



## Supporting Documentation

### Application for Native Vegetation Clearing Permit

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Nyidinghu Project Investigative Works

**7 July 2023**

**NY-AE-EN-0001 Rev 0**

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## 1. INTRODUCTION

Fortescue Metals Group Ltd (Fortescue) proposes to clear up to 25.11 ha of native vegetation to undertake geotechnical and hydrological investigations at its Nyidinghu Iron Ore Project. Nyidinghu is located approximately 80 km north-west of Newman in the Pilbara Region of Western Australia (Figure 1).

This report and its appendices provide all the relevant information required under Part V, Section 51E of the EP Act, to assess the proposed clearing. This includes baseline environmental data, survey reports, a digital permit envelope (shapefile) and assessment against the 10 Clearing Principles.

### 1.1 Summary of Proposal

The key details of the proposed clearing are represented in Table 1.

**Table 1: Key Details of Proposed Clearing**

<b>Site Details</b>	
<b>Project Name</b>	Nyidinghu Investigations
<b>Description of operations</b>	Geotechnical and Hydrogeological drilling
<b>Total Clearing Proposed</b>	25.11 ha
<b>Project Commencement Date</b>	October 2023
<b>Land Title</b>	S.91 Licence L01000/2014_A12614995.
<b>Clearing Method</b>	Mechanised Clearing
<b>Purpose of Clearing</b>	Establish tracks and drill pads within the permit envelope.
<b>Proponent Details</b>	
<b>Company Name</b>	Fortescue Metals Group Ltd
<b>CAN</b>	57 002 594 872
<b>Postal Address</b>	PO Box 6915 EAST PERTH WA 6985
<b>Key Contact</b>	Isaias De La Torre Environmental Advisor +61 8 6235 9620 miningapprovals@fmgl.com.au

### 1.2 Proposed Clearing Activities

Fortescue proposes to clear up to 25.11 ha of native vegetation within the permit envelope of 1,261 ha in order to complete geotechnical, hydrological and hydrogeological investigations associated with its Nyidinghu Project (Figure 2). The final disturbance footprint within the envelope will be provided during the reporting period, as it is expected site environmental

conditions at the time of onground drilling activities needs to be accounted for at the time. A breakdown of clearing requirements is provided in Table 2.

**Table 2: Proposed Clearing**

<b>Item</b>	<b>Disturbance (ha)</b>
Tracks	18.20
Hydrological Drill Pads 7x(110x80m)	6.16
Geotechnical Drill Pads 3x(50x50m)	0.75
<b>Total</b>	<b>25.11</b>

Previously disturbed vehicular tracks are present within the permit envelope, and these will be utilised wherever possible.

### **1.3 Relevant Approvals and Background**

Key legislation that may affect the environmental management of the project and a list of all relevant environmental approvals is provided in Table 3.

**Table 3: Relevant Approvals for proposed works**

<b>Legislation</b>	<b>Approval Required</b>
<i>Environmental Protection Act 1986 Part V</i>	A native vegetation clearing permit is required for the proposed works.
<i>Rights in Water and Irrigation Act 1914</i>	Approval to construct a well for the purpose of groundwater production (26D Licence) and approval to abstract groundwater (5C Licence) will be required for the proposed works.
<i>Land Administration Act 1997</i>	Licence to Occupy Crown Land Section 91 Lic L01000/2014 _A12614995



## 2. STAKEHOLDER ENGAGEMENT

Stakeholder engagement for the larger Nyidinghu Project commenced in 2020 focusing on key stakeholders with direct interest in the Project an ongoing process, mainly through face to face meetings and visual presentations. Stakeholder consultation has not been specific to this particular clearing permit, however it is entirely located within the larger Project. The overarching objectives of the consultation are:

- To inform stakeholders about the Project and its impacts to the environment and to describe the outcomes of consultation on project design; and
- To establish relationships with key stakeholders that enable ongoing dialogue through implementation and regulation of the Proposal.

### 2.1 Key Stakeholders

Key stakeholders identified as relevant to this clearing permit and their interests acknowledged through consultation are listed in Table 4.

**Table 4: Key Stakeholders at Nyidinghu**

<b>Stakeholder</b>	<b>Interests</b>	<b>Consultation Summary</b>
Nyiyaparli People	Traditional Owners	Nyiyaparli are regularly updated on the progress of the Nyidinghu Project. Nyiyaparli will be provided copies of this application for their information. No heritage sites will be impacted by the proposed clearing.
Marillana Station	Pastoral Lease Holder	An agreement has been reached between Fortescue and Marillana station for the proposed investigations within the S.91 Licence area as shown in Figure 2.
Rio Tinto Iron Ore	Underlying Tenement Holder	An agreement has been reached between Fortescue and RTIO for the proposed investigations within the S.91 License area (the clearing permit area as shown in Figure 2).

### 2.2 Heritage and Native Title

This application is located entirely within the Nyiyaparli Native Title Determination area. Fortescue has successfully entered into a Land Access Agreement (LAA) with the Nyiyaparli. This agreement requires the establishment of a Working Group and relevant Heritage Sub-committee which deals specifically with heritage matters. Fortescue meets and consults with the Nyiyaparli over all aspects related to identification, protection, and management of their cultural heritage, constant with the relevant legislation (Aboriginal Cultural Heritage Act 2021 WA (ACH)) and its contractual obligations as prescribed by the LAA's.

In accordance with Nyiyaparli LAA, Fortescue engages nominated traditional owners and their professional heritage consultants to conduct comprehensive ethnographic and archaeological cultural heritage surveys. These surveys are completed to ensure compliance with the *Aboriginal Heritage Act 1972 WA (AHA)* and contractual obligations set out in the LAA's. Heritage surveys are undertaken prior to any disturbance as is the agreed process and Fortescue is committed to avoiding any heritage place for these proposed works. Fortescue will continue to consult with the Nyiyaparli on all aspects of the project and its planning, including this clearing permit and any updates upon their request.

