Australia's unique biota: implications for ecological processes., 1990; Oakwood, 2002).

Within the Pilbara, the prevalence of Northern Quolls is highest within complex rocky areas (Northover, et al., 2023; van Dyck & Strahan, 2008). Therefore, their preferred habitat is considered to be rocky escarpments, but it also inhabits riverine habitats. Northern Quolls can be found in a variety of habitats, particularly males during the breeding season, but show a preference for complex rocky areas in the Pilbara (Molloy, Davis, Dunlop, & van Etton, 2017; Moore, 2021; Cowan, et al., 2022; Gibson, et al., 2023; Shaw, et al., 2023).

Complex, rocky landforms often in close proximity to permanent water are considered critical habitat as they provide refuge from predators (Hernandez-Santin, Goldizen, & Fisher, 2016) and other threats (e.g., fire (Cook, Radford, Bencini, & Mills, 2010)), access to food (Dunlop, Rayner, & Doherty, 2017), and shelter for denning (Braithwaite & Griffiths, 1994; Hernandez-Santin, Goldizen, & Fisher, 2022). Watercourses facilitate connectivity for dispersal and foraging (Cowan, et al., 2022; Shaw, et al., 2023), while areas with high silt or clay content (i.e., alluvial, coastal, and hardpan plains) may impede dispersal (Shaw, et al., 2023). Rocky areas provide prime habitat for Northern Quolls (Hill & Ward, 2010).

A male quoll can have a home range of more than 100 ha while a female occupies territories of up to 35 ha (van Dyck & Strahan, 2008). This species is predominantly nocturnal but may be observed during the day during the breeding season and on overcast days (Oakwood, 2008). Targeted surveys were undertaken for this species.

The Northern Quoll are known to prefer rocky cliffs for denning habitat and to travel vast distances to forage. Foraging habitat usually includes rocky plains and foot slopes however as there are no cliffs nearby it is unlikely the habitat would be significant for the Northern Quoll; however, they may be transient visitors within the Application Area.

Rocky Hills habitat has been recorded within the Application Area, although no dens have been recorded. Records of Northern Quoll have been identified in proximity to the Application Area, which supports the above statement that they may be transient visitors within the Application Area. There is continuous dispersal habitat for Northern Quoll to the north of the Application Area where additional areas of rocky hills habitat is found, this connects with the wider Chichester ranges.

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Pilbara Leaf-nosed Bat (recorded in Application Area)

The Pilbara Leaf-nosed Bat (*Rhinocterus aurantia*) is the Pilbara form of the Orange Leaf-nosed Bat and is listed as Vulnerable under the BC Act. While it is considered a separate form, formal reclassification has been hampered by the small size of the Pilbara population which appear morphologically similar to the northern form (Armstrong, 2008).

Foraging in a variety of habitats including the characteristic *Triodia* hummock grasslands of the Pilbara, the Pilbara Leaf-nosed Bat favours the highly productive and structurally complex riparian zones where water is permanently available and insect biomass is sufficiently high (Armstrong, 2001; McKenzie & Bullen, 2009). Females are highly dependent on foraging habitat within close proximity to maternal roosts, especially during lactation (Woinarski, Burbridge, & Harrison, 2014). As such, diurnal roost sites (deep caves within banded ironstone strata and disused underground copper/gold mines; (McKenzie & Bullen, 2012)) are typically located within flying range (i.e., 5-7 km) of permanent water (Bullen, 2023).

Habitat considered critical for this species includes Category 1, 2 or 3 roosts. Foraging habitat within 10 km radius of Category 1, 2 or 3 caves is also considered critical as is any permanent water source within 8.7 km of these caves. After extensive survey effort, no permanent known or suspected Category 1, 2, or 3 caves have been identified within the Application Area or has been documented within 30 km of the area (ecologia, 2023a). In addition, the Application Area does not contain permanent water sources.

The Rocky Hills habitat within the Proposed Action Area supports Priority 2 and Priority 3 foraging habitat, while Drainage Lines/Floodplains and Stony Spinifex Plains and Hillslopes support Priority 4 foraging habitat; however, in the absence of critical habitat and permanent water sources, is unlikely to be critical for the survival of this species.

Pilbara Olive Python (recorded in Application Area)

The Pilbara Olive Python (*Liasis olivaceus barroni*) is listed as Vulnerable under the BC Act. It is a dull olive-brown to pale fawn or rich brown python with a white/cream belly, pale lips finely dotted with pale grey or brown, pitted anterior scales bordering the lips and smooth scales in 55–80 rows at mid-body. The Pilbara Olive Python is one of Australia's largest snakes and can grow to 4 m in length with an average size of 2.5 m (Cogger, 2000).

