Australian Government
Department of the Environment and Energy

**Title of Proposal** - Wodgina Lithium Mine Expansion

# Section 1 - Summary of your proposed action

Provide a summary of your proposed action, including any consultations undertaken.

### 1.1 Project Industry Type

Mining

### 1.2 Provide a detailed description of the proposed action, including all proposed activities.

Mineral Resources Limited is an Australian Stock Exchange-listed mining services and mining company with operations in Western's Australia's Pilbara and Goldfields regions. MRL's Wodgina Lithium Project (the Project) in the Pilbara is located 80 kilometres southeast of Port Hedland and is undergoing an expansion phase to cater for the demand for spodumene ore as a key ingredient in the manufacture of lithium batteries (Figure 1). The Project is accessed from Port Hedland, south along the Great Northern Highway and then southeast via the Wodgina mine access road.

The expansion phase at Wodgina is comprised of extensions to Cassiterite Pit and associated waste rock landforms as well as the construction and operation of infrastructure to support mining operations, particularly with respect to processed spodumene concentrate. This product concentrates the naturally occurring spodumene ore and its manufacture requires additional infrastructure such as a process plant, increased power generation capacity and tailings storage.

The increased power generation capacity at Wodgina will be met by the construction of a new reciprocating gas-fired power station that, when complete, will be largest of its type in the southern hemisphere. Gas for the new power station will be supplied via the Wodgina gas lateral pipeline together with a new, larger gas pipeline to be constructed adjacent to this lateral pipeline.

The proposed action being referred under the EPBC Act is the duplication of the Wodgina gas lateral, the extensions of Cassiterite Pit and the Eastern Waste Landform (EWL) and the construction and operation of a new dry tailings storage facility (TSF4) to the north of existing tailings storage facility 3 (TSF3).

The duplication of the Wodgina gas lateral is about 80 km in length and will run southeast from the existing Pilbara Energy Pty Ltd (PEP) metering station near South Hedland; crossing underneath the North West Coastal Highway and continuing adjacent to the Great Northern Highway towards Wodgina Mine (Figure 1).

The development envelope for the proposed action comprises: a) the mine site envelope (including TSF4, Cassiterite pit and EWL expansion) - this envelope has a total area of 320 ha

to be cleared and (b) the gas pipeline envelope – this envelope has a total area of 1,593 ha, of which only 240 ha is proposed to be cleared.

**1.3 What is the extent and location of your proposed action? Use the polygon tool on the map below to mark the location of your proposed action.**

| Area | Point | Latitude | Longitude |
|---|---|---|---|
| TSF | 1 | -21.183251306283 | 118.65978208725 |
| TSF | 2 | -21.181530628405 | 118.65883794968 |
| TSF | 3 | -21.179649864564 | 118.6586662883 |
| TSF | 4 | -21.177769076802 | 118.65785089676 |
| TSF | 5 | -21.171846439945 | 118.65450349991 |
| TSF | 6 | -21.170085610284 | 118.66437402908 |
| TSF | 7 | -21.177849110811 | 118.66656271164 |
| TSF | 8 | -21.181410580364 | 118.66694894974 |
| TSF | 9 | -21.181690692308 | 118.6665197963 |
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| TSF | 11 | -21.182410977728 | 118.66355863754 |
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| TSF | 13 | -21.182450993482 | 118.66184202377 |
| TSF | 14 | -21.183011212897 | 118.66055456345 |
| TSF | 15 | -21.183251306283 | 118.65982500259 |
| TSF | 16 | -21.183211290745 | 118.65986791794 |
| TSF | 17 | -21.183251306283 | 118.65978208725 |
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| Mine Expansion | 3 | -21.1840476158 | 118.67377248947 |
| Mine Expansion | 4 | -21.1840476158 | 118.67475954239 |
| Mine Expansion | 5 | -21.183367353859 | 118.67634741013 |
| Mine Expansion | 6 | -21.182727104467 | 118.67789236252 |
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| Mine Expansion | 9 | -21.178285297979 | 118.67986646835 |
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| Mine Expansion | 11 | -21.183527415774 | 118.68244138901 |
| Mine Expansion | 12 | -21.18444776842 | 118.68454424088 |
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| Mine Expansion | 15 | -21.189729676613 | 118.68853536789 |
| Mine Expansion | 16 | -21.191570298942 | 118.68857828323 |
| Mine Expansion | 17 | -21.195811645724 | 118.68750539963 |
| Mine Expansion | 18 | -21.198412411363 | 118.68548837845 |

| Area | Point | Latitude | Longitude |
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| Mine Expansion | 64 | -21.185808274344 | 118.67780653183 |

| Area | Point | Latitude | Longitude |
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| Area | Point | Latitude | Longitude |
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| Gas Pipeline | 74 | -20.680496865967 | 118.35214773058 |
| Gas Pipeline | 75 | -20.664034447321 | 118.34219137072 |
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| Area | Point | Latitude | Longitude |
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| Area | Point | Latitude | Longitude |
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| Area | Point | Latitude | Longitude |
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| Gas Pipeline | 199 | -21.164199517203 | 118.67718854784 |
| Gas Pipeline | 200 | -21.164659754377 | 118.6766413772 |
| Gas Pipeline | 201 | -21.16571029039 | 118.67601910471 |
| Gas Pipeline | 202 | -21.166010442166 | 118.6754504764 |
| Gas Pipeline | 203 | -21.166280578245 | 118.67531100153 |
| Gas Pipeline | 204 | -21.167020948673 | 118.67488184809 |
| Gas Pipeline | 205 | -21.168171516986 | 118.67450633883 |
| Gas Pipeline | 206 | -21.16847166377 | 118.67455998301 |
| Gas Pipeline | 207 | -21.168921882805 | 118.67478528856 |
| Gas Pipeline | 208 | -21.169782297593 | 118.67489257692 |
| Gas Pipeline | 209 | -21.170342564998 | 118.67512861132 |
| Gas Pipeline | 210 | -21.171152948026 | 118.67517152666 |
| Gas Pipeline | 211 | -21.171503112159 | 118.67512861132 |
| Gas Pipeline | 212 | -21.171963326615 | 118.67509642481 |
| Gas Pipeline | 213 | -21.172373516555 | 118.67527881502 |
| Gas Pipeline | 214 | -21.173033819921 | 118.6755684936 |
| Gas Pipeline | 215 | -21.173193893021 | 118.67505350946 |
| Gas Pipeline | 216 | -21.172663650215 | 118.67486039042 |
| Gas Pipeline | 217 | -21.172633636415 | 118.67497840761 |

**1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland).**

The mine site envelope associated with the proposed action is located approximately 80 km south east of Port Hedland within the Pilbara biogeographic region of Western Australia (Figure 1). The pipeline envelope associated with the proposed action extends north of the mine site envelope for approximately 80 km to the northwest. The northernmost extent of the pipeline envelope is approximately 42 km southwest of Port Hedland. The underlying tenure of the mine and gas pipeline is a combination of Crown Land and Vacant Crown Land. The proposed action is located on various tenements within Mineral Field 45:

L45/108;

L45/441;

L45/58;

M45/50;

M45/365;

M45/381;

M45/383;

M45/923;

M45/924;

M45/1252; and

G45/321.

The proposed action is not located within the vicinity of a World Heritage Property. The nearest World Heritage Property is the Ningaloo Coast located approximately 477 km southwest of the mine site envelope. The proposed action is not located within the vicinity of a National Heritage Place. The nearest National Heritage Place is Dampier Archipelago located approximately 217 km northwest of the mine site envelope. The proposed action is not located within the vicinity of a Ramsar wetland. The nearest Ramsar wetland is located approximately 171 km northwest of the mine site envelope.

**1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?**

The development envelope has a total area of 1913 ha, of which 560 ha is proposed to be

cleared

**1.7 Is the proposed action a street address or lot?**

Lot

**1.7.2 Describe the lot number and title.**Not applicable, see mining tenements

**1.8 Primary Jurisdiction.**

Western Australia

**1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?**

No

**1.10 Is the proposed action subject to local government planning approval?**

No

**1.11 Provide an estimated start and estimated end date for the proposed action.**

Start date 06/2018

End date 06/2040

**1.12 Provide details of the context, planning framework and State and/or Local government requirements.**

Mineral Resources is proposing to expand the current operations at the Wodgina Lithium Mine Site (the Project), these expansions are subject to approval by the Department of Mines, Industry Regulation and Safety (DMIRS) under the WA Mining Act 1978. A Mining Proposal has been submitted to DMIRS under the same Act in order to proceed with the mining expansion activities. In order to obtain approval to clear native vegetation for the expansions, a Native Vegetation Clearing Permit (NVCP) is being sought from DMIRS under the WA Environmental Protection Act 1986 (EP Act). Once these State approvals have been obtained, Mineral Resources aim to commence clearing in mid 2018.

**1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders.**

Multiple heritage surveys have been undertaken across the tenements to identify suitable infrastructure areas and mine site development. Access Agreements have been negotiated with Native Title claimants with conditions agreed around land access, land use and survey/management requirements. Under the Land Access Agreement a Monitoring and Liaison

Committee meeting is held bi-yearly to discuss site development and future plans including required surveys and other requirements.

**1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project.**

Environmental impact assessment (EIA) of the mine and pipeline envelopes has been undertaken with respect to the ten clearing principles under Part V of the *Environment Protection Act 1986* (EP Act), as part of the Native Vegetation Clearing Permit application submitted to DMIRS on 16 April 2018. These areas will undergo further EIA as part of Mining Proposals to be submitted to DMIRS pursuant to the *Mining Act 1978* (WA).

**1.15 Is this action part of a staged development (or a component of a larger project)?**

No

**1.16 Is the proposed action related to other actions or proposals in the region?**

No

# Section 2 - Matters of National Environmental Significance

Describe the affected area and the likely impacts of the proposal, emphasising the relevant matters protected by the EPBC Act. Refer to relevant maps as appropriate. The interactive map tool can help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in your area of interest. Consideration of likely impacts should include both direct and indirect impacts.

Your assessment of likely impacts should consider whether a bioregional plan is relevant to your proposal. The following resources can assist you in your assessment of likely impacts:

• Profiles of relevant species/communities (where available), that will assist in the identification of whether there is likely to be a significant impact on them if the proposal proceeds;

• Significant Impact Guidelines 1.1 – Matters of National Environmental Significance;

• Significant Impact Guideline 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies.

**2.1 Is the proposed action likely to have ANY direct or indirect impact on the values of any World Heritage properties?**

No

**2.2 Is the proposed action likely to have ANY direct or indirect impact on the values of any National Heritage places?**

No

**2.3 Is the proposed action likely to have ANY direct or indirect impact on the ecological character of a Ramsar wetland?**

No

**2.4 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?**

Yes

**2.4.1 Impact table**

| Species | Impact |
|---|---|
| Northern Quoll (Dasyurus hallucatus) | The Northern Quoll (Dasyurus hallucatus) is a |

| Species | Impact |
| --- | --- |
| | Threatened fauna species listed as Endangered under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and Wildlife Conservation Act 1950 (WC Act). The species is a widely distributed marsupial endemic to Australia, individuals have a moderately large home range of 35 hectares (ha) and reproduce once per year. The Northern Quoll was once distributed across the Pilbara and Kimberley, which has since contracted to several disjunct populations (Cramer et al. 2016). The Northern Quoll occupies a variety of habitats across its current range, including eucalypt forest and woodland habitats associated with steep dissected rocky terrain, rainforest patches, vegetation along creeklines, around human settlement and beaches. Important factors in the landscape to the species include shallow soils, large cover of rocks including outcropping rock, proximity to permanent water and time since last fire. Northern Quoll dens occur in a wide range of situations including rock overhangs, tree hollows, tree logs, termite mounds and human dwellings (Woinarski et al. 2008). A Level 1 Vertebrate Fauna Survey and Targeted Northern Quoll survey was undertaken from 12 December to 17 December 2017 for the mine site expansion and TSF4. A Level 1 Vertebrate Fauna Survey and Targeted Northern Quoll survey was undertaken from 31 January to 6 February 2018 for the proposed gas pipeline envelope (Figures 4, 5, 6). Two quoll photos were obtained across 491 camera trap nights, three recent and 19 aged scats were collected across both targeted quoll surveys (360 Environmental 2018a;b). Three of the scats (all considered aged) and both quoll photos were obtained outside of the boundary for the proposed action. These results equate to a low density quoll population according to the EPBC Act Referral Guidelines for Northern Quolls (DoE 2016). Approximately 49.1 ha of Northern Quoll suitable habitat is within the development envelope in areas mapped as Major Drainage Line and Rocky Ironstone Ridge / Rocky |

| Species | Impact |
|---|---|
| | Ironstone Valley (Figure 4) (360 Environmental 2018a;b). This is all in the Mine Site Envelope and is likely to be cleared to facilitate the mine and pipeline expansion. The clearing of 49.1 ha of Northern Quoll habitat is not considered significant. Quolls prefer habitat to be continuous, however the suitable habitat within the development envelope is fragmented, and infrequently used as evidenced by camera trap and scat results. Based on aerial imagery, there appears to be a substantial area of continuous Rocky Ridge/Rocky Valley habitat to the west of the surveyed areas which would likely provide more suitable habitat for the Northern Quoll (360 Environmental 2018a;b). Although the Project involves the clearing of 49.1 ha of suitable Northern Quoll habitat, it is not likely to have a significant impact on the species due to the low density population, limited recent evidence of the species' presence and fragmented habitat within the development envelope. |
| Greater Bilby (Macrotis lagotis) | The Bilby (Macrotis lagotis) is listed as Vulnerable under the EPBC Act and WC Act. Prior to European settlement, the Bilby was found on over 70% of the Australian arid and semi-arid mainland. However, the species range has now declined northwards (Woinarski et al. 2014). Wild Bilby populations are now restricted predominately to the Tanami Desert, Northern Territory, the Great Sandy, Little Desert, Gibson Deserts, Pilbara and patches on the Dampier Peninsular in WA, and an outlying population between Boulia and Birdsville in south-west Queensland (Woinarski et al. 2014; Southgate 1990). The species occupies three major vegetation types; open tussock grassland on uplands and hills, mulga woodland / shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas (Southgate 1990), usually on landforms with level to low slope topography and light to medium soils (typically sandy for burrow excavation). The development envelope falls within the known distribution of the species. Approximately 2,140 ha of suitable habitat for |

| Species | Impact |
| --- | --- |
| | the Bilby was recorded within the wider surveyed areas, of which 290 ha is proposed to be cleared for the Project, representing only 13.6% of suitable habitat within the wider surveyed area (360 Environmental 2018a;b). Only two Bilby records were identified during the surveys (two scats within the pipeline envelope), this suggests the species has a low population density (Refer to 7a-g in the attached Pipeline and Borefield Flora and Fauna Survey Report). Suitable Bilby habitat was considered to be extensive and common within the surrounding area and on a regional scale. Clearing of 290 ha of Bilby habitat is not considered significant due to suitable habitat being well represented within the surrounding area and region, and the low population densities of the species (Figures 5a-g; Figure 6) (360 Environmental 2018a;b). |
| Pilbara Leaf Nosed Bat (Rhinonicteris aurantia [Pilbara Form]) | The Pilbara Leaf-nosed Bat (Rhinonicteris aurantia) is listed as Vulnerable under the EPBC Act and the WC Act. The species roosts in deep, warm humid caves or mines during the dry season and forages nearby. During the wet season, the species is more widespread and may not require caves for roosting (Menkhorst & Knight 2004). The development envelope falls within the known distribution of the species but no evidence of Pilbara Leaf-nosed Bats (PLNB) were recorded during either surveys (Figure 6). The surveys identified only one cave that could be potentially suitable for PLNB species, however the cave was not of a sufficient size to support roosting and they had a closed chamber, making it unsuitable for maternal roosting. Three other caves were identified during the surveys that were large enough for potential diurnal and nocturnal roosting, however unsuitable for maternal roosting due as the had single chambers. These caves are located approximately 47 km from TSF4, outside of the clearing area. Therefore, the PLNB are unlikely to depend on the habitat or caves within the wider surveyed areas for roosting. One old mine shaft was identified to provide potential roosting habitat |

| Species | Impact |
| --- | --- |
| | for the PLNB, however this mine shaft is located outside of the clearing area. It is likely that the PLNB species would occur within the development envelope for airborne foraging (360 Environmental 2018a;b). Two suitable PLNB habitats include the Major Drainage Line and the Rocky Ridge/Rocky Valley covering an area of 51 ha and 53.9 ha within the wider surveyed area, respectively (Figures 5a-g). It is proposed to only clear a maximum of 21.6 ha of the Major Drainage Line and the 37.7 ha of the Rocky Ridge/Rocky Valley habitats. Review of aerial imagery identifies the Rocky Ridge/Rocky Valley habitat extending for at least 10 km north and site of the mine site envelope, which is within the PLNB nightly flight range of 10 km (Woinarski et al. 2012). Given the above, it is unlikely that the proposed action would have significant impacts on the PLNB at a local or regional level (Figure 12). Additionally, as the species are likely to only use the development area for airborne foraging, clearing will not necessarily have a significant impact. |