### 3. BASELINE ENVIRONMENTAL DATA

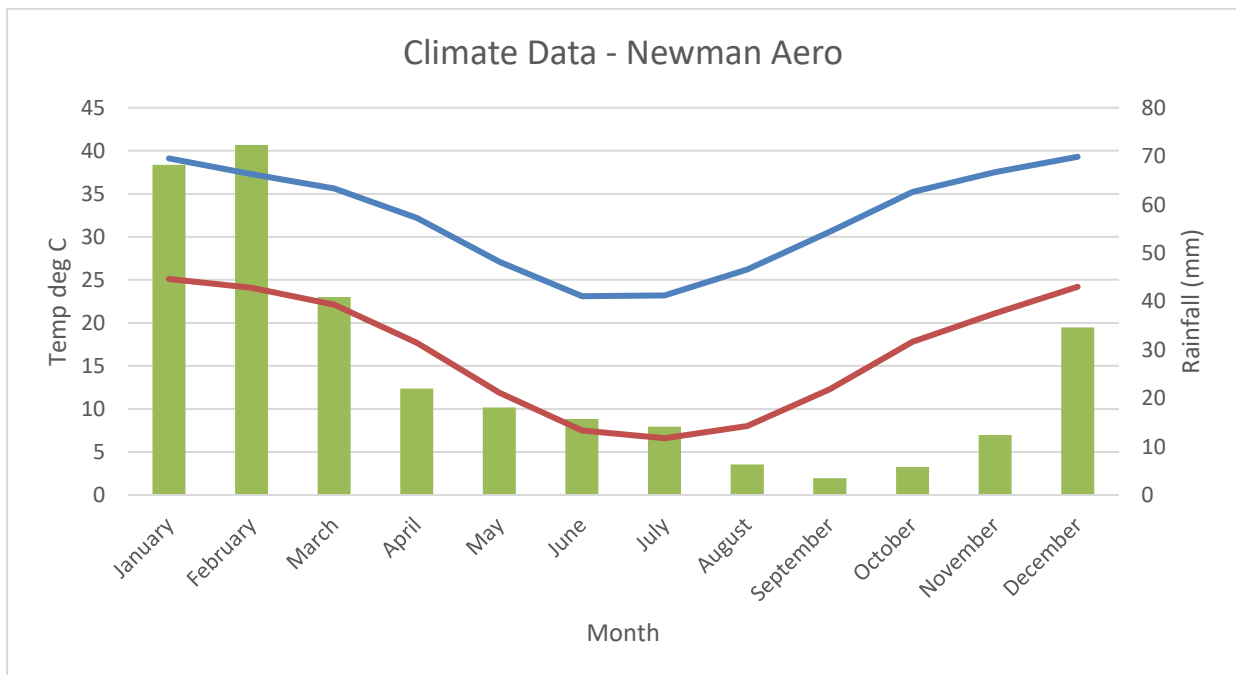
The permit area has been subject to numerous extensive environmental surveys since 2011. This section outlines the environmental surveyed data obtained to date that is relevant to this clearing permit application. The data has been used to define the environmental values and identify and assess the potential risks and impacts to these values that requires management controls.

#### 3.1 Climate

The application area is entirely within the broader Pilbara region, which is considered arid with average rainfall generally less than 350mm. However, rainfall is highly seasonal with most rain falling in a summer wet-season between December and May, and drier, cooler conditions prevail between June and November.(van Vreeswyk, et al., 2004).

The monthly rainfall and temperature averages that closely represents Nyidinghu is the Newman (BOM) Bureau of Meteorology stations, located approximately 80 km south-east of the permit envelope are shown in Graph 1.

**Graph 1: Climate Data, Newman**



Monthly maximum temperatures range from a mean of 23.1 in Jun to 39.3 in December, whereas mean minimum temperatures range from 6.6 in July to 25.1 in January (BOM, 2022)

Annual rainfall in the Pilbara has a substantial yearly variation. Tropical cyclones, along with local thunderstorms, produce much of the summer and early autumn rainfall. The driest months

are in late winter and spring (August to November), and the wettest in summer (December to March) (BOM, 2022).

### 3.2 Landscape

The application area lies in the Pilbara biogeographic region of the Interim Biogeographic Regionalisation for Australia (IBRA). The Pilbara biogeographic region incorporates 17,928,700 ha and includes four subregions: Chichester, Roebourne, Hamersley, and Fortescue Plains. The permit envelope is located entirely within the Fortescue Plains sub-bioregion of the Pilbara bioregion.

The Fortescue Plains sub-bioregion as described by Kendrick (2001), consists of alluvial plains and river frontage, an extensive salt marsh (the Fortescue Marsh), mulga-bunch grass, and short grass communities on alluvial plains in the east. Deeply incised gorge systems occur in the western (lower) part of the drainage. Rivergum woodlands fringe the drainage lines. The Fortescue Plains mark the northern limit of Mulga (*Acacia aneura*). An extensive calcrete aquifer (originating within a palaeo-drainage valley) feeds numerous permanent springs in the central Fortescue, supporting large permanent wetlands with extensive stands of river gum and Melaleuca Cajuputi woodlands. The permit envelope occurs approximately 26 kilometres south of the Fortescue Marsh on stony plains, in the eastern parts of the sub-bioregion.

### 3.3 Land Systems

Four land systems, as described by van Vreeswyk et al (2004), occur within the application area (Figure 3). Extents within the permit envelope are described in Table 5.

**Table 5: Land Systems in the permit envelope**

<b>Land System</b>	<b>Description</b>	<b>WA Soil Group (Schoknecht, Pathan 2013)</b>	<b>% of Envelope</b>
Boolgeeda	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.	522, 544, 705.	5.3
Newman	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.	203, 522, 544	24.2
River	Narrow, seasonally active flood plains and major river channels supporting moderately close, tall shrublands or woodlands of acacias and fringing communities of eucalypts sometimes with tussock grasses or spinifex.	705, 544, 445, 463	34.6
Urandy	Stony plains, alluvial plains and drainage lines supporting shrubby soft spinifex grasslands.	544, 406	35.9

### 3.4 Soils Assessment

A soils assessment was undertaken for the Nyidinghu Project area in 2011 (FMG, 2012). Table 6 describes the types of soils that are likely to be found within the permit envelope.