The Pilbara Olive Python is restricted to gorges, rocky habitats, and escarpments of the Pilbara (Wilson & Swan, 2017). Bush and Maryan (Field Guide to Snakes of the Pilbara, 2011) noted that Pilbara Olive Pythons have been observed from locations some distance from water sources including granite outcrops, elevated mesas, and spinifex plains on stony ground, preferring to shelter in caves, crevices, and beneath large boulders.

The Conservation Advice for the Pilbara Olive Python does not define which habitat is considered critical for the survival of this species (DCCEEW, 2008). Based on survey information available to date, the Application Area does not contain deep gorges or permanent sources of water considered preferred habitat for this species (DCCEEW, 2008). As such, denning is considered to be less likely within the Application Area, given the absence of persistent watering holes. Pilbara Olive Python forages in Rocky Hills habitat, Drainage Line habitat, and Stony Spinifex Plains/Hillslopes. All these habitat types occur within the Application Area however these contain foraging value only.

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Management and Mitigation

Management methods will be utilised to minimise the direct impact of clearing activities on fauna including, but are not limited to:

1. Demarcation of area permitted for clearing;
2. Ensure suitably qualified fauna spotter/handler is available on site during clearing works;
3. Clearing of vegetation will be kept as minimal as practicable;
4. Promote driver awareness and implement appropriate speed limits, prohibition of off-road driving and adherence to vehicle movements on designated tracks;
5. Ensure staff and contractors are provided with appropriate training in regard to protection of significant fauna and associated habitats;
6. Use raised blade clearing (a technique designed to clear vegetation with less damage to topsoil) where practical; and
7. Clearing works will only be conducted during daylight hours.

Conservation Significant Fauna shall be managed in accordance with the Conservation Significant Fauna Management Plan.

Short Range Endemics

SREs are known to occur in a wide range of habitats throughout the Pilbara, including the habitats found within the Application Area. Due to the widespread local availability of the fauna habitat within the Application Area, broader area and low impact nature of the activities which will not eliminate or fragment any habitats. The proposed clearing, which involves a maximum of 26.07% (or 394.5 hectares) of the 1,512.9 hectares of SRE fauna habitat, is assessed as unlikely to have a significant impact on SRE's.

The nature and scale of vegetation to be cleared does not comprise significant habitat for local or regional fauna species. No species are at risk of becoming vulnerable or at increased vulnerability due to the loss of the proposed habitat.

The proposed clearing is therefore **not likely to be at variance to this principle.**

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4.3 Threatened Flora

Clearing Principle	Description	Variance
C	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of threatened flora	Not at Variance

Threatened flora is the species of flora that are listed under the BC Act as critically endangered, endangered or vulnerable threatened species (DBCA, 2023).

No Threatened flora species listed under the BC Act were recorded within the Application Area or Study Area.

The proposed clearing is **not at variance to this principle.**

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4.4 Threatened Ecological Community

Clearing Principle	Description	Variance
D	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community	Not at Variance

No TEC's have been recorded within the Application Area or Study Area.

The nearest TEC is over 68 kms (southwest direction) from the Application Area, the Project will have no direct or indirect impacts on this TEC.

Taking into consideration of the above, the proposed clearing is therefore **not at variance to this principle**.

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4.5 Remnant Vegetation

Clearing Principle	Description	Variance
E	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared	Not at Variance

The Application Area lies within Vegetation Associations:

- Fortescue Valley 562: of which there is 100% remaining within the IBRA region and subregion; and
- Fortescue Valley 29: of which there is 99.8% remaining within the IBRA region and subregion.

A total of nine vegetation types have been mapped within the Application Area as per studies listed in **Section 2.8.1**:

- AaAxSL: *Acacia* Tall Sparse Shrubland (3.3 ha);
- AdEvWL: *Acacia* and *Eucalyptus* Low Open Woodland (4.9 ha);
- ASL (1): *Acacia* Tall Sparse to Open Shrubland (156.9 ha);
- ASL (2): *Acacia* Tall Shrubland (125.3 ha);
- AWL (1): *Acacia* Low Woodland or Tall Shrubland (963.6 ha);
- AWL (2): *Acacia* Low Woodland or Tall Shrubland (93.2 ha);
- AxAsSL: *Acacia* Tall Shrubland (0.011 ha);
- THG (1): *Triodia* Hummock Grassland (348.4 ha); and
- THG (2): *Triodia* Hummock Grassland (372.1 ha).