**2.4.2 Do you consider this impact to be significant?**

No

**2.5 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed migratory species, or their habitat?**

Yes

**2.5.1 Impact table**

| Species | Impact |
| --- | --- |
| Fork-tailed Swift (Apus pacificus) | The Fork-tailed Swift is listed as Migratory/Marine under the EPBC Act and is a non-breeding visitor to all states and territories of Australia (Menkhorst et al. 2017). The Forktailed Swift is a summer migrant to Australia usually during the months of October-April. The species is an aerial bird which |

| Species | Impact |
|---|---|
| | forages high above the tree canopy and is often independent of terrestrial habitats (360 Environmental 2018b). The development envelope is not within the known distribution of the Fork-tailed Swift however, the species was recorded during the surveys within the northern extent of the pipeline envelope. The species is almost entirely airborne and does not depend upon terrestrial habitat. As such, clearing within the mine site envelope and along the pipeline is not considered to be significant for the Fork-tailed Swift. |
| Oriental Pratincole (Glareola maldivarum); Rednecked Stint (Calidris ruficollis); Wood Sandpiper (Tringa glareola); Common Greenshank (Tringa nebularia); and Marsh Sandpiper (Tringa stagnatilis). | These five fauna species are listed as Migratory/Marine under the EPBC Act. These species are likely to utilise the low-lying habitats, occurring within the pipeline envelope, after heavy rainfall resulting in ephemeral wet areas. As this suitable habitat is only temporarily available for these species and the pipeline itself will not require a large clearing footprint, it is unlikely that these species would be impacted by Project. Suitable habitat for these species extends beyond the surveyed area of the pipeline. Review of aerial imagery, hydrography data and topographical contours has identified the landscape surrounding the northern portion of the pipeline envelope is relatively low lying with some areas subject to inundation, and consist of major river (Turner and Yule Rivers) which would be more suitable for these species than the portion of habitat within the development envelope. The northern portion of the pipeline envelope is also approximately 27.76 km from the coastline which is also considered suitable habitat for these species. As such, as the surrounding landscape contains large areas of suitable habitat, it is not likely that clearing within the pipeline envelope would have a significant impact on these five species. |

**2.5.2 Do you consider this impact to be significant?**

No

**2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?**

No

**2.7 Is the proposed action to be taken on or near Commonwealth land?**

No

**2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?**

No

**2.9 Is the proposed action likely to have ANY direct or indirect impact on a water resource related to coal/gas/mining?**

No

**2.10 Is the proposed action a nuclear action?**

No

**2.11 Is the proposed action to be taken by the Commonwealth agency?**

No

**2.12 Is the proposed action to be undertaken in a Commonwealth Heritage Place Overseas?**

No

**2.13 Is the proposed action likely to have ANY direct or indirect impact on any part of the environment in the Commonwealth marine area?**

No

# Section 3 - Description of the project area

Provide a description of the project area and the affected area, including information about the following features (where relevant to the project area and/or affected area, and to the extent not otherwise addressed in Section 2).

**3.1 Describe the flora and fauna relevant to the project area.**

**FLORA**

A likelihood assessment was undertaken to determine the flora species that are 'Likely', ' Possible' and 'Unlikely' to occur within the development envelope. The assessment was carried out through analysis of desktop searches of nearby recordes of conservation significant species and regional soil characteristics. The likelihood assessment identified 44 conservation significant flora taxa potentially occcurring within the vicinity of the development envelope (Appendix G of the two attached 360 Environmental Flora and Fauna Survey reports). No conservation significant flora protected under the EPBC Act were identified in the database searches and therefore none were included in the likelihood assessment. As such, it is not likely that any flora of conservation significance protected under the EPBC Act would occur within the development envelope. Two Level 2 Flora and Vegetation Surveys were undertaken for the development envelope by 360 Environmental in December 2017 and between January and February 2018. A total of 56 flora from 34 genera and 18 families were identified within the surveyed areas (360 Environmental 2018a). No Threatened flora species pursuant to the EPBC Act and/or gazetted as Threatened/Declared Rare Flora pursuant to the (WA) *Wildlife Conservation Act 1950* (WC Act) were recorded during the surveys (360 Environmental 2018a;b). Although no conservation significant flora protected under the EPBC Act were identified during the surveys, the surveys were conducted outside of the recommended flora survey period for the Eremaean province. Although the surveys were undertaken outside the optimum survey period, no flora species protected under the EPBC Act were identified in the database searches.

Five surveys were previously undertaken for the local area, none of these identified any flora species of conservation significance pursuant to the EPBC Act (Figure 3)

- Interim Report on the Flora and Vegetation of the Cassiterite Pit Extension and EWL Extension: Western Botanical for Rapallo Group Pty Ltd and Mineral Resources Ltd, December 2017;

- Proposed Wodgina Lateral Natural Gas Pipeline Flora, Vegetation and Fauna Survey, Woodman Environmental Consulting Pty Ltd for Epic Energy, May 2001;

- Wodgina DSO Project, Flora and Vegetation Assessment, Outback Ecology Services for Atlas Iron Limited, October 2009;

- Hercules DSO Project, Flora and Vegetation Studies for the Hercules Project, Woodman Environmental Consulting Pty Ltd for Atlas Iron Limited, November 2002; and

- Hercules DSO Project, Conservation Significant Flora Assessment, Woodman Consulting Pty Ltd for Atlas Iron Limited, March 2013.

It is not likely that any Threatened flora pursuant to the EPBC Act would occur within the development envelope or surrounding area due to the lack of recordings in seven surveys undertaken to date.

Note that approximately 3.5 ha of the pipeline envelope were not surveyed due to an engineering change that occurred after the surveys were completed. This 3.5 ha is the southern most extent of the pipeline envelope and is comprised of cleared land and grassland, and is representative of vegetetation, flora and fauna habitat immediately adjacent (Figure 2; Figure 5g).

**INTRODUCED FLORA**

During the surveys, a total of four introduced flora taxa were recorded within the development envelope, with one of these (**Calotropis procera*) Declared under the Biosecurity and Agriculture Management Act 2007 (BAM Act) and listed as a Weed of National Significance (WONS):

- **Cenchrus ciliaris*;

- **Calotropis procera*;

- **Passiflora foetida var. hispida*; and

- **Aerva javanica.*

Weed diversity was considered low and the weeds were mostly occurring within areas of larger drainage lines. The weed species were not widespread or dominating within the surveyed areas, mostly limited to areas that have been previously disturbed (360 Environmental 2018a;b).

**FAUNA**

Desktop searches of the DEE's Protected Matters Search Tool (PMST), the Department of Biodiversity Conservation and Attractions (DBCA)'s NatureMap database and Threatened Fauna database requests in addition to the review of previous surveys have identified a number of conservation significant fauna species as potentially occurring within the vicinity of the development envelope (360 Environmental 2018a;b). A likelihood assessment of the database searches identified 11 MNES fauna species as having a high or medium likelihood of occurrence due to the presence of suitable habitat within the development envelope and the area within the species' known distributions:

- Northern Quoll (*Dasyurus hallucatus*) - Endangered;

- Pilbara Olive Python (*Liasis olivaceus barroni*) - Vulnerable;

- Spotted Nightjar (*Eurostopodus ar*gus) - Marine;

- Ghost Bat (*Macroderma gigas*) - Vulnerable;

- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) - Vulnerable;

- Bilby (*Macrotis lagotis*) - Vulnerable;

- Oriental Pratincole (*Glareola maldivarum*) - Migratory/Marine;

- Red-necked Stint (*Calidris ruficollis*) - Migratory/Marine;

- Wood Sandpiper (*Tringa glareola*) - Migratory/Marine;

- Common Greenshank (*Tringa nebularia*) - Migratory/Marine; and

- Marsh Sandpiper (*Tringa stagnatilis*) - Migratory/Marine (360 Environmental 2018a;b).

15 conservation significant fauna species protected under the EPBC Act were considered to have a low likelihood of occurrence within the development envelope (360 Environmental 2018a;b). During the Level 1 Vertebrate Fauna Surveys and the Targeted Northern Quoll surveys within the development envelope, the following conservation significant fauna species pursuant to the EPBC Act were recorded:

- Spotted Nightjar;

- Fork-tailed Swift (*Apus pacificus*);

- Rainbow Bee-eater (*Merops ornatus*); and

- Nothern Quoll.

Although the Rainbow Bee-eater and Spotted Nightjar were recorded during the surveys, the development envelope contains no suitable habitat for the species and is therefore omitted from further discussion (360 Environmental 2018a;b).

**FAUNA HABITATS**

A total of seven broad fauna habitats were identified and mapped during the surveys and comprised of the following (Figures 5a-g):

- Grassland - Hills, midslopes, upperslopes and ridges over rock (150.8 ha);

- Grassland - Footslopes, low rises, undulating plain over rock (327.9 ha);

- Grassland - Flat plain on sand (1,904 ha);

- Low Woodland/Shrubland - Eucalyptus and Acacia over Triodia grassland (236 ha);

- Low lying Habitat with ephemeral wet areas (83.2 ha);

- Major drainage line (55.7 ha); and

- Rocky Ironstone Ridge/ Rocky Ironstone Valley (53.4 ha) (Figures 5a-g) (360 Environmental 2018a;b).

Some areas within the mine site were not surveyed for fauna or fauna habitats as it was very steep and as such, some broad fauna habitats have been extrapolated out for these areas based on aerial imagery and the knowledge of the Zoologist from the site visit (360 Environmental 2018a;b). Two fauna habitat types (Low Woodland/Shrubland - Eucalyptus and Acacia over Triodia grassland and Low lying Habitat with ephemeral wet areas) are located outside of the proposed clearing areas.

**The Northern Quoll**

Two Targeted Northern Quoll Surveys were undertaken for the development envelope by 360 Environmental in December 2017 and between January and February 2018. The surveys covered the mine site envelope, pipeline envelope and other surrounding areas. The surveys identified a total of 49.1 ha of Northern Quoll habitat within the mine site envelope, mainly occurring within the Major Drainage Line and Rocky Ironstone Ridge/Rocky Ironstone Valley fauna habitats. (360 Environmental 2018a;b) (Figures 5a-g). Two quoll photos were obtained across 491 camera trap nights as well as three recent and 19 aged scats collected across both targeted quoll surveys (360 Environmental 2018a;b). Three of the scats (all considered aged) and both quoll photos were obtained outside of the boundary for the proposed action. These results equate to a low density quoll population according to the EPBC Act Referral Guidelines for Northern Quolls (DoE 2016).

**3.2 Describe the hydrology relevant to the project area (including water flows).**

**SURFACE WATER**

There are no mapped wetlands within the development envelope (DoE 2008; DPaW 2016). A review of available spatial data has identified that no major surface water features intersect the minesite. The nearest watercourse is Turner River West, a major tributary of Turner River that is located within 0.55 km to the west of the northern-most portion of the minesite envelope. The Yule River flows parallel to the Turner River and is located approximately 19 km west of the development envelope (DoW 2014) (Figure 7). The proposed pipeline route runs parallel in between Turner and Yule Rivers. The closest distance between the proposed pipeline envelope and the rivers is the northernmost portion  located approximately 2.7 km east of the Yule River (Figure 7). The Yule River is the longest and largest river in the Port Hedland Coast Basin and is ephemeral in nature, indicating the erratic nature of rainfall and flows only after heavy rain

(WRC 2000).

No riparian vegetation will be cleared as part of the Project, nor will the project interface with the bed or banks of a watercourse.

**GROUNDWATER**

The groundwater within the mining envelope and southern-most 30 km of the pipeline envelope is considered Fresh with salinity ranging between 500 - 1,000 mg/L of Total Dissolved Solids (TDS). The remaining northernmost 50 km of the pipeline envelope is considered Fresh-Brackish with salinity ranging between 1,000 to 3,000 mg/L TDS (DoW 2010).

**Public Drinking Water Source Area**

The northernmost portion of the pipeline envelope (~13 km) is located within a Priority 1 Public Drinking Water Source Area (P1 PDWSA) - Yule River Reserve which supports the Port Hedland Regional water supply (Figure 7). P1 PDWSAs are defined to ensure that there is no degradation of the water source the main objective of these areas is risk avoidance (DoW 2016a). P1 areas are declared over land where the provision of the highest quality drinking water is the prime beneficial land use (WRC 2000). The water table in the vicinity of the Yule River wellfield lies approximately 4 to 10 m below ground level (mbgl) (WRC 2000). Most of the recharge to the alluvial aquifer occurs through the river bed sands when the river is in flood, where river water rapidly infiltrates beneath the river bed and then more slowly flows away (Water Corporation 1996). According to the (then) Department of Water (DoW)'s Water Quality Protection Note 25 - Land use compatability table, a 'Gas Pipeline (bulk supply)' is a compatible activity (with conditions) (DoW 2016b). An 'Application for Pipeline Licence' under the Petroleum Pipelines Act 1969 has been lodged with the Department of Mines, Industry and Safety (DMIRS) Petroleum Division to support the additional gas pipeline. The Department of Water and Environmental Regulation (DWER) have been consulted and any potential impacts to groundwater will be addressed via the DMIRS process.

**3.3 Describe the soil and vegetation characteristics relevant to the project area.**

**SOILS**

Soil Landscapes and Land Systems mapping has identified six land systems within the development envelope (Figure 8):

- Capricorn System: Rugged sandstone hills, ridges, stony footslopes and interfluves supporting low acacia shrublands or hard spinifex grasslands with scattered shrubs;

- Platform System: Dissected slopes and raised plains supporting shrubbby hard spinifex grasslands;

- Uaroo System: Broad sandy plains, pebbly plains and drainage tracts supporting hard and soft spinifex hummock grasslands with scattered acacia shrubs;

- Boolgeeda System: Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands;

- Ruth System: Hills and ridges of volcanic and other rocks supporting shrubby hard spinifex and occassionally soft spinifex or grasslands; and

- Mallina System: Sandy surfaces alluvial plains supporting soft spinifex grasslands and minor hard spinifex and tussock grasslands (DAFWA 2012).

These land systems are mostly characteristic of the Pilbara region. Soil salinity is variable in the Pilbara region and is dependent upon land unit location, however, many deep clays tend to have weakly saline subsoils (Van Vreeswyk et al. 2004).