**Table 6: Soils potentially occurring within the permit envelope**

<b>Land System</b>	<b>Soils</b>
Boolgeeda	<ul style="list-style-type: none"> <li>• Low hills and rises – stony soils and shallow red loams</li> <li>• Stony slopes and upper plains – shallow red loams or loamy red earths</li> <li>• Stony lower plains – loamy red earths</li> <li>• Groves – loamy red earths</li> <li>• Narrow drainage floors and channels – loamy red earths and minor self-mulching cracking clays. Channels with river bed soils.</li> </ul>
Newman	<ul style="list-style-type: none"> <li>• Plateaux, ridges, mountains and hills – stony soils, shallow red loams and some shallow red sands</li> <li>• Lower slopes – stony soils on upper margins with loamy red earths on lower margins</li> <li>• Stony plains – stony soils, shallow red loams with some loamy red earths</li> <li>• Narrow drainage floors with channels – shallow red low loams, loamy red earths. Channels with river bed soils.</li> </ul>
River	<ul style="list-style-type: none"> <li>• Sandy leaves and sand sheets – deep red, sands, red sandy earths, loamy red earths and some river bed soils</li> <li>• Upper terraces – deep red sands</li> <li>• Flood plains and lower terraces – deep red/brown non-cracking clays and loamy red earths</li> <li>• Stony plains – shallow red loams and shallow red sands</li> <li>• Minor and major channels – river bed soils</li> </ul>
Urandy	<ul style="list-style-type: none"> <li>• Stony plains – loamy red earths</li> <li>• Alluvial plains – loamy red earths with some shallow red sandy surface texture contrast soils</li> <li>• Drainage zones and channels – loamy red earths, levees of deep red sand and channels with river bed soils.</li> </ul>

#### 3.4.1 Local Soil Characteristics

Soils at the Nyidinghu site were described in terms of their physical and chemical properties (FMG, 2012). Soils were low in organic matter, were generally low in nutrients, had low Cation Exchange Capacities and were low in clay content. Soil pH levels were almost universally within optimal ranges and contained very low levels of sodium chloride (salt). Exchangeable sodium levels were low and calcium to magnesium ratios were all above parity. Physically these soils (both topsoils and subsoils) are relatively stable media but are slightly to moderately dispersive and are a suitable substrate for the re-establishment of vegetation species.

Soil chemical testing indicated that low levels of nutrients were present at each site (with the exception of K and some trace elements). Particle size distribution (PSD) confirmed that the soils were low in clay particles and thus lacked the buffering capacity required to respond to fluctuating levels of soil nutrients (FMG, 2012).

The soils at Nyidinghu are slightly to moderately dispersive with both subsoil and topsoil material able to be used for rehabilitation (FMG, 2012). Drill hole evidence suggests that the soils on the plains and flats are very deep soils extending down many meters.

### 3.5 Flora and Vegetation

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The permit envelope has been extensively surveyed for flora and vegetation with the most recent survey completed in 2021 by Ecoscape, refer to Appendices 1 and 2. The results of these investigations are provided in this section.

#### 3.5.1 Regional Vegetation Units

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Vegetation units have been described on a regional scale by Beard (Beard, 1975) and their extents are updated periodically (Data WA, 2021). These vegetation units are broad scale descriptors and attempt to depict the native vegetation as it was presumed to be at the time of European settlement. Two Beard vegetation units occur within the application area (Figure 4) and are listed in Table 7 with their total estimated pre-European extent.

- **29:** Sparse low woodland; mulga, discontinuous in scattered groups
- **82:** Hummock grasslands; low tree steppe, snappy gum over *Triodia wiseana*

**Table 7: Beard Vegetation Units within permit envelope**

<b>Vegetation Unit</b>	<b>Pre-European Extent (ha)</b>	<b>Current State-wide Remaining (ha)</b>	<b>Current State-wide % remaining</b>	<b>Extent in Conservation Estate (ha)</b>
<b>29</b>	7,903,991	7,898,973	99.94	22,595
<b>82</b>	2,565,901	2,553,206	99.51	262,983

#### 3.5.2 Flora and Vegetation Investigations

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The permit envelope and surrounds has been subject to extensive survey effort. The most relevant surveys relating to the permit envelope include:

- Nyidinghu Transport Corridor Flora and Vegetation Assessment (Ecoscape, 2022)
- Nyidinghu Targeted Flora and Vegetation Survey (Ecoscape, 2021)

These surveys have been used to assess the flora and vegetation of the permit envelope for this clearing permit. The flora and vegetation surveys were conducted over a broad region surrounding and including the permit envelope. Both Survey reports are provided at Appendix 1 and 2.

#### 3.5.3 Vegetation Communities

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A total of six vegetation communities have been mapped within the permit envelope as depicted in Table 8 and Figure 5.

**Table 8: Vegetation Communities within the Permit Envelope**

<b>Vegetation Community</b>	<b>Description</b>	<b>Extent in Envelope (ha)</b>	<b>Proposed Clearing (ha)</b>
<b>AcCc</b>	Acacia citrinoviridis and A. pruinocarpa low open woodland over *Cenchrus ciliaris and *C. setiger low tussock grassland	134.6	9.4
<b>ApTp</b>	Acacia pachyacra, A. ancistrocarpa and A. inaequilatera mid sparse shrubland over Triodia pungens, *Cenchrus ciliaris and Eragrostis eriopoda low hummock grassland/ tussock grassland	337.2	8.1
<b>AtTp</b>	Acacia tumida var. pilbarensis, A. pyrifolia var. pyrifolia and G. wickhamii mid open shrubland over Triodia pungens and *Cenchrus ciliaris low hummock/tussock grassland	9.6	0.2
<b>EgAaTb2</b>	Eucalyptus gamophylla and Corymbia hamersleyana low open woodland over Acacia ancistrocarpa, A. sclerosperma subsp. sclerosperma and A. inaequilatera mid sparse shrubland over Triodia basedowii low hummock grassland	309.5	5.1
<b>EIGwTv</b>	Eucalyptus leucophloia subsp. leucophloia low open woodland over Grevillea wickhamii, Acacia inaequilatera and Senna glutinosa subsp. glutinosa mid sparse shrubland over Triodia vanleeuwenii low hummock grassland	292.5	2.2
<b>EvAcCc</b>	Eucalyptus victrix mid open woodland over Acacia citrinoviridis, A. pyrifolia var. pyrifolia and G. wickhamii tall sparse shrubland over Corchorus crozophorifolius, Tephrosia rosea var. Fortescue creeks (M.I.H. Brooker 2186) and *Cenchrus ciliaris open low shrubland/tussock grassland	166.1	0.1

### 3.5.4 Vegetation Condition

The vegetation condition of the permit envelope has been assessed using the adapted Keighery (1994) Vegetation Condition Scale for the Eremaean and Northern Botanical Provinces (Figure 6). Within the permit envelope 292.7 has been identified in 'Excellent' condition, 297.2 ha in 'Very Good' condition, 525.3 ha in 'Good' condition and 134.6 ha in a 'Degraded' condition (Ecoscape, 2021).