Of these, approximately 18.2% will be cleared (i.e. 394.5 ha Clearing Area within the 2,160.8 ha Application Area).

These vegetation types are not considered to have regional conservation significance and are widespread throughout the region.

The Clearing Area represents a relatively small area of native vegetation surrounded by an extensive region of uncleared vegetation. The Application Area does not represent an area that is significant as a remnant of native vegetation in an area that has been extensively cleared.

Due to the above, the proposed clearing is **not at variance to this principle**.

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4.6 Watercourses or Wetlands

Clearing Principle	Description	Variance
F	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland	Is likely at Variance

The Application Area is located approximately 1 km north of the closest wetland of national significance (i.e. Fortescue Marsh). The Fortescue Marsh Nature Reserve is approximately 40 km south east of the Application Area.

The Application Area intersects several minor drainage lines most of which are ephemeral and often only flow during/or following large rainfall events (non-perennial watercourses). None of these watercourses are listed as significant. No buffer area will be applied at watercourses when clearing in the Application Area.

Minor waterways (corresponding with vegetation type ASL (2)) cover 5.8% (125.3 ha) of the Application Area.

Where possible work will be conducted in already precleared/disturbed areas and avoid disturbance in watercourses. The clearing of vegetation associated with a riparian area and watercourse will be undertaken under a Bed and Banks permit (RIWI Act 1914). There was one vegetation type identified as being riparian, that being AdEvWL. This vegetation type covers 0.23% of the Application Area. As the total quantity of habitat is relatively low (in comparison to the total Application Area), for the purposes of this impact assessment all of this habitat type is assessed as potentially cleared however due to the proposed mining activities required to be dispersed throughout the application area this outcome is highly unlikely.

Watercourses and wetlands shall be managed under the Water Management Plan (WMP) prepared for the Mulga Downs Iron Ore Mine Proposal (Assessment No. 2326). Aspects being monitored include:

- Groundwater level and quality (with trigger/threshold levels and associated mitigation strategies)
- Surface water quality trigger levels (with trigger/threshold levels and associated mitigation strategies)
- Vegetation health monitoring (with trigger/threshold levels and associated mitigation strategies)

The proposed clearing is **likely to be at variance to this principle**.

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4.7 Land Degradation

Clearing Principle	Description	Variance
G	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	Not likely at Variance

The Application Area lies within the Newman and Jamindie land systems (GIS Database - DPIRD-063). These land systems have been mapped and described in technical bulletins produced by the former Department of Agriculture (now the Department of Primary Industries and Regional Development (**DPIRD**)).

The Jamindie land system is described as stony hardpan plains and rises supporting groved mulga shrublands, occasionally with spinifex understorey. This land system has a low water / wind erosion hazard due to stony mantle and rock outcrop (van Vreeswyk, Leighton, Payne, & Hennig, 2004).

The Newman land system is described as rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands. This land system also has a low water / wind erosion hazard due to stony mantle and rock outcrop (van Vreeswyk, Leighton, Payne, & Hennig, 2004).

The infrastructure areas have been placed to minimise impacts to vegetation where possible. Clearing will also occur in accordance with the CSFMP, WMP, ECS (**Appendix 7**), SRP (**Appendix 8**) and Ground Disturbance Procedure (**Appendix 9**), which are intended to minimise and manage impacts as a result of changes to hydrological regimes, sedimentation and erosion.

Surface water studies conducted have determined that there will be no upstream ponding or downstream shadowing from the Project as minimal surface water diversion will be necessary (MWH, 2012).

An increase in sediment runoff and scour may occur due to ground disturbance and vegetation removal. Surface water quality in the Pilbara tends to be dominated by high sediment loads caused by the large runoff events generated by significant rainfall events and cyclones. Diversion of flows into defined channels (diversion channels) have the potential to concentrate flood flows and increase flood velocities, thereby increasing the potential for scour. The extent of these effects will be minimised through the engineering design of the diversion channels, and the WMP. The WMP has been prepared for the wider MDIOM and will be in place for the Project where relevant.

Overall, the clearing for Murray's Hill is unlikely to cause appreciable land degradation.

Due to the above, the proposed clearing is therefore **not likely to be at variance to this principle**.

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4.8 Conservation Area

Clearing Principle	Description	Variance
H	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area/s.	Not at Variance

There are three land areas managed for conservation purposes by DBCA within proximity to the Application Area. The Mungaroon Range Nature Reserve is approximately 16 km to the northwest, the Fortescue Marsh Nature Reserve is approximately 40km south east of the Application Area and Karijini National Park is approximately 20 km to the south. Due to the remote distance from the Project, the proposed clearing will not have a direct or indirect impact on the environmental values of these conservation areas.