**VEGETATION**

Mapping of the pre-European vegetation extents within the Pilbara region of WA was completed on a broad scale (1:1,000,000) by Beard (1975). These vegetation types were later re-assessed by Shepherd et al. (2001) to account for clearing in intensive land use zones, dividing some larger vegetation units into smaller units. Five broad vegetation types have been identified for the development envelope (Figure 9):

- Abydos Plain - Chichester 93: Hummock grasslands, shrub steppe; kanji over soft spinifex;

- Abydos Plain - Chichester 626: Hummock grasslands, shrub-steppe, kanji over soft spinifex and Triodia brizioides;

- Abydos Plain 93: Hummock grasslands, shrub steppe; kanji over soft spinifex;

- Abydos Plain 647: Hummock grasslands, dwarf-shrub steppe; Acacia translucens over soft spinifex; and

- Abydos Plain 589: Mosaic. Short bunch grassland - savanna / grass plain (Pilbara) / Hummock grasslands, grass steppe, soft spinifex (Shepherd et al. 2001).

The following vegetation associations were identified and mapped within the surveyed areas (360 Environmental 2018a;b) (Refer to the figures in the attached 360 Environmental Flora, Vegetation and Fauna Survey reports).

- 1.1 - Hills, mid slopes, upper slopes and ridges: Eucalyptus spp. low isolated clumps of trees over G*revillea wickhamii subsp. hispidula, Hakea lorea subsp. lorea, Acacia acradenia* low isolated shrubs over *Triodia wiseana* low tussock grassland;

- 1.2 - Hills, mid sloeps, upper slopes and ridges : *Eucalyptus ?leucophloia* low isolated trees over *Gossypium australe, Acacia pyrifolia, Senna glutinosa subsp. glutinosa* mid isolated clumps of shrubs over *Triodia epaotia, *Cenohrus oiliaris, Themeda sp. Mt Barricade* low tussock grassland;

- 2 - Hill footslopes, low rises, undulating plains: *Acacia spp. Grevillea wickhamii subsp. hispidula* tall isolated shrubs over *Ptilotus oalostaohyus, Solanum lasiphyllum* low isolated shrubs over *Triodia epaotia* low tussock grassland;

- 3.1 - Major Drainage Lines: *Eucalyptus spp*. low isolated trees over *Acacia tumida var. pilbarensis* tall isolated clumps of shrubs over *Acacia bivenosa, Acacia pyrifolia* low isolated shrubs over *Triodia wiseana* low open tussock grassland;

- 3.2 - Major Drainage Lines: *Corymbia hamersleyana* low woodland over *Acacia tumida var.pilbarensis*, *Grevillea wickhamii subsp. hispidula* tall closed shrubland over *Acacia pyrifolia, Acacia acradenia* mid isolated clumps of shrubs over *Triodia wiseana* isolated clumps of tussock grassland;

- 3.3 - Major Drainage Lines: *Melaleuca argentea* low open forest over *Pluchea rubelliflora, Cyperus vaginatus* low open grassland;

- 4.1 - Flat Plains: *Corymbia zygophylla, Corymbia hamersleyana* low isolated trees over A*cacia pyrifolia, Grevillea wickhamii subsp. hispidula, Hakea lorea subsp. lorea* tall sparse shrubland over *Ptilotus calostachyus*, *Pluchea ferdinandi-muelleri* mid isolated shrubs over *Acacia ancistrocarpa, Acacia stellaticeps, Acacia sphaerostachya* low open isolated clumps of shrubs over *Triodia epactia* low tussock grassland;

- 4.2 - Flat Plains: *Corymbia hamersleyana* low woodland over Acacia pyrifolia, A. ancistrocarpa, Petalostylis labicheoides tall sparse shrubland over *Triodia ?brizoides, Triodia epactia* low closed tussock grassland;

- AiTe: Acacia inaequilatera, *A. orthocarpa* tall isolated clumps of trees over *Triodia epactia, T. brizoides* mid tussock grassland;

- AmTe: *Acacia maitlandii* mid isolated clumps of shrubs over *Triodia epactia* tussock grassland;

- AaAbTe: *Acacia ancistrocarpa*, *A. bivenosa* mid sparse shrubland over *Triodia epactia* tussock grassland;

- AiGwTe: *Acacia inaequilatera*, *Grevillea wickhamii* tall sparse shrubland over *A. ancistrocarpa, A. bivenosa* mid isolated clumos of shrubs over *Triodia epactia* tussock grassland;

- CzAspp.Te: *Corymbia zygophylla* low isolated clumps of trees over *Acacia tumida var. pilbariensis*, *A. acradenia* mid sparse shrubland over *A. ancistrocarpa, A.stellaticeps* low sparse shrubland over *Triodia epactia* mid tussock grassland;

- CzAtTe: *Corymbia zygophylla* low isolated clumps of trees over *Acacia trachycarpa, Hakea lorea* mid sparse shrubland over *A. inaequilatera* low isolated clumps of shrubs over *Triodia epactia* tussock grassland;

- ChAtTe: *Corymbia hamersleyana* low isolated trees over *Acacia tumida var. pilbariensis, A. ancistrocarpa, Grevillea wickhamii* tall sparse shrubland over *A. maitlandii* mid isolated shrubs

over *Triodia epactia* tussock grassland;

- ChAiTb: *Corymbia hamersleyana* low isolated trees over *Acacia inaequilatera, A. sericophylla,* tall isolated clumps of shrubs over *Grevillea wickhamii, Sida arenicola* mid isolated shrubs over A*. acradenia, A. stellaticeps* low isolated shrubs over *Triodia epactia* tussock grassland;

- ChAtMnTe: *Corymbia hamersleyana* low isolated trees over *Acacia tumida var. pilbariensis, Mallotus nesophilus, Grevillea wickhamii* mid sparse shrubland over *Hibiscus stuartii var. campylochlamys* low isolated shrubs over *Triodia epactia* open tussock grassland;

- AiGaTsTe: *Acacia inaequilatera, Gossypium australe, Tephrosia virens* mid isolated clumps of shrubs over *Senna glaucifolia, Tribulus su*berosus low isolated shrubs over Triodia *epactia* low open tussock grassland;

- EvChCc: *Eucalyptus victrix* mid woodland over *Corymbia hamersleyana* low isolated trees over *Acacia tumida var. pilb*ariensis mid isolated shrubs over *Triodia epactia* mid tussock grassland;

- CcAiMlTe: *Corymbia candida ?subsp. lautifolia* low isolated clumps of trees over *Acacia inaequilatera, Melaleuca lasiandra* mid isolated clumps of shrubs over *A. stellaticeps* low open shrubland over *Triodia epactia* mid tussock grassland;

- CcAiTe: *Corymbia candida ?subsp. lautifolia* low woodland over *Carissa lanceolata, Acacia inaequilatera* mid isolated shrubs over *Corchorus laniflorus, Indigofera linnaei, Bonamia linearis, Trigastrotheca molluginea* low isolated shrubs over *Triodia epactia, *Cenchrus ciliaris, Eragrostis desertorum* mid closed grassland clay pan;

- TsCP: *Neptunia dimorphantha, Rhynchosia minima* low isolated shrubs over *Triodia secunda, Dactyloctenium radulans, Eriachne glauca var. glauca* low open grassland

- MlAiTe: *Melaleuca lasiandra* low isolated clumps of trees over *Acacia inaqeuilatera* tall isolated shrubs over *A. stellaticeps, Corchorus parviflorus* low sparse shrubland over *Triodia epactia* tussock grassland; and

- AhAiTe: *Atalaya hemiglauca* low Isolated clumps of trees over *Acacia inaequilatera* tall isolated clumps of shrubs over *Carissa lanceolata* mid isolated shrubs over *Corchorus laniflorus* low isoalted shrubs over *Triodia epactia, Eragrostis desertorum, *Cenchrus ciliaris* mid open grassland.

**Threatened Ecological Communities**

Results from the DBCA Threatened and Priority Ecological Communities (TEC and PEC) database and the PMST report did not identify any known occurrences of any TECs or PECs in the surveyed areas or within the surrounding 30 km radius buffer (20 km buffer search for the pipeline envelope) (360 Environmental 2018a;b). None of the vegetation communities identified

during the surveyes represent a TEC or PEC (360 Environmental 2018a;b).

**3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area.**

There are no conservation areas within or nearby the development envelope. The nearest conservation estate is the Mungaroona Range Wildlife Sanctuary located in excess of 52 km southwest of the development envelope (DBCA 2017). Environmentally Sensitive Areas (ESAs) are identified and protected under the Environmental Protection (Environmentally Sensitive Areas) Notice 2005. Under the Notice it is an offence to kill or destroy vegetation within an ESA without a Native Vegetation Clearing Permit (NVCP). Mapping undertaken by the (then) Department of Environment Regulation (DER) has identified the development envelope is not within the extent of or nearby an ESA (DWER 2018).

**3.5 Describe the status of native vegetation relevant to the project area.**

**VEGETATION CONDITION**

The vegetation condition within the surveyed areas ranged from Excellent to Completely Degraded, with majority of the vegetation in Very Good condition (Figures 10a-l):

- Excellent (135 ha)

- Very Good (2,200 ha);

- Good (349.21 ha);

- Poor (25.41 ha);

- Degraded (5.64 ha); and

- Completely Degraded (37.43) (360 Environmental 2018a;b).

**3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.**

The topography of the entire development envelope is highly variable, ranging between 25 m Australian Height Datum (AHD) in the northern end of the pipeline envelope to 300 m AHD at the mine site envelope, increasing from northwest to southeast over a distance of approximately 82 km.

**3.7 Describe the current condition of the environment relevant to the project area.**

The 18 vegetation associations identified across the surveyed areas are considered to be representative of the region. The vegetation associations with the greatest extent was the *Corymbia hamersleyana* with *Acacia inaquilatera* and *Triodia grasslands*, and the *Corymbia zygophylla* with *Acacia spp.* and *Triodia* grasslands (360 Environmental 2018a;b). Overall the majority of the development envelope was considered to be in Very Good condition (Figures 10a-l). However, several impacts are evident from current mining activities and associated dust, cleared areas and rehabilitated areas, localised areas of recent fires and grazing impacts from cattle and wild horses (360 Environmental 2018a;b).

**3.8 Describe any Commonwealth Heritage Places or other places recognised as having heritage values relevant to the project area.**

There are no World, Commonwealth or State Heritage Places within or in the vicinity of the development envelope (DEE 2018; SHO 2018).

**3.9 Describe any Indigenous heritage values relevant to the project area.**

**Aboriginal Heritage**

In Western Australia, the Aboriginal Heritage Act 1972 protects places and objects customarily used by or traditional to the original habitants of Australia. A register of such places and objects is maintained under the Act, however all sites are protected under the Act whether they are Registered or not (DPLH 2018). Several Registered and Aboriginal Heritage places are located across the pipeline envelope and the mine site envelope. The location of the pipeline will be designed to avoid Aboriginal heritage places and the Department of Planning, Lands and Heritage (DPLH) will be consulted. The Aboriginal Heritage places extending over the mine site envelope are not likely to be a significant impact for the proposed mine expansion, due to the existing Mine located within portions of these mapped places (Figures 11a-b).

**3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area.**

The underlying tenure of the mine and gas pipeline is a variation of Crown Land and Vacant Crown Land. The Project is located across various tenements within Mineral Field 45 and the status and ownership of the tenements are presented in the attached Tenements document. A Native Title Claim occurs over the Project area. The Claim was lodged by the Kariyarra People and a Native Title Agreement (Land Access Agreement) has been signed between Mineral Resources and the Kariyarra People and a Native Title Agreement (Land Access Agreement) has been signed between Mineral Resources and the Kariyarra People.

**3.11 Describe any existing or any proposed uses relevant to the project area.**

Land use surrounding Wodgina comprises iron ore prospecting, exploration and mining,

pastoral grazing and, to a lesser extent, tourism.

The project tenements all intersect prospecting, exploration and mining leases held by Global Advanced Metalds and other companies.

The Project overlies the Kangan pastoral lease which is owned and run by the Yandeyarra Community, located approximately 27 km southwest of the Proposal. The Kangan lease is bordered by the Wallareenya and Indee pastoral leases.

# Section 4 - Measures to avoid or reduce impacts

Provide a description of measures that will be implemented to avoid, reduce, manage or offset any relevant impacts of the action. Include, if appropriate, any relevant reports or technical advice relating to the feasibility and effectiveness of the proposed measures.

Examples of relevant measures to avoid or reduce impacts may include the timing of works, avoidance of important habitat, specific design measures, or adoption of specific work practices.

**4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action.**

The development envelope covers a combined total area of 1,913 ha for the pipeline and mine site envelopes. The pipeline envelope covers an area of 1,593 ha, within which the pipeline will be located with a total area of 240 ha. The mine site envelope covers an area of 320 ha which will be cleared. Approximately 560 ha of vegetation will be cleared to support the Project, representing 29% of the vegetation within the development envelope.

**Clearing:**

- Prior to clearing activities, areas of vegetation to be cleared and retained will be clearly demarcated and all site personnel will be made aware of the requirement to protect native vegetation and minimise clearing to within approved limits;

- Staged clearing outside of the breeding period for conservation significant fauna species will be conducted, where possible;

- No dead standing or fallen timber should be removed unnecessarily. Logs and other debris (with the exception of weeds) resulting from land clearing should be placed in nearby vegetated areas to enhance the surrounding fauna habitat;

- Prior to clearing, any conservation significant fauna present will be removed and relocated by authorised personnel;

- Vegetation clearing will be scheduled to occur as close as possible before planned earthworks to minimise the potential for dust, where practicable;

- Disturbed areas and haul roads within the mine site will be treated with dust suppressants, especially on high risk days/areas;

- A water truck will be available to dampen haul roads and disturbed areas; and

- Semi-permanent dust control treatments will be implemented on stockpiles that are left for

longer than one month.

**Native Fauna:**

- All contractors and site personnel involves in clearing activities will be inducted on the potential impacts to fauna and advised to stop works immediately within the vicinity of any injured or shocked animals that are encountered. They will be instructed to contact the relevant environmental staff in this event; and

- Appropriate speed limits will be set, signposted and adhered to on all site access roads to avoid native fauna strike. Speed restrictions will apply at dusk/dawn where there is a high risk of fauna/vehicle collision;

**Feral Fauna:**

- Domestic animals or pets will not be permitted on site; and

- Rubbish and food waste will be stored in bins that are not easily accessible for fauna, such as dingos (if present).

**Weed Control:**

- Weed control will be undertaken by appropriately trained operators prior to revegetation.

**4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved.**

**Northern Quoll:** Listed as Endangered under the EPBC Act. Approximately 49.1 ha of suitable habitat is proposed to be cleared.

**Greater Bilby:** Listed as Vulnerable under the EPBC Act. Approximately 290 ha of suitable habitat is proposed to be cleared.

**PLNB:** listed as Vulnerable under the EPBC Act. Approximately 64.2 ha of suitable habitat is proposed to be cleared.

The suitable fauna habitats for the Northern Quoll, Greater Bilby and PLNB are considered to be extensive and common outside of the development envelope, within the surrounding landscape and on a regional scale. Adequate management measures, such as staged clearing and staged rehabilitation, would be implemented to reduce the potential impacts to these conservation significant fauna species.

# Section 5 – Conclusion on the likelihood of significant impacts

A checkbox tick identifies each of the matters of National Environmental Significance you identified in section 2 of this application as likely to be a significant impact.

Review the matters you have identified below. If a matter ticked below has been incorrectly identified you will need to return to Section 2 to edit.