The majority of vegetation considered to be in 'Good' to 'Excellent' condition was associated with hills and stony plains, which are not often grazed by cattle (van Vreeswyk, et al., 2004). Grazing pressures on lower lying areas such as mulga, clay pans and major drainage lines tended to be in poorer condition with higher abundance of weed species.

### 3.5.5 Conservation Significant Vegetation Communities

Vegetation communities in Western Australia are described as Threatened Ecological Communities (TEC) if they have been endorsed by the Western Australian Minister for

Environment following recommendations made by the Threatened Species Scientific Committee. TECs that are listed to be of State conservation significance in Western Australia are considered to be Environmentally Sensitive Areas (ESA) under Part V of the EP Act.

Possible threatened ecological communities that do not meet survey criteria are added to the Priority Ecological Community (PEC) list under Priority 1, 2 or 3. Ecological communities that are adequately known, are rare but not threatened, or meet criteria for “Near Threatened”, or that have been recently removed from the threatened list, are placed in Priority 4. Conservation dependent ecological communities are placed in Priority 5.

During the design of infrastructure placement, specific attention was given to avoiding flora and vegetation communities of environmental significance. There will be no impact to Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC) under this application.

There are no TECs within the permit envelope. The closest recorded TEC is the Ethel Gorge Stygobiont Community, located approximately 80 km south-east of the permit envelope.

Examples of the Vegetation of sand dunes of the Hamersley Range/Fortescue Valley (Priority 3 – PEC) are located between 4-5 km east and west of the permit envelope. No vegetation representative of this community has been recorded within the permit envelope.

#### 3.5.6 Sheetflow Dependent Vegetation

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The term ‘sheet flow dependent vegetation’ is intended to refer to vegetation communities that are dependent on overland sheet flow of water, which occurs on broad plains with a very gradual slope. The main communities that are considered to be reliant on this process in the Pilbara are typically recognised as grove-intergrove vegetation (often referred to as ‘Banded Mulga’, as the communities are dominated by various taxa in the *Acacia* ‘aneura’ complex) (Ecoscape, 2021). None of the vegetation communities mapped within the permit envelope are sheetflow dependent mulga communities.

#### 3.5.7 Groundwater Dependent Vegetation

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Groundwater Dependent Vegetation (GDV) is defined as terrestrial vegetation that is dependent on the presence of groundwater to meet some or all of its ecological water requirement (Astron, 2016).

GDV is often characterised by the presence of key indicator species such as Coolibah (*Melaleuca argentea*) or River Red Gum (*Eucalyptus camaldulensis*). These species obtain the majority of their water requirements from groundwater.

Other vegetation communities may potentially be dependent on groundwater depending on the depth to groundwater. In particular, the presence of *Eucalyptus victrix* as dominant overstorey



species may indicate that a vegetation community may potentially be dependent on groundwater. A discussion on *E. victrix* follows.

From an assessment of water level ranges of Pilbara riparian species, it was found that the mean minimum groundwater level depth of *E. victrix* was greater than that for *E. camaldulensis*, providing support for the view that *E. victrix* is found in slightly drier areas than *E. camaldulensis* and may not be as responsive to water table fluctuations (Loomes, 2020).

This is supported by a number of studies which find that *E. victrix* is considered to be a facultative phreatophyte (Batini, 2009) (Froend, 2009). That is, *E. victrix* uses soil water derived from surface water drainage into the unsaturated zone but may obtain some of their water requirements from groundwater where it is available, particularly large mature trees.

Water inputs from flooding appears to be important for sustaining *E. victrix* communities in most environments, regardless of the groundwater level. Regular flood events are required to recharge soil moisture in the vadose zone and provide enough soil water to sustain *E. victrix* during lengthy periods of drought that can last many months to years (Astron, 2016).

Therefore, based on available literature Fortescue considers that the presence of *E. victrix* as a dominant overstorey species is indicative of a potential use of groundwater, depending on site-based conditions, including depth to groundwater and the surface hydrological regime.

One vegetation unit has been identified within the application area that is considered a potential GDV due to the presence of *E. victrix*:

**EvAcCc:** *Eucalyptus victrix* mid open woodland over *Acacia citrinoviridis*, *A. pyrifolia* var. *pyrifolia* and *G. wickhamii* tall sparse shrubland over *Corchorus crozophorifolius*, *Tephrosia rosea* var. Fortescue creeks (M.I.H. Brooker 2186) and \**Cenchrus ciliaris* open low shrubland/tussock grassland.

### 3.5.8 Flora Taxa

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The flora survey conducted over the permit envelope and surrounding areas in 2021 identified 607 vascular plants from 194 genera and 59 families. As a comparison, a survey was undertaken over the Nyidinghu Project area in 2011, including some of the area subject to this application (Cardno, 2012). This survey located 361 vascular plants from 47 families and 144 genera. However, the Ecoscape survey was a much larger survey covering two IBRA sub-bioregions.

### 3.5.9 Flora of Conservation Significance.

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No flora species of conservation significance have been recorded from within the permit envelope despite targeted searches (Ecoscape, 2022). The following conservation significant flora species have been recorded within a 20 km radius:

- *Synostemon hamersleyensis* (Priority 1)
- *Calotis squamigera* (Priority 1)
- *Euphorbia inappendiculata* var. *queenslandica* (Priority 1)
- *Eragrostis crateriformis* (Priority 3)
- *Eremophila youngii* subsp. *lepidota* (Priority 4)
- *Goodenia nuda* (Priority 4)
- *Lepidium catapycnon* (Priority 4)

It is possible un-recorded specimens may be disturbed by the proposed works. The proposed disturbance will not have a significant impact on any priority flora species.