Taking the above into consideration, the proposed clearing is therefore **not at variance to this principle**.

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4.9 Water Quality

Clearing Principle	Description	Variance
I	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water	Not likely at variance

The proposed clearing may result in local disturbance of minor surface water drainage channels. The proposed clearing will be completed to avoid or minimise disturbance of surface water channels, minimise sedimentation and deterioration of surface or underground water.

An increase in sediment runoff and scour may occur due to ground disturbance and vegetation removal. Surface water quality in the Pilbara tends to be dominated by high sediment loads caused by the large runoff events generated by significant rainfall events and cyclones. Diversion of flows into defined channels (diversion channels) have the potential to concentrate flood flows and increase flood velocities, thereby increasing the potential for scour. The extent of these effects will be minimised through the engineering design of the diversion channels and the WMP. The WMP has been prepared for the wider MDIOM and will be in place for the Project where relevant.

Dust suppression management, utilising existing cleared areas where possible and appropriate hydrocarbon storage and handling management amongst others will ensure there is no adverse environmental impacts through sedimentation or contamination of water bodies.

There are no Public Drinking Water Source Areas (**PDWSAs**) within or in close proximity to the Application Area. The nearest PDSWA is approximately 63 km to the southwest of the Application Area (Priority 1 Protection Area 'Southern Fortescue and Marandoo Water Reserves').

The areas surrounding the Clearing Areas will remain largely vegetated, which also minimises the risk of water quality deterioration as vegetation acts as a natural filter (Gumiere, Bissonais, Raclot, & Cheviron, 2010).

Given the above the proposed clearing is therefore **not likely to be at variance to this principle**.

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4.10 Flooding

Clearing Principle	Description	Variance
J	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	Not likely at variance

The climate of the region is arid, with a low average rainfall of approximately 457 mm per year (BoM, 2025a; BoM, 2025b). Drainage lines dissecting the Application Area are mostly ephemeral and often only flow during/or following large rainfall events (Spectrum, 2024).

According to van Vreeswyk et al. (2004), the Jamindie and Newman land systems do not contain an inundation or flooding risk.

Within drainage channels, the clearing of vegetation along beds and banks and disturbance of associated surface materials will be avoided or minimised to reduce the impact on water flow in these channels, water depths and velocities. The clearing of vegetation associated with a riparian area and watercourse will be undertaken under a Bed and Banks permit. The clearing will not cause or exacerbate the incidence or intensity of flooding.

Due to the above, the proposed clearing is therefore **not likely to be at variance to this principle**.

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5 Conclusions

MDIO proposes to construct the Murray's Hill Project within a Clearing Area of 394.5 ha within an Application Area of 2,160.8 ha.

An assessment against the ten clearing principles listed in Schedule 5 of the EP Act has indicated that the proposed clearing is not significantly at variance with majority of the clearing principles. The clearing principle likely at variance is in relation to 'Clearing Principle F: Watercourses or Wetlands'. However, the clearing of vegetation associated with a riparian area and watercourse will be undertaken under a Bed and Banks permit which will allow for further impact assessment and any additional mitigation strategies should they be required. Therefore, it is concluded that clearing can occur under a Native Vegetation Clearing Permit, which is in line with the EPA's decision of "Not Assessed" made following referral of the Project in 2013.

The findings of the assessment against the ten clearing principles are presented in **Table 5-1** below.

Table 5-1: Summary of Clearing Assessment

Clearing Principle	Findings
A: Biodiversity	Not likely at variance
B: Fauna Habitat	Not likely at variance
C: Threatened Flora	Not at variance
D: Threatened Ecological Community	Not at variance
E: Remnant Vegetation	Not at variance
F: Watercourses or Wetlands	Is likely at variance The clearing of vegetation associated with a riparian area and watercourse will be undertaken under a Bed and Banks permit which will allow for further impact assessment and any additional mitigation strategies should they be required.
G: Land Degradation	Not likely at variance
H: Conservation Area	Not at variance
I: Water Quality	Not likely at variance
J: Flooding	Not likely at variance

In addition, the following measures are proposed to reduce, minimise and mitigate the impacts:

- Where possible work should be conducted in already precleared/disturbed areas and avoid disturbance in watercourses.
- Clearing of vegetation will be kept as minimal as practicable.
- No clearing will commence prior to the completion of a desktop (and ground based if required) review of Environmental, Heritage, Tenure and Land Access sensitivities and a GDP is issued and accepted by the work package owner.
- Prescriptive clearing related conditions, including environmental or Heritage related supervision will be applied as conditions to the GDP, as required.
- All works must be conducted in accordance with an internal GDP system and must comply with the conditions of the GDP.
- Cleared areas to be surveyed for reporting in accordance with permit requirements.