### 5.1.1 World Heritage Properties

No

### 5.1.2 National Heritage Places

No

### 5.1.3 Wetlands of International Importance (declared Ramsar Wetlands)

No

### 5.1.4 Listed threatened species or any threatened ecological community

No

### 5.1.5 Listed migratory species

No

### 5.1.6 Commonwealth marine environment

No

### 5.1.7 Protection of the environment from actions involving Commonwealth land

No

### 5.1.8 Great Barrier Reef Marine Park

No

### 5.1.9 A water resource, in relation to coal/gas/mining

No

### 5.1.10 Protection of the environment from nuclear actions

No

### 5.1.11 Protection of the environment from Commonwealth actions

No

### 5.1.12 Commonwealth Heritage places overseas

No

### 5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action.

**Lead to a long-term decrease in the size of a population**

*Northern Quoll*

The development envelope contains 49.1 ha of suitable habitat for the Northern Quoll species to be cleared.

The expansion of the mine and the construction of the gas pipeline will result in clearing of up to 49.1 ha of this habitat occurring within the Major Drainage Line and Rocky Ironstone Ridge/Rocky Ironstone Valley fauna habitat in mostly ‘Very Good’ and ‘Good’ condition. Suitable habitat for the species is not isolated to the development envelope, whereby the Rocky Habitat appears extensive and continuous throughout the region. The wider habitat within the region is more likely to support greater Northern Quoll population densities than the habitat within the development envelope due the extensive area of habitat, high connectivity and lack of proposed mining activities.

It is not considered that the Northern Quoll populations within the surveyed areas are large or of a ‘High’ density. In addition, only three of the Quoll scats recorded during the surveys were considered recent, suggesting the species have not frequently utilised the area for a number of months.

It is not likely that the expansion of the already existing mine site and the construction of a gas pipeline would have a significant impact on the habitat available that would lead to a long term decrease in the size of the Northern Quoll population in the area. Extensive suitable habitat within the region and low evidence of recent Quoll activity within the development envelope suggests that a population would not be subject to a long-term decrease in size.

*Bilby*

Surveys undertaken to date have identified a total of 2,223 ha of suitable habitat for the Bilby within the surveyed areas. Approximately 222 ha of suitable habitat is proposed to be cleared

as part of the Project. Suitable habitat for the Bilby was identified as the Grassland – Flat plain on sand with Low Eucalyptus woodland and Low Woodland/Shrubland – Eucalyptus and Acacia over Triodia Grassland fauna habitats, which occur along the Pipeline envelope. These habitats are considered well-represented within the development envelope and regionally. The species was recorded within the development envelope during the surveys but considered to have low population densities. Locally, it is expected that the Project would have an impact on any individuals that inhabit the proposed clearing areas; however, due to low population densities and extensive suitable habitat with the surrounding region it is unlikely that the Project would lead to a long-term decrease in the size of a population of Bilby regionally.

*Pilbara Leaf-nosed Bat*

The development envelope contains a total of 109.1 ha of suitable habitat for the Pilbara Leafnosed Bat (PLNB), of which, 19.4 ha will be cleared as part of the Project. The surveys identified four caves that were potentially large enough to be used by the PLNB and other bats for diurnal or nocturnal roosting, but unlikely suitable for maternal roosting. Three of the four caves are located outside of the clearing areas and one cave that was not big enough for utilisation by the PLNB is within the clearing area.

No evidence of the PLNB was recorded during the surveys, but the species is considered highly likely to occur within the development envelope for airborne foraging. The nearest confirmed known dirunal roost is located at Lalla Rookh, approximately 58 km northeast of the mine site envelope (DoE 2016a). The habitat suitable for the PLNB is considered extensive within the region (DoE 2016a). As such, it is considered highly unlikely that the Project would produce significant impacts to the species at a local or regional level.

*Fork-tailed Swift and other Migratory/Marine species*

The Fork-tailed Swift was recorded during the surveys within the northern extent of the pipeline envelope. However, the species is migratory and almost entirely airborne; the species does not depend significantly on terrestrial habitat. It is unlikely that the Project would lead to a long-term reduction in a population of the Fork-tailed Swift due to its high mobility, extensive home range and lack of dependence on terrestrial habitats. The Oriental Pratincole, Red-necked Stint, Wood Sandpiper, Common Greenshank and Marsh Sandpiper were considered likely to utilise the low-lying habitats within the pipeline envelope after heavy rainfall resulting in ephemeral wet areas. Suitable wet habitat is only temporarily available for these species and as such, the clearing within the pipeline envelope would not lead to a long term decline in size of a population.

**Reduce the area of occupancy of the species**

It is unlikely the Project would significantly reduce the area of occupancy for the Northern Quoll, Bilby, PLNB and migratory/marine species. Although the areas to be cleared contain suitable habitat for the species', the habitats identified during the surveys are considered extensive and common within the wider region.

Scat evidence of Northern Quolls suggests the species may not be utilising the development envelope regularly or recently, and as such, it is highly likely the species utilise a wider habitat

outside the development envelope.

Suitable Bilby habitat proposed to be cleared represents 13.6% of suitable habitat surveyed within the wider area. This suggests, in addition to aerial imagery review, that suitable habitat for the species is widespread and common within the region. The clearing for the Project is not expected to have a significant reduction in the area of occupancy of the Bilby in a regional context.

The PLNB was considered highly likely to occur within the development envelope due to suitable habitat for airborne foraging. Suitable habitat identified for the species is considered extensive within the region and unlikely to reduce the area of occupancy on a regional scale. The Rocky Ridge/Rocky Valley habitat occurs in small patches throughout the landscape while the Major Drainage Line is continuous within the landscape associated with watercourses. The width of habitat to be cleared is up to approximately 50 km in width however nearby patches of the habitat is available for the species.

The Fork-tailed Swift and the other Migratory/Marine species (Oriental Pratincole, Red-necked Stint, Wood Sandpiper, Common Greenshank and Marsh Sandpiper) are considered to have dependence upon rainfall to utilise the low lying areas within the development envelope. As the Fork-tailed Swift is not dependent upon terrestrial habitats and the other Migratory/Marine species habitat within the development envelope are considered temporary (ephemeral wet areas), it is not considered likely that the Project would reduce the area of occupancy of the species'. These species are migratory and have extensive habitats. The Fork-tailed Swift forages above the tree canopy while the other Migratory/Marine species are waterbirds that are dependent upon submerged areas for foraging and feeding. There are no permanently submerged areas within the mine site envelope and the gas pipeline is not likely to have a significant impact to the wide range of this habitat type closer to the coast.

**Fragment an existing population into two or more populations**

It is not likely that the Project would fragment existing populations of the Northern Quoll, Bilby, PLNB into two or more populations due to extensive suitable habitat surrounding the development envelope and within the wider region. The reduction in suitable habitats is not considered significant in a regional context, the surrounding landscape is largely uncleared and would provide more suitable habitat for these species than the areas proposed for the mine site expansion and the gas pipeline.

The other Migratory/Marine species populations are unlikely to be fragmented into two or more populations by the Project. These species are migrants of Australia and suitable habitat is in ephemeral or permanently wet areas. Of which, ephemeral areas within the development envelope is dependent upon large rainfall events. In addition, these species are highly mobile with extensive home ranges. The clearing of suitable habitat is not considered to have an impact on fragmenting populations and not considered to have a significant impact on the species' populations.

**Adversely affect habitat critical to the survival of a species**

The Rocky Ridge/Valley habitat has been identified as the most important Northern Quoll habitat within the development envelope and wider surveyed areas. However, this habitat was relatively fragmented and did not form continuous large corridors of habitat that would be preferred by the species. Aerial imagery has identified a substantial area of this habitat occurring within a regional context outside of the development envelope. As such, the surrounding landscape would be able to support greater Northern Quoll population densities than habitat within the development envelope due to its size and greater connectivity (360 Environmental 2018a;b). It is not likely the clearing of suitable habitat within the development envelope would adversely affect the Northern Quoll species' survival.

The Bilby's habitat is considered to be well represented beyond the development envelope and the surrounding landscape (360 Environmental 2018a;b). Furthermore, the population densities of the Bilby are considered to be low within the development envelope. The clearing of 290 ha of suitable habitat for the species may have local impacts, however, is not likely to have a significant impact to the survival of the species on a regional scale (360 Environmental 2018a;b).

Mining related activities such as vegetation clearing, excavation and earthworks, blasting, drilling, rail and haul road vehicle activity in habitat used by the PLNB has the potential to impact the survival of the species. No PLNB species or evidence of the species occurring within the development envelopes were recorded during the surveys and was identified the species would utilise the development envelope for airborne foraging. Although the species have a high likelihood of occurrence within the development envelope for the purpose of foraging, it is not considered that the species would be significantly impacted by the development.

The Fork-tailed Swift is a Migratory/Marine non-breeding migrant to Australia in Summer. The species has a mostly aerial habitat from <1 m to 1,000 m and is mostly observed across inland plains in Australia and along coastal areas as well as offshore islands. The species has a large area of occupancy and is not isolated to Western Australia (DoE 2015a). The species was recorded during the survey but the habitat within the development envelope is not considered to be critical to the survival of the species. The Fork-tailed Swift does not depend solely on the habitat available within the development envelope.

The seasonal movements of the other Migratory/Marine species identified as likely to occur within the northern portion of the site suggests that the development envelope does not habitat critical to the survival of these species. These Migratory/Marine shorebird species are reliant upon inundated areas for foraging and feeding such as wetlands or rivers (DoE 2015b). The development envelope is not mapped as containing permanent wetlands or other surface water features; it does contain low-lying areas that are ephemeral in nature, inundated only after heavy rainfall events. As only a small portion in the northern pipeline envelope is ephemeral in nature and dependent upon large rainfall events, it is not considered critical habitat for the survival of these Migratory/Marine waterbirds. The temporary availability of suitable habitat within the development envelope is considered not to be critical habitat for these species.

Development of the pipeline will reduce some portions of the low-lying areas becoming inundated after heavy rainfall; however, these low-lying areas extend beyond the pipeline envelope. It is likely that surrounding rivers and permanently inundated wetlands would provide

more suitable habitat critical to the survival of these Migratory/Marine shorebirds.

**Disrupt the breeding cycle or lifecycle of a population**

It is unlikely that the Project would disrupt the breeding cycle or lifecycle of a population of the Northern Quoll species. The habitat is considered to be extensive outside of the development envelope and more likely to support greater Northern Quoll densities than habitat within the development envelope (360 Environmental 2018a; b). The habitat within the development envelope was not considered likely to be essential for the survival or life cycle of the species given the widespread availability of habitat on local and regional scales (360 Environmental 2018a;b).

The Bilby was identified to have a high likelihood of occurrence within the development envelope but low population densities, suggesting that impacts to the Bilby populations from the Project is not expected to be significant on a regional scale (360 Environmental 2018a;b).

Development or mining related activities in close proximity to diurnal roosts have the potential to disrupt the breeding cycle of the PLNB if they occur within the breeding period. The caves identified as suitable habitat for diurnal or nocturnal roosting are located outside of the clearing areas.

The Fork-tailed Swift and the other Migratory/Marine shorebirds (Oriental Pratincole, Red-necked Stint, Wood Sandpiper, Common Greenshank and Marsh Sandpiper) are summer nonbreeding migrants to Australia. These species visit Australia for foraging and feeding important for the life cycle of the species. However, it is highly unlikely that the clearing within the development envelope would disrupt the breeding cycle of a population. Australia's coastal and freshwater habitats are considered to be important habitat for these species to rest, feed, and accumulate energy reserves to travel long distances back to their breeding grounds. Feeding and foraging habitat is important in the breeding cycle for species, however, given the development envelope does not contain permanently inundated areas it is not considered a critical habitat. It is likely these species would utilise the region for more suitable and permanent water habitats nearby.

**Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to extent that the species is likely to decline**

The Northern Quoll targeted surveys identified 49.1 ha of 2,778 ha of suitable habitat to be cleared for the Project. The suitable habitat within the surveyed areas was considered to be fragmented compared to the substantial area of continuous habitat to the west and east of the surveyed areas (360 Environmental 2018a;b). This suggests these larger intact areas would provide more suitable habitat for the Northern Quoll than the development envelope. Only two Northern Quoll individuals were captured on remote motion cameras over a period of 60 trapping nights within the wider surveyed areas. In addition, only 19 scats were recorded during the surveys of which 3 were considered to be recent. The low individual recordings and low scat densities indicates a low population density and suggests the species have not likely utilised the surveyed areas for a number of months and likely utilising surrounding habitat outside of the surveyed areas (360 Environmental 2018a;b). Although the Project involves the clearing of 49.1

ha of suitable Northern Quoll habitat, it is not likely to have a significant impact on the species that would cause the species to decline given the low population density, limited recent evidence of the species and fragmented habitat within the development envelope.

Habitat suitable for the Bilby is not restricted to the development envelope, the habitat is considered to be widespread and common within the surrounding landscape and region. The clearing of 290 ha of the surveyed 2,140 ha of suitable habitat is not considered to result in a reduction in availability or quality of habitat that is necessary for the species' survival (360 Environmental 2018a;b).

No PLNBs were recorded during the surveys however suitable habitat was identified as having a total area of 104.9 ha within the wider surveyed areas, of which 64.2 ha is proposed to be cleared for the Project. Shallow cave sizes are common in the Pilbara area, which are considered unsuitable for the PLNB. It is not likely that the suitable habitat identified would impact the habitat available causing the species to decline. Suitable habitat for the species is considered widespread and common on a regional scale.

The Fork-tailed Swift is a mostly exclusively aerial forager from <1m to 1000 m and was recorded within the northern portion of the pipeline envelope. As the species has a widespread foraging and feeding areas within Australia, it is not considered that the clearing within the development envelopes would have a significant impact on the availability or quality of habitat that would cause the species to decline.

Habitat important to the other Migratory/Marine shorebirds requires the habitat to support 0.1 % of the flyway population or at least 2000 migratory shorebirds or at least 15 migratory shorebird species (DoE 2015b). None of these Migratory/Marine shorebirds were recorded during the surveys but were considered likely to occur due to the ephemeral nature of low-lying areas within the pipeline envelope and nearby historical occurrences of the species. However, as the habitat is only considered suitable to the species when inundated (subject to heavy rainfall), it is not likely that the development within a portion of this habitat would modify, destroy, remove, isolate or decrease the availability or quantity of habitat that causes these species to decline.

These species are highly mobile and would have greater association with permanent waterbodies and rivers in the surrounding landscape.

**Result in invasive species that are harmful to listed species becoming established in that species' habitat**

The clearing within the development envelope is not likely to result in invasive species becoming established. The invasive species Gamba Grass (*Andropogon gayanus*) is listed as a key threatening process under the EPBC Act for the Northern Quoll species. The surveys did not identify the Gamba Grass weed species within the development envelope or wider surveyed areas. It is not likely that the clearing within the development envelope would result in the introduction of the Gamba Grass. Weed management measures will be taken during clearing and construction activities to ensure weeds are not spread or introduced as part of the Project.

No invasive weed species recorded within the development envelope are listed as being

harmful to the Migratory/Marine shorebirds. There are no significant threats to the Fork-tailed Swift in Australia. Potential threats to the species include predation by feral animals, however, due to the wide range of the species the potential impacts are considered to be negligible (Birdlife International 2009).

Four weed species were recorded during the surveys, of which one (**Calotropis procera*) is listed as WONS and Declared under the BAM Act. Clearing may ameliorate weed species, however if invasive species do result in the uncleared area from the development they are not seen to be key threats to the Bilby, PLNB, Northern Quoll, Fork-tailed Swift and the other Migratory/Marine species. Best practice management will be undertaken to ensure that the machinery and equipment used on Site will not increase the risk of introducing weeds or disease, or spread weeds across the site from already infested areas.