### 3.5.10 Weeds

Only two species of weeds have been recorded within the permit envelope. These are:

- *Cenchrus ciliaris* (Buffel Grass)
- *Setaria verticillata* (Whorled Pigeon Grass)

Buffel grass is a common weed species often present near creeks and drainage lines.

## 3.6 Vertebrate Fauna

A number of vertebrate fauna surveys have been undertaken over the permit envelope and surrounding areas. The most recent of these was undertaken over 2021 by 360 Environmental. Their report is provided at Appendix 3.

The fauna habitat types listed in Table 9 have been recorded within the permit envelope (360 Environmental, 2022) (Figure 7).

**Table 9: Fauna Habitats**

Habitat	Description	Important Habitat	Area in envelope (ha)
Drainage Line/ River/Creek (Major)	Open riparian woodland (Eucalypt, Corymbia) over hummock or tussock grassland on substrates ranging from sand to sandy clay, with an assortment of river stones	Pilbara Olive Python ( <i>Liasis olivaceus</i> ) Grey Falcon ( <i>Falco hypoleucos</i> ) Peregrine Falcon ( <i>Falco peregrinus</i> )	158.3
Drainage Line/ River/Creek (Minor)	Riparian shrublands (Acacia) and open woodland (Eucalypt, Corymbia) over hummock or tussock grassland on substrates ranging from sand to sandy clay,	Grey Falcon ( <i>Falco hypoleucos</i> ) Peregrine Falcon ( <i>Falco peregrinus</i> )	365.6

<b>Habitat</b>	<b>Description</b>	<b>Important Habitat</b>	<b>Area in envelope (ha)</b>
	with an assortment of river stones		
Hills/Ranges/Plateaux	Open shrublands (Acacia) over Triodia hummock grasslands on rocky ironstone hills and slopes with rocky outcropping and thin soils over shallow bedrock	Western Pebble Mound Mouse ( <i>Pseudomys chapmani</i> )	208.3
Hummock Grassland	Triodia hummock grassland on primarily sandy loam and sandy clay plain with a sparse overstorey of mixed shrubs dominated by Acacia and scattered Corymbia	Ganes Blind Snake ( <i>Anilius ganei</i> ) Greater Bilby ( <i>Macrotis lagotis</i> ) Mulgara ( <i>Dasyercus cristicaudata</i> )	514.8
Rocky Escarpments/ Ridges/Mesa	Rocky escarpments and breakaways with abundant crevices, overhangs, cavities and caves (part of the broader Hills/Ranges/Plateaux habitat)	Northern Quoll ( <i>Dasyurus hallucatus</i> ) Pilbara Leaf-nosed Bat ( <i>Rhinonictis aurantia</i> ) Ghost Bat ( <i>Macroderma gigas</i> ) Pilbara Olive Python ( <i>Liasis olivaceus</i> )	2.5

No conservation significant fauna species has been located within the purpose permit envelope, despite extensive targeted searches (360 Environmental, 2022). It is possible that some conservation significant fauna species may occur sporadically within the permit envelope, however the risk of any impact to conservation significant fauna species is very low.

### 3.6.1 Short Range Endemics

One potential SRE invertebrate species has been recorded within the permit envelope (Figure 8) – a pseudoscorpion *Beierolpium* sp. 8/3 (Bennelongia, 2011). This specimen was observed in Hills/Ranges/Plateaux habitat which is common both within the permit envelope and beyond. This potential SRE species is unlikely to be significantly impacted by the proposed clearing.

### 3.6.2 Feral Animals

Cattle and Dingos have both been recorded within the permit envelope (360 Environmental, 2022). The permit envelope occurs on Marillana Station, and it is expected that cattle will occur in suitable grazing areas, such as major drainage lines and mulga communities.

## 3.7 Hydrology

The permit envelope occurs within the Weeli Wolli Creek catchment. The Creek bisects the permit envelope and is the major drainage feature present. Permanent flows occur within the creek as a result of the discharge of groundwater from the adjacent Iron Valley Iron Ore Mine, managed by Mineral Resources Ltd. Water quality within this permanent flow is considered fresh and there are no sediments.

During flood events, the creek is dominated by surface water flow from higher in the catchment. During flood events the water flowing in the creek is high in sediments. Floodwaters generally subside after a short period and the creek returns to no-flow conditions over most reaches, where water in the creek is only present due to the excess mine water discharge from Iron Valley. If not for the excess water discharge, there would be no surface water present in Weeli Wolli Creek except during flood events.

No clearing will occur within 200m of Weeli Wolli Creek.

### **3.8 Groundwater**

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Groundwater in the vicinity of the permit envelope is artificially high due to the excess third party mine water discharge occurring upstream, which is infiltrating from Weeli Wolli Creek to local aquifers.

The proposed clearing will not impact on groundwater levels, particularly considering the constant discharge of excess water to the Creek upstream of the permit envelope.

### **3.9 Social Surroundings**

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The main contemporary uses of the land surrounding the permit envelope area are mineral exploration and pastoral activities.

The permit envelope is located within the Nyiyaparli Native Title Determination area.

Fortescue has entered into a Land Access Agreement with the Nyiyaparli People which contain heritage management processes (Heritage Agreements). The LAAs include comprehensive provisions including agreed processes and protocols around cultural heritage management and environmental protection and facilitate exploration, mining, and development activities within the Native Title Determination areas.

Fortescue will undertake heritage surveys in accordance with the LAA prior to any disturbance within the permit envelope. These surveys will be completed in accordance with the contractual terms and heritage processes set out in the Agreements and to ensure compliance with relevant legislation, including the *Aboriginal Cultural Heritage Act 2021* (ACH).

Fortescue has engaged extensively with the Nyiyaparli people about important cultural values within the permit envelope and surrounding areas. Fortescue understands that the Weeli Wolli Creek has significant cultural importance to the Nyiyaparli and has committed to no disturbance within the Creek.