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- Ensure suitably qualified fauna spotter/handler is available on site during clearing works.
 - Ensure clean earth-moving machinery prior to entering/leaving clearing area and machinery to be inspected by suitable personnel.
 - Restrict the movement of machines and other vehicles within the limits of the clearing areas.
 - Ensure record keeping including GDP sign on, weed and seed vehicle inspections.
 - Retain the vegetative material and topsoil.
 - Topsoil stockpiles will not exceed 2m in vertical height and will not be compacted during stockpiling activities.
 - Efforts will be made to incorporate breaks in clearing to reduce potential impacts on surface hydrology flow. Industry standard methods for the storage and handling of hydrocarbons and ensuring the availability of spill response materials.
 - Clearing will occur within the dry season (dry conditions) where possible to minimise sedimentation.
 - Vegetation clearing and earthworks during high winds (>50 km/hr) will be avoided where possible.
 - Dust suppression techniques (e.g. water trucks) shall be used on unsealed roads and access tracks, cleared areas and at locations of high dust risk.
 - Implement programs for induction and education of the workforce and contractors with respect to flora and vegetation protection and management.
 - An emergency management plan shall be developed and implemented and shall include methods for managing major environmental incidents, including but not limited to fire, fauna awareness and native vegetation.
 - All environmental incidents must be reported through the Incident Reporting System.
- Clearly demarcate the area of vegetation required to be cleared prior to works commencing with either physical ground markers or electronic demarcation/ GPS Positioning tool e.g. Geomoby.
- Promote driver awareness and implement appropriate speed limits, prohibition of off-road driving and adherence to vehicle movements on designated tracks.
 - Ensure staff and contractors are provided with appropriate training with regard to protection of significant fauna and associated habitats.
 - Use raised blade clearing (a technique designed to clear vegetation with less damage to topsoil) where practical.
 - Clearing will only be conducted during daylight hours.

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6 Abbreviations

Table 6-1: Abbreviations

Abbreviation	Definition
AHD	Australian Height Datum
ACHIS	Aboriginal Cultural Heritage Inquiry System
ACN	Australian Company Number
ALA	Atlas of Living Australia
AWT	Above Water Table
BIF	Banded Iron Formation
BNTAC	Banjima Native Title Aboriginal Corporation
BoM	Bureau of Meteorology
CSFMP	Conservation Significant Fauna Management Plan
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety
DIWA	Directory of Important Wetlands in Australia
DMPE	Department of Mines, Petroleum and Exploration
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DSO	direct shipping ore
ECS	Environmental Compliance Standard
EMS	Environmental Management System
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986</i>
EPBC Act	<i>Environmental Protection Act and Biodiversity Conservation Act 1999</i>
GDP	Ground Disturbance Procedure
HPPL	Hancock Prospecting Propriety Limited
IBRA	Interim Biogeographic Regionalisation for Australia
MDIO	Mulga Downs Iron Ore Propriety Limited
MDIOM	Mulga Downs Iron Ore Mine
NVCP	Native Vegetation Clearing Permit
PDWSA	Public Drinking Water Source Area
PEC	Priority Ecological Community
RiWI Act	<i>Rights in Water and Irrigation Act 1914</i>
RO	Reverse Osmosis
SRE	Short-range Endemic
SRP	Spill Response Procedure
TDS	Total Dissolved Solids
TEC	Threatened Ecological Community

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Abbreviation	Definition
UCL	Unallocated Crown Land
WMP	Water Management Plan
WWTP	Waste Water Treatment Plant

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8 Appendices

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Appendix 1 – Environmental Policy

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Appendix 2 – Mulga Downs Iron Ore Project, Mine and Borefield Study Area Detailed Flora and Vegetation Assessment 2019-2022 (Maia 2022)

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Appendix 3 – Mulga Downs Groundwater, Surface Water and Ecohydrological Studies – Baseline Assessment (AQ2 2025)

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Appendix 4 – Memo: Data Reconciliation (Spectrum 2024)

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Appendix 5 – Mulga East Baseline Terrestrial Vertebrate Fauna Assessment (ecologia 2021a)

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Appendix 6 – Consolidated Terrestrial Fauna Report (Attexo 2023)

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Appendix 7 – Environmental Compliance Standard

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Appendix 8 – Spill Response Procedure

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Appendix 9 - Ground Disturbance Permit Procedure

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Appendix 10 - Mulga Downs *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638) Targeted Flora Survey

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