Feral cats (*Felis catus*) and the European Red Fox (*Vulpes vulpes*) are listed as key threatening processes under the EPBC Act for the Northern Quoll. In particular, Feral cats have the potential to impact upon Northern Quoll Populations either through competition for food or direct predation.

Invasive species are unlikely to have a significant effect overall on the PLNB (DoE 2016a).

**Introduce disease that may cause the species to decline**

It is unlikely that vegetation clearing, construction and mining activities of the Project would introduce disease that would cause a decline in the Northern Quoll populations. The key listed threatened process to the Northern Quoll is the spread of Cane Toads and the lethal toxic ingestion of the invasive species. It is unlikely that the development itself would introduce Cane Toads into the area (DEH 2005).

There are no listed diseases that are threatening to the Bilby. It is unlikely that the clearing within the development envelope would introduce disease that would cause the species to decline.

There are no known diseases threatening the PLNB. The only known risk to the species is White Nose Syndrome which can be controlled by limiting human access to roost sites (DoE 2016a). All caves identified as potential roosting habitats are located outside of the clearing areas, with the exception of one cave that was identified as too small to be utilised by the species.

There are no significant threats to the Fork-tailed Swift in Australia (DoE 2015a).

Modification of wetland habitats may increase invasive species and pollution which can modify the habitat suitable for these Migratory/Marine shorebirds. The site does not contain permanent water bodies and development of the pipeline and mine site expansion is not likely to increase invasive species and pollution into nearby suitable wetland habitats for these species.

Management measures for pollution and invasive species control have and will be further considered at a State level through EPA and other agency approvals processes and

management plans.

No domestic animals or pets will be permitted on site to prevent the introduction or spread of disease, and to prevent predation on native fauna.

Standard hygiene controls and management of ground engaging equipment will be undertaken to ensure weeds and diseases are not introduced or spread.

**Interfere with the recovery of the species**

The reduction in the habitat surveyed is not likely interfere with the recovery of the Northern Quoll. Although the clearing will increase local habitat fragmentation, the surrounding landscape contains greater extents of suitable habitat than the development envelope. Particularly, the surrounding uncleared landscape has not been significantly subject to mining or development activities. The habitat within the development envelope was not considered likely to be essential for the recovery of the species within a local or regional scale (360 Environmental 2018a;b).

Habitat loss and fragmentation are threatening processes to the Bilby but the severity of these are dependent upon location (DoE 2016b). The Project is located in a largely remote inland area with large areas of intact remnant vegetation. Land clearing would reduce some habitat availability; however, there are significant areas of suitable Bilby habitat in the surrounding landscape. The clearing of Bilby habitat within the development envelope represents only

13.5% of the habitat within the wider surveyed area. In addition, only two Bilby individuals were recorded during the surveys indicating the species has a low population density within the development envelope and the wider surveyed area (360 Environmental 2018a;b). As such, it is not likely that the clearing of of suitable Bilby habitat within the development envelope would interfere with the recovery of the species.

As no PLNB species or suitable roosting habitat were observed during the surveys, it is not likely that the Project would interfere with the recovery of the species. The surrounding landscape and region contains suitable habitat for the species, which is considered widespread. In addition, no caves suitable for diurnal or nocturnal roosting are located within clearing areas.

The clearing of habitat within the low-lying areas of the northern portion of the pipeline envelope is not considered to interfere with the recovery of the Fork-tailed Swift or the other Migratory/Marine shorebirds. Due to the ephemeral nature of the northern portion of the pipeline envelope, these species would likely utilise permanent wetlands or waterbodies to rest, forage and feed to build up required energy reserves to migrate back to breeding grounds overseas.

These more permanent waterbodies would be considered more important habitat than temporary or ephemeral natured low lying areas that are dependent upon large rainfall events for inundation. In addition the Fork-tailed Swift is a mostly aerial forager and would have ease in identifying more suitable foraging habitat areas than the site during and post construction due to its high mobility and extensive home range.

# Section 6 – Environmental record of the person proposing to take the action

Provide details of any proceedings under Commonwealth, State or Territory law against the person proposing to take the action that pertain to the protection of the environment or the conservation and sustainable use of natural resources.

**6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Please explain in further detail.**

Wodgina Lithium Pty Ltd (WLPL) are part of the larger Mineral Resources Limited (MRL) group and have an extensive history of mining in Western Australia. To date no serious environmental non-compliance has been registered against WLPL or MRL. As a leading regional mining services, contracting and resource development company, MRL acknowledges that their operations have the potential to impact on environmental, community and heritage values. For this reason, MRL has adopted a systematic approach to understanding and managing potential impacts and to meet their commitments under legislation.

**6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application.**

Not applicable

**6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation's environmental policy and framework?**

Yes

**6.3.1 If the person taking the action is a corporation, please provide details of the corporation's environmental policy and planning framework.**

Mineral Resources Limited will be undertaking the proposed action in accordance with their Environment, Community and Heritage Policy (attached).

**6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?**

Yes

### 6.4.1 EPBC Act No and/or Name of Proposal.

**EPBC 2016/7637:** Mineral Resources Limited/Mining/90km north-west of Newman/Western Australia/Pilbara Bulk Ore Transport System Project, WA

**EPBC 2015/7494:** Mineral Resources Limited/Mining/Shire of Yilgarn/Western Australia/J5 and Bungalbin East Iron Ore Project, Shire of Yilgarn, WA

# Section 7 – Information sources

You are required to provide the references used in preparing the referral including the reliability of the source.

**7.1 List references used in preparing the referral (please provide the reference source reliability and any uncertainties of source).**

| Reference Source | Reliability | Uncertainties |
|---|---|---|
| 360 Environmental, 2018a. Flora, Vegetation and Fauna Survey - Wodgina Mine Site and Proposed Airstrip. Prepared for Mineral Resources. West Leederville. | Environmental survey undertaken using the current guideline specifications. | Portions of the survey areas were not accessible due to steep slopes. The fauna habitats for these areas were extrapolated based on aerial imagery and the knowledge of the fauna personnel's site visit. |
| 360 Environmental, 2018b. Flora, Vegetation and Targeted Northern Quoll Survey – Wodgina Mine and Additional Gas Pipeline. Prepared for Mineral Resources. West Leederville. | Environmental survey undertaken using the current guideline specifications. | N/A |
| Beard, J. S. 1975. Vegetation Survey of Western Australia. University of Western Australia Press, Nedlands. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Cramer, V, Dunlop, J, Davids, R, Ellis, R, Barnett, B, Cook, A, Morris, K & van Leeuwen, S, 2016, Research Priorities for the northern quoll (Dasyurus hallucatus) in the Pilbara region of Western Australia. Australian Mammalogy. 38: pp. 135-148. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Agriculture and Food WA (DAFWA), 2012. Soil Landscapes and Land Systems. GIS Dataset. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Biodiversity Conservation and Attractions (DBCA), 2017. DBCA Managed | All references are peer reviewed papers in reputable journals or are government | N/A |

| Reference Source | Reliability | Uncertainties |
|---|---|---|
| Lands and Waters. GIS Dataset. Government of Western Australia. | publications or data. | |
| Department of the Environment (DoE), 2008a. Wetlands of National Importance. GIS Dataset. Commonwealth of Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of the Environment (DoE), 2013. Matters of National Environmental Significance – Significant Impact Guidelines 1.1. Commonwealth of Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of the Environment and Energy (DEE), 2018. Protected Matters Search Tool (PMST). Available at http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf. Commonwealth of Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Parks and Wildlife (DPaW), 2016. Geomorphic Wetlands. GIS Dataset. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Planning, Lands and Heritage. Aboriginal Heritage Inquiry System. Available at https://maps.daa.wa.gov.au/AHIS/. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Water (DoW), 2010.Groundwater Salinity. GIS Dataset, Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Water (DoW), 2014. Hydrography. GIS Dataset. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Water (DoW), 2016a. Public Drinking Water Source Areas. GIS Dataset. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Water (DoW), | All references are peer | N/A |

| Reference Source | Reliability | Uncertainties |
|---|---|---|
| 2016b. Water Quality Protection Note 25 – Land Use Compatibility Table. Government of Western Australia. | reviewed papers in reputable journals or are government publications or data. | |
| Department of Water and Environmental Regulation (DWER), 2018a. Environmentally Sensitive Areas – Clearing Permit System. Available at https://cps.der.wa.gov.au/main.html. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Menkhorst, P, & Knight, F, 2004, A field guide to the mammals of Australia, Second Edition. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Menkhorst, P, Rogers, D, Clarke, R, Davies, J, Marsack, P, & Franklin, K, 2017, The Australian Bird Guide. CSIRO Publishing. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Shepherd, D. P., Beeston, G. R., and Hopkins, A. J. M. 2001. Native Vegetation in Western Australia (Technical Report 249). Perth: Department of Agriculture. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| State Heritage Office (SHO), 2018. State Heritage Places, available at http://inherit.stateheritage.wa.gov.au/Public/. Department of Planning, Lands and Heritage. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Van Vreeswyk, A. M. E., Payne, A. L., Leighton, K. A., and Hennig, P. 2004. An Inventory and Condition Survey of the Pilbara Region of Western Australia (Technical Bulletin 92). Perth: Department of Agriculture. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Water Corporation 1996. Yule River Borefield, Hydrogeology | All references are peer reviewed papers in reputable | N/A |

| Reference Source | Reliability | Uncertainties |
|---|---|---|
| and Investigation Plan. Infrastructure Planning Branch, Planning and Development Division. | journals or are government publications or data. | |
| Water and Rivers Commission (WRC), 2000. Yule River Water Reserve Water Source Protection Plan. Port Hedland Regional Water Supply. Available from https://www.water.wa.gov.au/__data/assets/pdf_file/0005/5549/10117.pdf. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Woinarski, J, Oakwood, M, Winter, J, Burnett, S, Milne, D, Foster, P, Myles, H, & Holmes, B, 2008, Surviving the toads: patterns of persistence of the Northern Quoll Dasyurus hallucatus in Queensland. Report to Australian Government's National Heritage Trust. Tropical Savannas Cooperative Research Centre, Darwin. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Woinarski, J, Burbidge, A, & Harrison, P, 2014, The Action Plan for Australian Mammals 2012. CSIRO Publishing, Victoria, Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Southgate, R, 1990, Habitats and diet of the greater bilby Macrotis lagotis (Marsupialia: Peramelidae). In: Seebeck, J. H., P.R. Brown, R.L. Wallis & C. M. Kemper, eds. Bandicoots and Bilbies. pp. 303-309. Surrey Beatty & Sons: Chipping Norton, NSW. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |

# Section 8 – Proposed alternatives

You are required to complete this section if you have any feasible alternatives to taking the proposed action (including not taking the action) that were considered but not proposed.

**8.0 Provide a description of the feasible alternative?**

Not applicable.

**8.1 Select the relevant alternatives related to your proposed action.**

**8.27 Do you have another alternative?**

No

# Section 9 – Contacts, signatures and declarations

Where applicable, you must provide the contact details of each of the following entities: Person Proposing the Action; Proposed Designated Proponent and; Person Preparing the Referral. You will also be required to provide signed declarations from each of the identified entities.

**9.0 Is the person proposing to take the action an Organisation or an Individual?**

Organisation

**9.2 Organisation**

**9.2.1 Job Title**

General Manager

**9.2.2 First Name**

Timothy

**9.2.3 Last Name**

Berryman

**9.2.4 E-mail**

timothy.berryman@mrl.com.au

**9.2.5 Postal Address**

Locked Bag 3

Canning Bridge
Applecross WA 6153
Australia

**9.2.6 ABN/ACN**

ABN

33118549910 - MINERAL RESOURCES LIMITED

**9.2.7 Organisation Telephone**

Australian Government
Department of the Environment and Energy

**Title of Proposal** - Wodgina Lithium Mine Expansion

# Section 1 - Summary of your proposed action

Provide a summary of your proposed action, including any consultations undertaken.

### 1.1 Project Industry Type

Mining

### 1.2 Provide a detailed description of the proposed action, including all proposed activities.

Mineral Resources Limited is an Australian Stock Exchange-listed mining services and mining company with operations in Western's Australia's Pilbara and Goldfields regions. MRL's Wodgina Lithium Project (the Project) in the Pilbara is located 80 kilometres southeast of Port Hedland and is undergoing an expansion phase to cater for the demand for spodumene ore as a key ingredient in the manufacture of lithium batteries (Figure 1). The Project is accessed from Port Hedland, south along the Great Northern Highway and then southeast via the Wodgina mine access road.

The expansion phase at Wodgina is comprised of extensions to Cassiterite Pit and associated waste rock landforms as well as the construction and operation of infrastructure to support mining operations, particularly with respect to processed spodumene concentrate. This product concentrates the naturally occurring spodumene ore and its manufacture requires additional infrastructure such as a process plant, increased power generation capacity and tailings storage.

The increased power generation capacity at Wodgina will be met by the construction of a new reciprocating gas-fired power station that, when complete, will be largest of its type in the southern hemisphere. Gas for the new power station will be supplied via the Wodgina gas lateral pipeline together with a new, larger gas pipeline to be constructed adjacent to this lateral pipeline.

The proposed action being referred under the EPBC Act is the duplication of the Wodgina gas lateral, the extensions of Cassiterite Pit and the Eastern Waste Landform (EWL) and the construction and operation of a new dry tailings storage facility (TSF4) to the north of existing tailings storage facility 3 (TSF3).

The duplication of the Wodgina gas lateral is about 80 km in length and will run southeast from the existing Pilbara Energy Pty Ltd (PEP) metering station near South Hedland; crossing underneath the North West Coastal Highway and continuing adjacent to the Great Northern Highway towards Wodgina Mine (Figure 1).

The development envelope for the proposed action comprises: a) the mine site envelope (including TSF4, Cassiterite pit and EWL expansion) - this envelope has a total area of 320 ha

to be cleared and (b) the gas pipeline envelope – this envelope has a total area of 1,593 ha, of which only 240 ha is proposed to be cleared.