## **4. ENVIRONMENTAL IMPACTS AND MANAGEMENT**

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The environmental impacts of the proposed vegetation clearing have been considered in the following section.

### **4.1 Potential Impacts to Flora and Vegetation**

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Potential impacts to flora and vegetation resulting from the implementation of this proposal include:

- Direct loss of vegetation at a local level
- Direct loss of conservation significant flora
- Degradation of vegetation due to indirect impacts such as:
  - Fragmentation, leading to edge effects
  - Dust deposition
  - Chemical and hydrocarbon spills and leaks
  - Changes to surface hydrology

#### **4.1.1 Direct Loss of Vegetation**

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Disturbance within the permit envelope will result in the clearing of approximately 25.11 ha of native vegetation. The disturbance by vegetation unit together with the area of each vegetation unit to be cleared in relation to the currently mapped extent was provided in Table 8.

The loss of 25.11 ha of vegetation will not significantly impact on the biodiversity values of the vegetation within the permit envelope or the wider area. None of the vegetation types within the permit envelope are restricted in areal extent or otherwise conservation significant.

#### **4.1.2 Direct Loss of Conservation Significant Flora**

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As discussed in Section 3.5.9, no flora species of conservation significance have been recorded from within the permit envelope. It is possible that some priority flora species may occur within the permit envelope, however, the proposed clearing will not impact the conservation significance of the flora species.

#### **4.1.3 Degradation of Vegetation**

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Degradation of vegetation may occur as a result of:

- uncontrolled vehicle access leading to physical damage of vegetation and/or the introduction or spread of weeds

- dust deposition on vegetation resulting from land clearing and construction activities
- introduction or spread of weed species
- leaks of containment structures, pipes, vehicles or equipment leading to contamination of soils, surface water or groundwater
- spills of chemicals or hydrocarbons leading to contamination of soils, surface water or groundwater
- inappropriate disposal of domestic waste, waste hydrocarbons and chemicals, construction waste or treated sewerage leading to contamination of soils, surface water or groundwater.

These indirect impacts can be managed as discussed later in this section to ensure there are no significant impacts.

### **Dust Deposition**

Dust deposition on foliage can impact on a plants ability to photosynthesise, or control water loss through transpiration. One published study indicates that vegetation health is not impacted by dust deposition until relatively high levels of dust are experienced, that is, greater than 7g/m<sup>2</sup>/month (Doley, 2006). Dust deposition can occur through movement of vehicles and earth moving. The impact from dust deposition from this proposal is low due to limited amount of clearing and Fortescue's dust management measures.

### **Chemical Spills, Leaks and Leachate**

Contamination of soil by chemical and hydrocarbon spills can impede plant growth or kill vegetation. Drainage from infrastructure may contain higher levels of sediments which may cause a decline in vegetation health. Fortescue consider the risk of impacts to vegetation from contamination and pollution to be low.

### **Altered Surface Hydrology**

Pilbara creeks are typically ephemeral and with the exception of pools and groundwater-fed springs, are dry for the majority of the year. Pilbara soils typically have high initial infiltration rates where the moisture content of catchment soils is low. Significant streamflow usually occurs when rainfall intensity exceeds the infiltration capacity of the soil. The magnitude of the flow can be increased if soil is already saturated following extended wet periods. There are typically two different types of climatic events which cause flood response in the Pilbara, namely cyclonic activity/tropical low-pressure systems and localised diurnal thunderstorms.

The proposed roads and drill pads are located in lower catchment of Weeli Wollie Creek, but not within the main drainage line. Figure 2 demonstrates that disturbance will avoid the low flow channel of the creek.

#### 4.1.4 Management Measures

Fortescue manages clearing of native vegetation through a Land Use Certificate System (LUC), previously known as a Ground Disturbance Permit (GDP). A LUC identifies the area to be disturbed and considers multiple factors, such as environmental (significant values and approvals), heritage, *Mining Act 1978* tenure, pastoral leases, and water, before disturbance is permitted. Each LUC application is reviewed for each factor by technical leads with Fortescue before approval. Conditions are placed on each LUC with regards to the identified factors to ensure clearing is undertaken in accordance with legal obligations and with regards to environmental or heritage values. The LUC process allows applicants to modify their application to avoid significant or sensitive values in consultation with the technical leads prior to approval of the LUC.

Conditions of the LUC may include ground inspections for conservation significant flora or fauna depending on the receiving environment and the conditions of any environmental approval applicable to the area. No LUC would be approved without the area having been subject to heritage survey.

**Table 10: Management Measures for Flora and Vegetation**

<b>Impact</b>	<b>Management Actions</b>
Direct Loss of Vegetation and Flora	<ul style="list-style-type: none"> <li>• Minimise clearing and vegetation disturbance to ensure significant flora and vegetation are protected. Conduct vegetation clearing in accordance with a permit issued under the Land Use Certificate Procedure 100-PR-TA-0001</li> <li>• Ensure staff and contractors are aware of the location of significant flora and vegetation on site and their responsibility to ensure they are protected.</li> </ul>
Fragmentation	<ul style="list-style-type: none"> <li>• Weed hygiene requirements are implemented for plant and equipment in identified weed risk areas and/or in areas where weed populations have been identified and high-risk activities are proposed to be undertaken in accordance with the Weed Management Plan 100-PL-EN-1017.</li> <li>• To ensure vegetation conservation values are maintained, conduct rehabilitation as per Fortescue's Exploration Environmental Management Plan E-PL-EN-0002</li> </ul>
Altered fire regimes	<ul style="list-style-type: none"> <li>• Site induction will inform about fire risk and potential sources.</li> <li>• A Hot Works Permit system will be implemented.</li> <li>• Appropriate fire breaks will be installed from workspaces and around camps and other infrastructure in accordance with regulations.</li> </ul>
Dust	<ul style="list-style-type: none"> <li>• Vehicle speeds restricted according to Traffic Management Plan 100-PR-SA-0049</li> <li>• Dust suppression will be carried out during construction, operation.</li> <li>• Conduct rehabilitation as per Fortescue's Exploration Environmental Management Plan E-PL-EN-0002</li> </ul>
Chemical and Hydrocarbon Spills	<ul style="list-style-type: none"> <li>• Prior to constructing new chemical and hydrocarbon storage facilities that have the potential to significantly impact on the environment, conduct a risk assessment. New chemical and hydrocarbon storage locations, design and construction shall be to design specifications which reflect risk assessment outcomes in minimising environmental impacts.</li> <li>• When diesel storage areas are required to be licensed under the Environmental Protection Act 1986 and/or the Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007, ensure the facilities are designed and constructed in accordance with the Standard Engineering Specification Diesel Storage and Handling 100-SP-ME0044.</li> </ul>