**1.3 What is the extent and location of your proposed action? Use the polygon tool on the map below to mark the location of your proposed action.**

| Area | Point | Latitude | Longitude |
|---|---|---|---|
| TSF | 1 | -21.183251306283 | 118.65978208725 |
| TSF | 2 | -21.181530628405 | 118.65883794968 |
| TSF | 3 | -21.179649864564 | 118.6586662883 |
| TSF | 4 | -21.177769076802 | 118.65785089676 |
| TSF | 5 | -21.171846439945 | 118.65450349991 |
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| TSF | 7 | -21.177849110811 | 118.66656271164 |
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| TSF | 9 | -21.181690692308 | 118.6665197963 |
| TSF | 10 | -21.182130867148 | 118.66433111374 |
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| TSF | 12 | -21.181930787838 | 118.66265741531 |
| TSF | 13 | -21.182450993482 | 118.66184202377 |
| TSF | 14 | -21.183011212897 | 118.66055456345 |
| TSF | 15 | -21.183251306283 | 118.65982500259 |
| TSF | 16 | -21.183211290745 | 118.65986791794 |
| TSF | 17 | -21.183251306283 | 118.65978208725 |
| Mine Expansion | 1 | -21.185848294063 | 118.67154089157 |
| Mine Expansion | 2 | -21.18508801036 | 118.67261377518 |
| Mine Expansion | 3 | -21.1840476158 | 118.67377248947 |
| Mine Expansion | 4 | -21.1840476158 | 118.67475954239 |
| Mine Expansion | 5 | -21.183367353859 | 118.67634741013 |
| Mine Expansion | 6 | -21.182727104467 | 118.67789236252 |
| Mine Expansion | 7 | -21.180166079176 | 118.67862192337 |
| Mine Expansion | 8 | -21.179085633327 | 118.67797819321 |
| Mine Expansion | 9 | -21.178285297979 | 118.67986646835 |
| Mine Expansion | 10 | -21.181966804713 | 118.68209806625 |
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| Mine Expansion | 15 | -21.189729676613 | 118.68853536789 |
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| Mine Expansion | 18 | -21.198412411363 | 118.68548837845 |

| Area | Point | Latitude | Longitude |
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| Mine Expansion | 20 | -21.206614521256 | 118.68656126206 |
| Mine Expansion | 21 | -21.207174649064 | 118.6832138652 |
| Mine Expansion | 22 | -21.206694539645 | 118.68231264298 |
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| Mine Expansion | 24 | -21.206934594549 | 118.6795231456 |
| Mine Expansion | 25 | -21.207174649064 | 118.67900816147 |
| Mine Expansion | 26 | -21.211055476225 | 118.67334333603 |
| Mine Expansion | 27 | -21.208374915782 | 118.67008176987 |
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| Mine Expansion | 29 | -21.205254202021 | 118.67081133072 |
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| Mine Expansion | 34 | -21.204614047457 | 118.67488828842 |
| Mine Expansion | 35 | -21.203573790372 | 118.67514578049 |
| Mine Expansion | 36 | -21.202813597869 | 118.67574659531 |
| Mine Expansion | 37 | -21.202213443129 | 118.67617574875 |
| Mine Expansion | 38 | -21.201693307048 | 118.67643324081 |
| Mine Expansion | 39 | -21.201053137049 | 118.67737737839 |
| Mine Expansion | 40 | -21.201533264808 | 118.67866483871 |
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| Mine Expansion | 43 | -21.199772793613 | 118.68123975937 |
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| Mine Expansion | 46 | -21.196611886182 | 118.68201223557 |
| Mine Expansion | 47 | -21.195651597113 | 118.68265596573 |
| Mine Expansion | 48 | -21.194051101462 | 118.68184057419 |
| Mine Expansion | 49 | -21.193530936642 | 118.6795231456 |
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| Mine Expansion | 64 | -21.185808274344 | 118.67780653183 |

| Area | Point | Latitude | Longitude |
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| Mine Expansion | 71 | -21.185768259499 | 118.67154089157 |
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| | | | |
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| Gas Pipeline | 4 | -21.171192966841 | 118.67482820392 |
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| Gas Pipeline | 19 | -21.16082773601 | 118.67493549228 |
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| Gas Pipeline | 21 | -21.158726587213 | 118.67317596316 |
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| Gas Pipeline | 34 | -21.060339481976 | 118.59644332766 |
| Gas Pipeline | 35 | -21.045781065073 | 118.58738819003 |
| Gas Pipeline | 36 | -21.033244066142 | 118.57942739367 |
| Gas Pipeline | 37 | -21.02028538834 | 118.57116618991 |

| Area | Point | Latitude | Longitude |
|---|---|---|---|
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| Gas Pipeline | 39 | -21.001015534778 | 118.55887094378 |
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| Gas Pipeline | 46 | -20.927398638559 | 118.51490417361 |
| Gas Pipeline | 47 | -20.918680032051 | 118.51009765505 |
| Gas Pipeline | 48 | -20.916635595739 | 118.5089818561 |
| Gas Pipeline | 49 | -20.913147963566 | 118.50668588519 |
| Gas Pipeline | 50 | -20.912045534222 | 118.50597778201 |
| Gas Pipeline | 51 | -20.898855842013 | 118.49660077929 |
| Gas Pipeline | 52 | -20.882577602329 | 118.48475614428 |
| Gas Pipeline | 53 | -20.866217396597 | 118.47263255953 |
| Gas Pipeline | 54 | -20.859781092223 | 118.46786895632 |
| Gas Pipeline | 55 | -20.853023678704 | 118.46293369173 |
| Gas Pipeline | 56 | -20.849013200714 | 118.45990815997 |
| Gas Pipeline | 57 | -20.84273658808 | 118.45546642184 |
| Gas Pipeline | 58 | -20.839106861945 | 118.4525696361 |
| Gas Pipeline | 59 | -20.835958354573 | 118.45038095354 |
| Gas Pipeline | 60 | -20.8344542673 | 118.44922223925 |
| Gas Pipeline | 61 | -20.832529013665 | 118.44787040591 |
| Gas Pipeline | 62 | -20.829961970525 | 118.4458748424 |
| Gas Pipeline | 63 | -20.823163105809 | 118.44117561221 |
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| Gas Pipeline | 65 | -20.800036647352 | 118.4263269031 |
| Gas Pipeline | 66 | -20.785152003072 | 118.4171644771 |
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| Gas Pipeline | 68 | -20.759070247116 | 118.40113559603 |
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| Gas Pipeline | 71 | -20.722086629563 | 118.37789693712 |
| Gas Pipeline | 72 | -20.71104798807 | 118.37113777041 |
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| Gas Pipeline | 82 | -20.562771480856 | 118.27897706865 |
| Gas Pipeline | 83 | -20.561907584339 | 118.28041473268 |

| Area | Point | Latitude | Longitude |
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| Gas Pipeline | 107 | -20.708358451751 | 118.37052622675 |
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| Gas Pipeline | 129 | -20.890436283243 | 118.4923199737 |

| Area | Point | Latitude | Longitude |
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| Area | Point | Latitude | Longitude |
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| Gas Pipeline | 186 | -21.157766052102 | 118.67883005976 |
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| Gas Pipeline | 188 | -21.158936703421 | 118.6806861484 |
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| Gas Pipeline | 201 | -21.16571029039 | 118.67601910471 |
| Gas Pipeline | 202 | -21.166010442166 | 118.6754504764 |
| Gas Pipeline | 203 | -21.166280578245 | 118.67531100153 |
| Gas Pipeline | 204 | -21.167020948673 | 118.67488184809 |
| Gas Pipeline | 205 | -21.168171516986 | 118.67450633883 |
| Gas Pipeline | 206 | -21.16847166377 | 118.67455998301 |
| Gas Pipeline | 207 | -21.168921882805 | 118.67478528856 |
| Gas Pipeline | 208 | -21.169782297593 | 118.67489257692 |
| Gas Pipeline | 209 | -21.170342564998 | 118.67512861132 |
| Gas Pipeline | 210 | -21.171152948026 | 118.67517152666 |
| Gas Pipeline | 211 | -21.171503112159 | 118.67512861132 |
| Gas Pipeline | 212 | -21.171963326615 | 118.67509642481 |
| Gas Pipeline | 213 | -21.172373516555 | 118.67527881502 |
| Gas Pipeline | 214 | -21.173033819921 | 118.6755684936 |
| Gas Pipeline | 215 | -21.173193893021 | 118.67505350946 |
| Gas Pipeline | 216 | -21.172663650215 | 118.67486039042 |
| Gas Pipeline | 217 | -21.172633636415 | 118.67497840761 |

**1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland).**

The mine site envelope associated with the proposed action is located approximately 80 km south east of Port Hedland within the Pilbara biogeographic region of Western Australia (Figure 1). The pipeline envelope associated with the proposed action extends north of the mine site envelope for approximately 80 km to the northwest. The northernmost extent of the pipeline envelope is approximately 42 km southwest of Port Hedland. The underlying tenure of the mine and gas pipeline is a combination of Crown Land and Vacant Crown Land. The proposed action is located on various tenements within Mineral Field 45:

L45/108;

L45/441;

L45/58;

M45/50;

M45/365;

M45/381;

M45/383;

M45/923;

M45/924;

M45/1252; and

G45/321.

The proposed action is not located within the vicinity of a World Heritage Property. The nearest World Heritage Property is the Ningaloo Coast located approximately 477 km southwest of the mine site envelope. The proposed action is not located within the vicinity of a National Heritage Place. The nearest National Heritage Place is Dampier Archipelago located approximately 217 km northwest of the mine site envelope. The proposed action is not located within the vicinity of a Ramsar wetland. The nearest Ramsar wetland is located approximately 171 km northwest of the mine site envelope.

**1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?**

The development envelope has a total area of 1913 ha, of which 560 ha is proposed to be

cleared

**1.7 Is the proposed action a street address or lot?**

Lot

**1.7.2 Describe the lot number and title.**Not applicable, see mining tenements

**1.8 Primary Jurisdiction.**

Western Australia

**1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?**

No

**1.10 Is the proposed action subject to local government planning approval?**

No

**1.11 Provide an estimated start and estimated end date for the proposed action.**

Start date 06/2018

End date 06/2040

**1.12 Provide details of the context, planning framework and State and/or Local government requirements.**

Mineral Resources is proposing to expand the current operations at the Wodgina Lithium Mine Site (the Project), these expansions are subject to approval by the Department of Mines, Industry Regulation and Safety (DMIRS) under the WA Mining Act 1978. A Mining Proposal has been submitted to DMIRS under the same Act in order to proceed with the mining expansion activities. In order to obtain approval to clear native vegetation for the expansions, a Native Vegetation Clearing Permit (NVCP) is being sought from DMIRS under the WA Environmental Protection Act 1986 (EP Act). Once these State approvals have been obtained, Mineral Resources aim to commence clearing in mid 2018.

**1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders.**

Multiple heritage surveys have been undertaken across the tenements to identify suitable infrastructure areas and mine site development. Access Agreements have been negotiated with Native Title claimants with conditions agreed around land access, land use and survey/management requirements. Under the Land Access Agreement a Monitoring and Liaison

Committee meeting is held bi-yearly to discuss site development and future plans including required surveys and other requirements.

**1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project.**

Environmental impact assessment (EIA) of the mine and pipeline envelopes has been undertaken with respect to the ten clearing principles under Part V of the *Environment Protection Act 1986* (EP Act), as part of the Native Vegetation Clearing Permit application submitted to DMIRS on 16 April 2018. These areas will undergo further EIA as part of Mining Proposals to be submitted to DMIRS pursuant to the *Mining Act 1978* (WA).

**1.15 Is this action part of a staged development (or a component of a larger project)?**

No

**1.16 Is the proposed action related to other actions or proposals in the region?**

No

# Section 2 - Matters of National Environmental Significance

Describe the affected area and the likely impacts of the proposal, emphasising the relevant matters protected by the EPBC Act. Refer to relevant maps as appropriate. The interactive map tool can help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in your area of interest. Consideration of likely impacts should include both direct and indirect impacts.

Your assessment of likely impacts should consider whether a bioregional plan is relevant to your proposal. The following resources can assist you in your assessment of likely impacts:

• Profiles of relevant species/communities (where available), that will assist in the identification of whether there is likely to be a significant impact on them if the proposal proceeds;

• Significant Impact Guidelines 1.1 – Matters of National Environmental Significance;

• Significant Impact Guideline 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies.

**2.1 Is the proposed action likely to have ANY direct or indirect impact on the values of any World Heritage properties?**

No

**2.2 Is the proposed action likely to have ANY direct or indirect impact on the values of any National Heritage places?**

No

**2.3 Is the proposed action likely to have ANY direct or indirect impact on the ecological character of a Ramsar wetland?**

No

**2.4 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?**

Yes

**2.4.1 Impact table**

| Species | Impact |
|---|---|
| Northern Quoll (Dasyurus hallucatus) | The Northern Quoll (Dasyurus hallucatus) is a |

| Species | Impact |
| --- | --- |
| | Threatened fauna species listed as Endangered under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and Wildlife Conservation Act 1950 (WC Act). The species is a widely distributed marsupial endemic to Australia, individuals have a moderately large home range of 35 hectares (ha) and reproduce once per year. The Northern Quoll was once distributed across the Pilbara and Kimberley, which has since contracted to several disjunct populations (Cramer et al. 2016). The Northern Quoll occupies a variety of habitats across its current range, including eucalypt forest and woodland habitats associated with steep dissected rocky terrain, rainforest patches, vegetation along creeklines, around human settlement and beaches. Important factors in the landscape to the species include shallow soils, large cover of rocks including outcropping rock, proximity to permanent water and time since last fire. Northern Quoll dens occur in a wide range of situations including rock overhangs, tree hollows, tree logs, termite mounds and human dwellings (Woinarski et al. 2008). A Level 1 Vertebrate Fauna Survey and Targeted Northern Quoll survey was undertaken from 12 December to 17 December 2017 for the mine site expansion and TSF4. A Level 1 Vertebrate Fauna Survey and Targeted Northern Quoll survey was undertaken from 31 January to 6 February 2018 for the proposed gas pipeline envelope (Figures 4, 5, 6). Two quoll photos were obtained across 491 camera trap nights, three recent and 19 aged scats were collected across both targeted quoll surveys (360 Environmental 2018a;b). Three of the scats (all considered aged) and both quoll photos were obtained outside of the boundary for the proposed action. These results equate to a low density quoll population according to the EPBC Act Referral Guidelines for Northern Quolls (DoE 2016). Approximately 49.1 ha of Northern Quoll suitable habitat is within the development envelope in areas mapped as Major Drainage Line and Rocky Ironstone Ridge / Rocky |

| Species | Impact |
|---|---|
| | Ironstone Valley (Figure 4) (360 Environmental 2018a;b). This is all in the Mine Site Envelope and is likely to be cleared to facilitate the mine and pipeline expansion. The clearing of 49.1 ha of Northern Quoll habitat is not considered significant. Quolls prefer habitat to be continuous, however the suitable habitat within the development envelope is fragmented, and infrequently used as evidenced by camera trap and scat results. Based on aerial imagery, there appears to be a substantial area of continuous Rocky Ridge/Rocky Valley habitat to the west of the surveyed areas which would likely provide more suitable habitat for the Northern Quoll (360 Environmental 2018a;b). Although the Project involves the clearing of 49.1 ha of suitable Northern Quoll habitat, it is not likely to have a significant impact on the species due to the low density population, limited recent evidence of the species' presence and fragmented habitat within the development envelope. |
| Greater Bilby (Macrotis lagotis) | The Bilby (Macrotis lagotis) is listed as Vulnerable under the EPBC Act and WC Act. Prior to European settlement, the Bilby was found on over 70% of the Australian arid and semi-arid mainland. However, the species range has now declined northwards (Woinarski et al. 2014). Wild Bilby populations are now restricted predominately to the Tanami Desert, Northern Territory, the Great Sandy, Little Desert, Gibson Deserts, Pilbara and patches on the Dampier Peninsular in WA, and an outlying population between Boulia and Birdsville in south-west Queensland (Woinarski et al. 2014; Southgate 1990). The species occupies three major vegetation types; open tussock grassland on uplands and hills, mulga woodland / shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas (Southgate 1990), usually on landforms with level to low slope topography and light to medium soils (typically sandy for burrow excavation). The development envelope falls within the known distribution of the species. Approximately 2,140 ha of suitable habitat for |

| Species | Impact |
| --- | --- |
| | the Bilby was recorded within the wider surveyed areas, of which 290 ha is proposed to be cleared for the Project, representing only 13.6% of suitable habitat within the wider surveyed area (360 Environmental 2018a;b). Only two Bilby records were identified during the surveys (two scats within the pipeline envelope), this suggests the species has a low population density (Refer to 7a-g in the attached Pipeline and Borefield Flora and Fauna Survey Report). Suitable Bilby habitat was considered to be extensive and common within the surrounding area and on a regional scale. Clearing of 290 ha of Bilby habitat is not considered significant due to suitable habitat being well represented within the surrounding area and region, and the low population densities of the species (Figures 5a-g; Figure 6) (360 Environmental 2018a;b). |
| Pilbara Leaf Nosed Bat (Rhinonicteris aurantia [Pilbara Form]) | The Pilbara Leaf-nosed Bat (Rhinonicteris aurantia) is listed as Vulnerable under the EPBC Act and the WC Act. The species roosts in deep, warm humid caves or mines during the dry season and forages nearby. During the wet season, the species is more widespread and may not require caves for roosting (Menkhorst & Knight 2004). The development envelope falls within the known distribution of the species but no evidence of Pilbara Leaf-nosed Bats (PLNB) were recorded during either surveys (Figure 6). The surveys identified only one cave that could be potentially suitable for PLNB species, however the cave was not of a sufficient size to support roosting and they had a closed chamber, making it unsuitable for maternal roosting. Three other caves were identified during the surveys that were large enough for potential diurnal and nocturnal roosting, however unsuitable for maternal roosting due as the had single chambers. These caves are located approximately 47 km from TSF4, outside of the clearing area. Therefore, the PLNB are unlikely to depend on the habitat or caves within the wider surveyed areas for roosting. One old mine shaft was identified to provide potential roosting habitat |

| Species | Impact |
| --- | --- |
| | for the PLNB, however this mine shaft is located outside of the clearing area. It is likely that the PLNB species would occur within the development envelope for airborne foraging (360 Environmental 2018a;b). Two suitable PLNB habitats include the Major Drainage Line and the Rocky Ridge/Rocky Valley covering an area of 51 ha and 53.9 ha within the wider surveyed area, respectively (Figures 5a-g). It is proposed to only clear a maximum of 21.6 ha of the Major Drainage Line and the 37.7 ha of the Rocky Ridge/Rocky Valley habitats. Review of aerial imagery identifies the Rocky Ridge/Rocky Valley habitat extending for at least 10 km north and site of the mine site envelope, which is within the PLNB nightly flight range of 10 km (Woinarski et al. 2012). Given the above, it is unlikely that the proposed action would have significant impacts on the PLNB at a local or regional level (Figure 12). Additionally, as the species are likely to only use the development area for airborne foraging, clearing will not necessarily have a significant impact. |

**2.4.2 Do you consider this impact to be significant?**

No

**2.5 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed migratory species, or their habitat?**

Yes

**2.5.1 Impact table**

| Species | Impact |
| --- | --- |
| Fork-tailed Swift (Apus pacificus) | The Fork-tailed Swift is listed as Migratory/Marine under the EPBC Act and is a non-breeding visitor to all states and territories of Australia (Menkhorst et al. 2017). The Forktailed Swift is a summer migrant to Australia usually during the months of October-April. The species is an aerial bird which |

| Species | Impact |
|---|---|
| | forages high above the tree canopy and is often independent of terrestrial habitats (360 Environmental 2018b). The development envelope is not within the known distribution of the Fork-tailed Swift however, the species was recorded during the surveys within the northern extent of the pipeline envelope. The species is almost entirely airborne and does not depend upon terrestrial habitat. As such, clearing within the mine site envelope and along the pipeline is not considered to be significant for the Fork-tailed Swift. |
| Oriental Pratincole (Glareola maldivarum); Rednecked Stint (Calidris ruficollis); Wood Sandpiper (Tringa glareola); Common Greenshank (Tringa nebularia); and Marsh Sandpiper (Tringa stagnatilis). | These five fauna species are listed as Migratory/Marine under the EPBC Act. These species are likely to utilise the low-lying habitats, occurring within the pipeline envelope, after heavy rainfall resulting in ephemeral wet areas. As this suitable habitat is only temporarily available for these species and the pipeline itself will not require a large clearing footprint, it is unlikely that these species would be impacted by Project. Suitable habitat for these species extends beyond the surveyed area of the pipeline. Review of aerial imagery, hydrography data and topographical contours has identified the landscape surrounding the northern portion of the pipeline envelope is relatively low lying with some areas subject to inundation, and consist of major river (Turner and Yule Rivers) which would be more suitable for these species than the portion of habitat within the development envelope. The northern portion of the pipeline envelope is also approximately 27.76 km from the coastline which is also considered suitable habitat for these species. As such, as the surrounding landscape contains large areas of suitable habitat, it is not likely that clearing within the pipeline envelope would have a significant impact on these five species. |

**2.5.2 Do you consider this impact to be significant?**

No

**2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?**

No

**2.7 Is the proposed action to be taken on or near Commonwealth land?**

No

**2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?**

No

**2.9 Is the proposed action likely to have ANY direct or indirect impact on a water resource related to coal/gas/mining?**

No

**2.10 Is the proposed action a nuclear action?**

No

**2.11 Is the proposed action to be taken by the Commonwealth agency?**

No

**2.12 Is the proposed action to be undertaken in a Commonwealth Heritage Place Overseas?**

No

**2.13 Is the proposed action likely to have ANY direct or indirect impact on any part of the environment in the Commonwealth marine area?**

No

# Section 3 - Description of the project area

Provide a description of the project area and the affected area, including information about the following features (where relevant to the project area and/or affected area, and to the extent not otherwise addressed in Section 2).

**3.1 Describe the flora and fauna relevant to the project area.**

**FLORA**

A likelihood assessment was undertaken to determine the flora species that are 'Likely', ' Possible' and 'Unlikely' to occur within the development envelope. The assessment was carried out through analysis of desktop searches of nearby recordes of conservation significant species and regional soil characteristics. The likelihood assessment identified 44 conservation significant flora taxa potentially occcurring within the vicinity of the development envelope (Appendix G of the two attached 360 Environmental Flora and Fauna Survey reports). No conservation significant flora protected under the EPBC Act were identified in the database searches and therefore none were included in the likelihood assessment. As such, it is not likely that any flora of conservation significance protected under the EPBC Act would occur within the development envelope. Two Level 2 Flora and Vegetation Surveys were undertaken for the development envelope by 360 Environmental in December 2017 and between January and February 2018. A total of 56 flora from 34 genera and 18 families were identified within the surveyed areas (360 Environmental 2018a). No Threatened flora species pursuant to the EPBC Act and/or gazetted as Threatened/Declared Rare Flora pursuant to the (WA) *Wildlife Conservation Act 1950* (WC Act) were recorded during the surveys (360 Environmental 2018a;b). Although no conservation significant flora protected under the EPBC Act were identified during the surveys, the surveys were conducted outside of the recommended flora survey period for the Eremaean province. Although the surveys were undertaken outside the optimum survey period, no flora species protected under the EPBC Act were identified in the database searches.

Five surveys were previously undertaken for the local area, none of these identified any flora species of conservation significance pursuant to the EPBC Act (Figure 3)

- Interim Report on the Flora and Vegetation of the Cassiterite Pit Extension and EWL Extension: Western Botanical for Rapallo Group Pty Ltd and Mineral Resources Ltd, December 2017;

- Proposed Wodgina Lateral Natural Gas Pipeline Flora, Vegetation and Fauna Survey, Woodman Environmental Consulting Pty Ltd for Epic Energy, May 2001;

- Wodgina DSO Project, Flora and Vegetation Assessment, Outback Ecology Services for Atlas Iron Limited, October 2009;

- Hercules DSO Project, Flora and Vegetation Studies for the Hercules Project, Woodman Environmental Consulting Pty Ltd for Atlas Iron Limited, November 2002; and

- Hercules DSO Project, Conservation Significant Flora Assessment, Woodman Consulting Pty Ltd for Atlas Iron Limited, March 2013.

It is not likely that any Threatened flora pursuant to the EPBC Act would occur within the development envelope or surrounding area due to the lack of recordings in seven surveys undertaken to date.

Note that approximately 3.5 ha of the pipeline envelope were not surveyed due to an engineering change that occurred after the surveys were completed. This 3.5 ha is the southern most extent of the pipeline envelope and is comprised of cleared land and grassland, and is representative of vegetetation, flora and fauna habitat immediately adjacent (Figure 2; Figure 5g).

**INTRODUCED FLORA**

During the surveys, a total of four introduced flora taxa were recorded within the development envelope, with one of these (**Calotropis procera*) Declared under the Biosecurity and Agriculture Management Act 2007 (BAM Act) and listed as a Weed of National Significance (WONS):

- **Cenchrus ciliaris*;

- **Calotropis procera*;

- **Passiflora foetida var. hispida*; and

- **Aerva javanica.*

Weed diversity was considered low and the weeds were mostly occurring within areas of larger drainage lines. The weed species were not widespread or dominating within the surveyed areas, mostly limited to areas that have been previously disturbed (360 Environmental 2018a;b).

**FAUNA**

Desktop searches of the DEE's Protected Matters Search Tool (PMST), the Department of Biodiversity Conservation and Attractions (DBCA)'s NatureMap database and Threatened Fauna database requests in addition to the review of previous surveys have identified a number of conservation significant fauna species as potentially occurring within the vicinity of the development envelope (360 Environmental 2018a;b). A likelihood assessment of the database searches identified 11 MNES fauna species as having a high or medium likelihood of occurrence due to the presence of suitable habitat within the development envelope and the area within the species' known distributions:

- Northern Quoll (*Dasyurus hallucatus*) - Endangered;

- Pilbara Olive Python (*Liasis olivaceus barroni*) - Vulnerable;

- Spotted Nightjar (*Eurostopodus ar*gus) - Marine;

- Ghost Bat (*Macroderma gigas*) - Vulnerable;

- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) - Vulnerable;

- Bilby (*Macrotis lagotis*) - Vulnerable;

- Oriental Pratincole (*Glareola maldivarum*) - Migratory/Marine;

- Red-necked Stint (*Calidris ruficollis*) - Migratory/Marine;

- Wood Sandpiper (*Tringa glareola*) - Migratory/Marine;

- Common Greenshank (*Tringa nebularia*) - Migratory/Marine; and

- Marsh Sandpiper (*Tringa stagnatilis*) - Migratory/Marine (360 Environmental 2018a;b).

15 conservation significant fauna species protected under the EPBC Act were considered to have a low likelihood of occurrence within the development envelope (360 Environmental 2018a;b). During the Level 1 Vertebrate Fauna Surveys and the Targeted Northern Quoll surveys within the development envelope, the following conservation significant fauna species pursuant to the EPBC Act were recorded:

- Spotted Nightjar;

- Fork-tailed Swift (*Apus pacificus*);

- Rainbow Bee-eater (*Merops ornatus*); and

- Nothern Quoll.

Although the Rainbow Bee-eater and Spotted Nightjar were recorded during the surveys, the development envelope contains no suitable habitat for the species and is therefore omitted from further discussion (360 Environmental 2018a;b).

**FAUNA HABITATS**

A total of seven broad fauna habitats were identified and mapped during the surveys and comprised of the following (Figures 5a-g):

- Grassland - Hills, midslopes, upperslopes and ridges over rock (150.8 ha);

- Grassland - Footslopes, low rises, undulating plain over rock (327.9 ha);

- Grassland - Flat plain on sand (1,904 ha);

- Low Woodland/Shrubland - Eucalyptus and Acacia over Triodia grassland (236 ha);

- Low lying Habitat with ephemeral wet areas (83.2 ha);

- Major drainage line (55.7 ha); and

- Rocky Ironstone Ridge/ Rocky Ironstone Valley (53.4 ha) (Figures 5a-g) (360 Environmental 2018a;b).

Some areas within the mine site were not surveyed for fauna or fauna habitats as it was very steep and as such, some broad fauna habitats have been extrapolated out for these areas based on aerial imagery and the knowledge of the Zoologist from the site visit (360 Environmental 2018a;b). Two fauna habitat types (Low Woodland/Shrubland - Eucalyptus and Acacia over Triodia grassland and Low lying Habitat with ephemeral wet areas) are located outside of the proposed clearing areas.

**The Northern Quoll**

Two Targeted Northern Quoll Surveys were undertaken for the development envelope by 360 Environmental in December 2017 and between January and February 2018. The surveys covered the mine site envelope, pipeline envelope and other surrounding areas. The surveys identified a total of 49.1 ha of Northern Quoll habitat within the mine site envelope, mainly occurring within the Major Drainage Line and Rocky Ironstone Ridge/Rocky Ironstone Valley fauna habitats. (360 Environmental 2018a;b) (Figures 5a-g). Two quoll photos were obtained across 491 camera trap nights as well as three recent and 19 aged scats collected across both targeted quoll surveys (360 Environmental 2018a;b). Three of the scats (all considered aged) and both quoll photos were obtained outside of the boundary for the proposed action. These results equate to a low density quoll population according to the EPBC Act Referral Guidelines for Northern Quolls (DoE 2016).

**3.2 Describe the hydrology relevant to the project area (including water flows).**

**SURFACE WATER**

There are no mapped wetlands within the development envelope (DoE 2008; DPaW 2016). A review of available spatial data has identified that no major surface water features intersect the minesite. The nearest watercourse is Turner River West, a major tributary of Turner River that is located within 0.55 km to the west of the northern-most portion of the minesite envelope. The Yule River flows parallel to the Turner River and is located approximately 19 km west of the development envelope (DoW 2014) (Figure 7). The proposed pipeline route runs parallel in between Turner and Yule Rivers. The closest distance between the proposed pipeline envelope and the rivers is the northernmost portion  located approximately 2.7 km east of the Yule River (Figure 7). The Yule River is the longest and largest river in the Port Hedland Coast Basin and is ephemeral in nature, indicating the erratic nature of rainfall and flows only after heavy rain

(WRC 2000).

No riparian vegetation will be cleared as part of the Project, nor will the project interface with the bed or banks of a watercourse.

**GROUNDWATER**

The groundwater within the mining envelope and southern-most 30 km of the pipeline envelope is considered Fresh with salinity ranging between 500 - 1,000 mg/L of Total Dissolved Solids (TDS). The remaining northernmost 50 km of the pipeline envelope is considered Fresh-Brackish with salinity ranging between 1,000 to 3,000 mg/L TDS (DoW 2010).

**Public Drinking Water Source Area**

The northernmost portion of the pipeline envelope (~13 km) is located within a Priority 1 Public Drinking Water Source Area (P1 PDWSA) - Yule River Reserve which supports the Port Hedland Regional water supply (Figure 7). P1 PDWSAs are defined to ensure that there is no degradation of the water source the main objective of these areas is risk avoidance (DoW 2016a). P1 areas are declared over land where the provision of the highest quality drinking water is the prime beneficial land use (WRC 2000). The water table in the vicinity of the Yule River wellfield lies approximately 4 to 10 m below ground level (mbgl) (WRC 2000). Most of the recharge to the alluvial aquifer occurs through the river bed sands when the river is in flood, where river water rapidly infiltrates beneath the river bed and then more slowly flows away (Water Corporation 1996). According to the (then) Department of Water (DoW)'s Water Quality Protection Note 25 - Land use compatability table, a 'Gas Pipeline (bulk supply)' is a compatible activity (with conditions) (DoW 2016b). An 'Application for Pipeline Licence' under the Petroleum Pipelines Act 1969 has been lodged with the Department of Mines, Industry and Safety (DMIRS) Petroleum Division to support the additional gas pipeline. The Department of Water and Environmental Regulation (DWER) have been consulted and any potential impacts to groundwater will be addressed via the DMIRS process.

**3.3 Describe the soil and vegetation characteristics relevant to the project area.**

**SOILS**

Soil Landscapes and Land Systems mapping has identified six land systems within the development envelope (Figure 8):

- Capricorn System: Rugged sandstone hills, ridges, stony footslopes and interfluves supporting low acacia shrublands or hard spinifex grasslands with scattered shrubs;

- Platform System: Dissected slopes and raised plains supporting shrubbby hard spinifex grasslands;

- Uaroo System: Broad sandy plains, pebbly plains and drainage tracts supporting hard and soft spinifex hummock grasslands with scattered acacia shrubs;

- Boolgeeda System: Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands;

- Ruth System: Hills and ridges of volcanic and other rocks supporting shrubby hard spinifex and occassionally soft spinifex or grasslands; and

- Mallina System: Sandy surfaces alluvial plains supporting soft spinifex grasslands and minor hard spinifex and tussock grasslands (DAFWA 2012).