<b>Impact</b>	<b>Management Actions</b>
	<ul style="list-style-type: none"> <li>• Ensure relevant personnel and contractors involved in chemical and hydrocarbon handling and storage activities are provided with the appropriate training and equipment as outlined in the Chemical and Hydrocarbon Spills Procedures 100-PR-EN-0014 and the Hazardous Materials Management Procedure 100-PR-SA-1059.</li> <li>• Chemicals and hydrocarbons should be stored in accordance with AS 1940, AS 3833 or AS 3780 to minimise the potential for environmental harm. Storage should only be in designated areas and within the limits specified in applicable Licence conditions under the EP Act.</li> <li>• Store chemicals and hydrocarbons in accordance with Licence conditions under the EP Act.</li> <li>• Where a chemical or hydrocarbon spill has occurred, manage the spill including any contaminated material, in accordance with the Chemical and Hydrocarbon Spills Procedure 100-PR-EN-0014 and investigate and report the incident in accordance with the Incident Event Management Procedure 100-PR-SA-0011.</li> <li>• Contain and appropriately manage potentially contaminated stormwater prior to release to the environment.</li> <li>• Remediate any area declared contaminated as defined under the Contaminated Sites Act 2003 in accordance with the DER's Contaminated Sites Management Series – Assessment Levels for Soil, Sediment and Water (2011)</li> </ul>
Altered surface hydrology	<ul style="list-style-type: none"> <li>• Protect natural drainage lines from construction impacts where possible to minimise impacts to water quality.</li> </ul>

#### 4.1.5 Conclusion – Impacts to Flora and Vegetation

Taking into account the existing environment, proposed activities and management strategies, Fortescue considers that the impacts to flora and vegetation of the proposed clearing are not significant.

## 4.2 Potential Impacts to Fauna

Potential impacts to terrestrial fauna, including the conservation significant fauna and SRE invertebrates include:

- Habitat loss from direct clearing of fauna habitat, including habitat for SRE invertebrates.
- Habitat fragmentation, resulting in:
  - Restriction or removal of access to breeding habitat, foraging habitat or water sources through placement of infrastructure
  - Increased feral animal species
  - Increased weed species
  - Increased vehicle strike

### 4.2.1 Fragmentation of Habitat

Fragmentation occurs when a large expanse of habitat is transformed into a number of smaller patches of smaller total area due to clearing, isolating these smaller fragments from each other



by cleared areas (Wilcove, McLellan, & Dobson, 1986). Where the landscape surrounding the fragments is inhospitable to species of the original habitat and when dispersal is low, remnant patches can be considered true habitat islands and local communities will be isolates. Small habitat fragments are likely to be low in heterogeneity, that is, the habitat may not present the range of habitat variety required by some species (e.g. both foraging and breeding habitat) (Wilcove, McLellan, & Dobson, 1986).

It is possible that clearing for the minor works may cause a barrier to some species movement within their home ranges, particularly small reptiles and mammals. However, large areas of undisturbed habitat will remain post-disturbance and populations in these areas will not be impacted. Significant impacts to fauna resulting from habitat fragmentation is not anticipated.

#### 4.2.2 Increased Vehicle Strike

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The proposed works within the permit envelope will result in an increase in the number of vehicles in the local area. Vehicles may strike fauna species on roads, particularly slow-moving animals or species that are easily startled. Vehicles travelling at night are more likely to strike native fauna when visibility is reduced, and more animals are on the move. Species such as birds of prey are also likely to feed off dead carcasses on roads and may also become victim to vehicle strike.

Fortescue keeps a record of all vehicle related fauna incidents. The species with the highest number of vehicle strikes at Fortescue's operating sites is the kangaroo, usually at dawn and dusk. There have been relatively few vehicle strikes involving significant fauna at Fortescue sites.

#### 4.2.3 Increased Weed Species

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Clearing for development and increased movement of vehicles, including earth moving machinery may result in the establishment of new populations of weed species. Increased numbers of weeds can significantly increase the risk of fire, which can impact on fauna habitat value (see further discussion later in this section). Areas of dense weed infestation can also reduce the ability of fauna to move through their habitat and impact on their ability to forage. Weed species palatable to feral herbivores may attract these animals to the area causing potential land degradation and further spreading weed species either by movement of soil or in the animal's dung.

#### 4.2.4 Management Measures

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Fortescue has applied the mitigation hierarchy to the Project in relation to terrestrial fauna. Mitigation measures to address potential impacts are detailed in Table 11.

**Table 11: Management Measures for Fauna**

<b>Impact</b>	<b>Management Actions</b>
Loss of Habitat	<ul style="list-style-type: none"> <li>• Land use certification (LUC) procedure. Must be adhered to before any: ground disturbance, rehabilitation, or land access. This ensures all proposed disturbance is checked for: purpose; cultural heritage; and environmental significance. No ground disturbance can take place without a valid land use certificate.</li> <li>• Ensure staff and contractors are provided with appropriate training to ensure conservation significant fauna and associated habitat are protected.</li> <li>• Prior to conducting ground disturbance activities, ensure known locations of environmentally sensitive areas to be retained and protected from disturbance are identified on the ground by appropriate signage, fencing or flagging.</li> </ul>
Fragmentation of habitat	<ul style="list-style-type: none"> <li>• Land use certification (LUC) procedure must be adhered to before any: ground disturbance, rehabilitation, or land access. This ensures all proposed disturbance is checked for: purpose; cultural heritage; and environmental significance. No ground disturbance can take place without a valid land use certificate.</li> <li>• Conduct progressive rehabilitation of disturbed areas, particularly those areas with known conservation significant fauna and associated habitat, in accordance with the Exploration Environmental Management Plan E-PL-EN-0002.</li> </ul>
Increased Feral Animals	<ul style="list-style-type: none"> <li>• Domestic waste stored in appropriate bins inaccessible to animals.</li> <li>• All domestic waste will be transported off site</li> <li>• No domestic animals permitted on site</li> </ul>
Vehicle Strike	<ul style="list-style-type: none"> <li>• To minimise the potential for fauna injuries or deaths on haul and access roads, implement appropriate mitigation measures such as speed limit restrictions, right of way for fauna and the prohibition of off-road driving.</li> </ul>
Weeds	<ul style="list-style-type: none"> <li>• Weed hygiene requirements are implemented for plant and equipment in identified weed risk areas and/or in areas where weed populations have been identified and high-risk activities are proposed to be undertaken in accordance with the <i>Weed Management Plan 100-PL-EN-1017</i>.</li> </ul>
Changes to surface water	<ul style="list-style-type: none"> <li>• Drainage infrastructure location, design, construction, and operation to design specifications which reflect risk assessment outcomes in minimising interference and disruption of natural surface water flows and quality in accordance with the <i>Standard Engineering Specification for Drainage and Flood Protection 100-SP-CI-0004</i> and the <i>Standard Engineering Specification for Road Design for Projects 100-SP-CL-0002</i>.</li> <li>• Protect natural drainage lines from construction impacts where possible to minimise impacts to water quality.</li> </ul>

#### 4.2.5 Conclusion – Impacts to Fauna

Taking into account the existing environment, proposed activities and management strategies, Fortescue considers that the impacts to fauna and fauna habitat of the proposed clearing are not significant.

## 5. ASSESSMENT AGAINST THE 10 CLEARING PRINCIPLES

The *Environmental Protection Act 1986* includes 10 principles that provide decision makers with a guide on whether native vegetation should be cleared. The principles, outlined in ‘Schedule 5 – Principles for Clearing Native Vegetation’, are used as a comparative tool by DWER and DMIRS in determining whether clearing activities are environmentally acceptable and capable of being appropriately managed. Table 12 assesses the proposed clearing against these Principles.

**Table 12: 10 Clearing Principles**

### **(a) Native Vegetation should not be cleared if it comprises a high level of biological diversity**

#### **Proposed clearing is unlikely to be at variance to this Principle**

Vegetation condition within the permit envelope ranges from Excellent in areas of elevated topography to Degraded in low lying areas around Weeli Wollli Creek and associated floodplains which are heavily grazed by cattle (Ecoscape, 2021). This grazing may have impacted on faunal diversity, with relatively low numbers of fauna species present compares to other parts of the Hamersley Bioregion.

The proposed clearing is not likely to be at variance to this Principle.

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

#### **Proposed Clearing is not likely to be at variance to this Principle**

The purpose permit envelope contains five mapped habitat types (360 Environmental, 2022). The clearing footprint is intended to be located primarily on the Hummock grassland habitat type. The survey recorded a Gaines blind snake (*Anillos ganeii*) Priority 1 outside of the purpose permit area but within Hummock grassland habitat. As this habitat is extensive in the local area, the proposed clearing is unlikely to significantly impact habitat availability for the species.

Vegetation within Weeli Wollli Creek is potential habitat for a number of threatened fauna species. However, despite extensive survey effort, no threatened fauna species have been recorded from within Weeli Wollli Creek. The proposed clearing avoids Weeli Wollli Creek.

The proposed clearing is unlikely to be at variance to this Principle.

### **(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.**

#### **Proposed clearing is not at variance to this Principle**

No rare or priority flora species have been recorded from within the permit envelope, despite extensive flora surveys. The small areas required to be cleared are not likely to put any threatened flora species at risk.

The proposed clearing is not at variance to this Principle.

### **(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.**

#### **Proposed clearing is not at variance to this Principle**

There is no threatened ecological community within the permit envelope.

The proposed clearing is not at variance to this Principle.

### **(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.**

#### **Proposed clearing is not at variance to this Principle**

There has been some minor disturbance within the permit envelope for historical mineral exploration activities. However, the permit envelope and the surrounding vegetation remains mostly undisturbed. As discussed in Section 3.5.1, most of the Pilbara remains uncleared.

The proposed clearing is not at variance to this Principle.

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

**Proposed clearing is not at variance to this Principle**

All clearing has been designed to avoid Weeli Wolli Creek.  
The proposed clearing is not at variance to this Principle.

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

**Proposed clearing is not at variance to this Principle**

Clearing is limited to narrow tracks and exploration drill pads. The topography of the area is very flat and is a low energy environment for surface water run-off.  
The proposed clearing is not at variance to this Principle.

**(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.**

**Proposed clearing is not at variance to this Principle**

There is no conservation area within reasonable proximity to the permit envelope. The nearest conservation area is Karijini National Park, located 80 kms east of the permit envelope.  
The proposed clearing is not at variance to this Principle.

**(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.**

**Proposed clearing is not at variance to this Principle**

Floodwaters in Weeli Wolli Creek are naturally high in sediments. Areas proposed to be cleared avoid Weeli Wolli Creek and any surface water run-off from cleared areas will not carry sediments to Weeli Wolli Creek.  
The proposed clearing is not at variance to this Principle.

**(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.**

**Proposed clearing is not at variance to this Principle**

The proposed clearing is limited to narrow tracks and drill pads. These areas are not large enough to generate significant volumes of surface water run-off.  
The proposed clearing is not at variance to this Principle.

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Figure 1:

Proposal Location

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Figure 2: Permit Envelope

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Figure 3: Land Systems

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Figure 4: Beard Vegetation Units

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Figure 5: Vegetation Communities (Ecoscape 2022)

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Figure 6: Vegetation Condition

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Figure 7: Vertebrate Fauna Habitat

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Figure 8: Short Range Endemic Invertebrates

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Appendix 1:	Ecoscape 2021
Appendix 2:	Ecoscape 2022
Appendix 3:	360 Environmental 2022