These land systems are mostly characteristic of the Pilbara region. Soil salinity is variable in the Pilbara region and is dependent upon land unit location, however, many deep clays tend to have weakly saline subsoils (Van Vreeswyk et al. 2004).

**VEGETATION**

Mapping of the pre-European vegetation extents within the Pilbara region of WA was completed on a broad scale (1:1,000,000) by Beard (1975). These vegetation types were later re-assessed by Shepherd et al. (2001) to account for clearing in intensive land use zones, dividing some larger vegetation units into smaller units. Five broad vegetation types have been identified for the development envelope (Figure 9):

- Abydos Plain - Chichester 93: Hummock grasslands, shrub steppe; kanji over soft spinifex;

- Abydos Plain - Chichester 626: Hummock grasslands, shrub-steppe, kanji over soft spinifex and Triodia brizioides;

- Abydos Plain 93: Hummock grasslands, shrub steppe; kanji over soft spinifex;

- Abydos Plain 647: Hummock grasslands, dwarf-shrub steppe; Acacia translucens over soft spinifex; and

- Abydos Plain 589: Mosaic. Short bunch grassland - savanna / grass plain (Pilbara) / Hummock grasslands, grass steppe, soft spinifex (Shepherd et al. 2001).

The following vegetation associations were identified and mapped within the surveyed areas (360 Environmental 2018a;b) (Refer to the figures in the attached 360 Environmental Flora, Vegetation and Fauna Survey reports).

- 1.1 - Hills, mid slopes, upper slopes and ridges: Eucalyptus spp. low isolated clumps of trees over G*revillea wickhamii subsp. hispidula, Hakea lorea subsp. lorea, Acacia acradenia* low isolated shrubs over *Triodia wiseana* low tussock grassland;

- 1.2 - Hills, mid sloeps, upper slopes and ridges : *Eucalyptus ?leucophloia* low isolated trees over *Gossypium australe, Acacia pyrifolia, Senna glutinosa subsp. glutinosa* mid isolated clumps of shrubs over *Triodia epaotia, *Cenohrus oiliaris, Themeda sp. Mt Barricade* low tussock grassland;

- 2 - Hill footslopes, low rises, undulating plains: *Acacia spp. Grevillea wickhamii subsp. hispidula* tall isolated shrubs over *Ptilotus oalostaohyus, Solanum lasiphyllum* low isolated shrubs over *Triodia epaotia* low tussock grassland;

- 3.1 - Major Drainage Lines: *Eucalyptus spp*. low isolated trees over *Acacia tumida var. pilbarensis* tall isolated clumps of shrubs over *Acacia bivenosa, Acacia pyrifolia* low isolated shrubs over *Triodia wiseana* low open tussock grassland;

- 3.2 - Major Drainage Lines: *Corymbia hamersleyana* low woodland over *Acacia tumida var.pilbarensis*, *Grevillea wickhamii subsp. hispidula* tall closed shrubland over *Acacia pyrifolia, Acacia acradenia* mid isolated clumps of shrubs over *Triodia wiseana* isolated clumps of tussock grassland;

- 3.3 - Major Drainage Lines: *Melaleuca argentea* low open forest over *Pluchea rubelliflora, Cyperus vaginatus* low open grassland;

- 4.1 - Flat Plains: *Corymbia zygophylla, Corymbia hamersleyana* low isolated trees over A*cacia pyrifolia, Grevillea wickhamii subsp. hispidula, Hakea lorea subsp. lorea* tall sparse shrubland over *Ptilotus calostachyus*, *Pluchea ferdinandi-muelleri* mid isolated shrubs over *Acacia ancistrocarpa, Acacia stellaticeps, Acacia sphaerostachya* low open isolated clumps of shrubs over *Triodia epactia* low tussock grassland;

- 4.2 - Flat Plains: *Corymbia hamersleyana* low woodland over Acacia pyrifolia, A. ancistrocarpa, Petalostylis labicheoides tall sparse shrubland over *Triodia ?brizoides, Triodia epactia* low closed tussock grassland;

- AiTe: Acacia inaequilatera, *A. orthocarpa* tall isolated clumps of trees over *Triodia epactia, T. brizoides* mid tussock grassland;

- AmTe: *Acacia maitlandii* mid isolated clumps of shrubs over *Triodia epactia* tussock grassland;

- AaAbTe: *Acacia ancistrocarpa*, *A. bivenosa* mid sparse shrubland over *Triodia epactia* tussock grassland;

- AiGwTe: *Acacia inaequilatera*, *Grevillea wickhamii* tall sparse shrubland over *A. ancistrocarpa, A. bivenosa* mid isolated clumos of shrubs over *Triodia epactia* tussock grassland;

- CzAspp.Te: *Corymbia zygophylla* low isolated clumps of trees over *Acacia tumida var. pilbariensis*, *A. acradenia* mid sparse shrubland over *A. ancistrocarpa, A.stellaticeps* low sparse shrubland over *Triodia epactia* mid tussock grassland;

- CzAtTe: *Corymbia zygophylla* low isolated clumps of trees over *Acacia trachycarpa, Hakea lorea* mid sparse shrubland over *A. inaequilatera* low isolated clumps of shrubs over *Triodia epactia* tussock grassland;

- ChAtTe: *Corymbia hamersleyana* low isolated trees over *Acacia tumida var. pilbariensis, A. ancistrocarpa, Grevillea wickhamii* tall sparse shrubland over *A. maitlandii* mid isolated shrubs

over *Triodia epactia* tussock grassland;

- ChAiTb: *Corymbia hamersleyana* low isolated trees over *Acacia inaequilatera, A. sericophylla,* tall isolated clumps of shrubs over *Grevillea wickhamii, Sida arenicola* mid isolated shrubs over A*. acradenia, A. stellaticeps* low isolated shrubs over *Triodia epactia* tussock grassland;

- ChAtMnTe: *Corymbia hamersleyana* low isolated trees over *Acacia tumida var. pilbariensis, Mallotus nesophilus, Grevillea wickhamii* mid sparse shrubland over *Hibiscus stuartii var. campylochlamys* low isolated shrubs over *Triodia epactia* open tussock grassland;

- AiGaTsTe: *Acacia inaequilatera, Gossypium australe, Tephrosia virens* mid isolated clumps of shrubs over *Senna glaucifolia, Tribulus su*berosus low isolated shrubs over Triodia *epactia* low open tussock grassland;

- EvChCc: *Eucalyptus victrix* mid woodland over *Corymbia hamersleyana* low isolated trees over *Acacia tumida var. pilb*ariensis mid isolated shrubs over *Triodia epactia* mid tussock grassland;

- CcAiMlTe: *Corymbia candida ?subsp. lautifolia* low isolated clumps of trees over *Acacia inaequilatera, Melaleuca lasiandra* mid isolated clumps of shrubs over *A. stellaticeps* low open shrubland over *Triodia epactia* mid tussock grassland;

- CcAiTe: *Corymbia candida ?subsp. lautifolia* low woodland over *Carissa lanceolata, Acacia inaequilatera* mid isolated shrubs over *Corchorus laniflorus, Indigofera linnaei, Bonamia linearis, Trigastrotheca molluginea* low isolated shrubs over *Triodia epactia, *Cenchrus ciliaris, Eragrostis desertorum* mid closed grassland clay pan;

- TsCP: *Neptunia dimorphantha, Rhynchosia minima* low isolated shrubs over *Triodia secunda, Dactyloctenium radulans, Eriachne glauca var. glauca* low open grassland

- MlAiTe: *Melaleuca lasiandra* low isolated clumps of trees over *Acacia inaqeuilatera* tall isolated shrubs over *A. stellaticeps, Corchorus parviflorus* low sparse shrubland over *Triodia epactia* tussock grassland; and

- AhAiTe: *Atalaya hemiglauca* low Isolated clumps of trees over *Acacia inaequilatera* tall isolated clumps of shrubs over *Carissa lanceolata* mid isolated shrubs over *Corchorus laniflorus* low isoalted shrubs over *Triodia epactia, Eragrostis desertorum, *Cenchrus ciliaris* mid open grassland.

**Threatened Ecological Communities**

Results from the DBCA Threatened and Priority Ecological Communities (TEC and PEC) database and the PMST report did not identify any known occurrences of any TECs or PECs in the surveyed areas or within the surrounding 30 km radius buffer (20 km buffer search for the pipeline envelope) (360 Environmental 2018a;b). None of the vegetation communities identified

during the surveyes represent a TEC or PEC (360 Environmental 2018a;b).

**3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area.**

There are no conservation areas within or nearby the development envelope. The nearest conservation estate is the Mungaroona Range Wildlife Sanctuary located in excess of 52 km southwest of the development envelope (DBCA 2017). Environmentally Sensitive Areas (ESAs) are identified and protected under the Environmental Protection (Environmentally Sensitive Areas) Notice 2005. Under the Notice it is an offence to kill or destroy vegetation within an ESA without a Native Vegetation Clearing Permit (NVCP). Mapping undertaken by the (then) Department of Environment Regulation (DER) has identified the development envelope is not within the extent of or nearby an ESA (DWER 2018).

**3.5 Describe the status of native vegetation relevant to the project area.**

**VEGETATION CONDITION**

The vegetation condition within the surveyed areas ranged from Excellent to Completely Degraded, with majority of the vegetation in Very Good condition (Figures 10a-l):

- Excellent (135 ha)

- Very Good (2,200 ha);

- Good (349.21 ha);

- Poor (25.41 ha);

- Degraded (5.64 ha); and

- Completely Degraded (37.43) (360 Environmental 2018a;b).

**3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.**

The topography of the entire development envelope is highly variable, ranging between 25 m Australian Height Datum (AHD) in the northern end of the pipeline envelope to 300 m AHD at the mine site envelope, increasing from northwest to southeast over a distance of approximately 82 km.

**3.7 Describe the current condition of the environment relevant to the project area.**

The 18 vegetation associations identified across the surveyed areas are considered to be representative of the region. The vegetation associations with the greatest extent was the *Corymbia hamersleyana* with *Acacia inaquilatera* and *Triodia grasslands*, and the *Corymbia zygophylla* with *Acacia spp.* and *Triodia* grasslands (360 Environmental 2018a;b). Overall the majority of the development envelope was considered to be in Very Good condition (Figures 10a-l). However, several impacts are evident from current mining activities and associated dust, cleared areas and rehabilitated areas, localised areas of recent fires and grazing impacts from cattle and wild horses (360 Environmental 2018a;b).

**3.8 Describe any Commonwealth Heritage Places or other places recognised as having heritage values relevant to the project area.**

There are no World, Commonwealth or State Heritage Places within or in the vicinity of the development envelope (DEE 2018; SHO 2018).

**3.9 Describe any Indigenous heritage values relevant to the project area.**

**Aboriginal Heritage**

In Western Australia, the Aboriginal Heritage Act 1972 protects places and objects customarily used by or traditional to the original habitants of Australia. A register of such places and objects is maintained under the Act, however all sites are protected under the Act whether they are Registered or not (DPLH 2018). Several Registered and Aboriginal Heritage places are located across the pipeline envelope and the mine site envelope. The location of the pipeline will be designed to avoid Aboriginal heritage places and the Department of Planning, Lands and Heritage (DPLH) will be consulted. The Aboriginal Heritage places extending over the mine site envelope are not likely to be a significant impact for the proposed mine expansion, due to the existing Mine located within portions of these mapped places (Figures 11a-b).

**3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area.**

The underlying tenure of the mine and gas pipeline is a variation of Crown Land and Vacant Crown Land. The Project is located across various tenements within Mineral Field 45 and the status and ownership of the tenements are presented in the attached Tenements document. A Native Title Claim occurs over the Project area. The Claim was lodged by the Kariyarra People and a Native Title Agreement (Land Access Agreement) has been signed between Mineral Resources and the Kariyarra People and a Native Title Agreement (Land Access Agreement) has been signed between Mineral Resources and the Kariyarra People.

**3.11 Describe any existing or any proposed uses relevant to the project area.**

Land use surrounding Wodgina comprises iron ore prospecting, exploration and mining,

pastoral grazing and, to a lesser extent, tourism.

The project tenements all intersect prospecting, exploration and mining leases held by Global Advanced Metalds and other companies.

The Project overlies the Kangan pastoral lease which is owned and run by the Yandeyarra Community, located approximately 27 km southwest of the Proposal. The Kangan lease is bordered by the Wallareenya and Indee pastoral leases.

# Section 4 - Measures to avoid or reduce impacts

Provide a description of measures that will be implemented to avoid, reduce, manage or offset any relevant impacts of the action. Include, if appropriate, any relevant reports or technical advice relating to the feasibility and effectiveness of the proposed measures.

Examples of relevant measures to avoid or reduce impacts may include the timing of works, avoidance of important habitat, specific design measures, or adoption of specific work practices.

**4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action.**

The development envelope covers a combined total area of 1,913 ha for the pipeline and mine site envelopes. The pipeline envelope covers an area of 1,593 ha, within which the pipeline will be located with a total area of 240 ha. The mine site envelope covers an area of 320 ha which will be cleared. Approximately 560 ha of vegetation will be cleared to support the Project, representing 29% of the vegetation within the development envelope.

**Clearing:**

- Prior to clearing activities, areas of vegetation to be cleared and retained will be clearly demarcated and all site personnel will be made aware of the requirement to protect native vegetation and minimise clearing to within approved limits;

- Staged clearing outside of the breeding period for conservation significant fauna species will be conducted, where possible;

- No dead standing or fallen timber should be removed unnecessarily. Logs and other debris (with the exception of weeds) resulting from land clearing should be placed in nearby vegetated areas to enhance the surrounding fauna habitat;

- Prior to clearing, any conservation significant fauna present will be removed and relocated by authorised personnel;

- Vegetation clearing will be scheduled to occur as close as possible before planned earthworks to minimise the potential for dust, where practicable;

- Disturbed areas and haul roads within the mine site will be treated with dust suppressants, especially on high risk days/areas;

- A water truck will be available to dampen haul roads and disturbed areas; and

- Semi-permanent dust control treatments will be implemented on stockpiles that are left for

longer than one month.

**Native Fauna:**

- All contractors and site personnel involves in clearing activities will be inducted on the potential impacts to fauna and advised to stop works immediately within the vicinity of any injured or shocked animals that are encountered. They will be instructed to contact the relevant environmental staff in this event; and

- Appropriate speed limits will be set, signposted and adhered to on all site access roads to avoid native fauna strike. Speed restrictions will apply at dusk/dawn where there is a high risk of fauna/vehicle collision;

**Feral Fauna:**

- Domestic animals or pets will not be permitted on site; and

- Rubbish and food waste will be stored in bins that are not easily accessible for fauna, such as dingos (if present).

**Weed Control:**

- Weed control will be undertaken by appropriately trained operators prior to revegetation.

**4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved.**

**Northern Quoll:** Listed as Endangered under the EPBC Act. Approximately 49.1 ha of suitable habitat is proposed to be cleared.

**Greater Bilby:** Listed as Vulnerable under the EPBC Act. Approximately 290 ha of suitable habitat is proposed to be cleared.

**PLNB:** listed as Vulnerable under the EPBC Act. Approximately 64.2 ha of suitable habitat is proposed to be cleared.

The suitable fauna habitats for the Northern Quoll, Greater Bilby and PLNB are considered to be extensive and common outside of the development envelope, within the surrounding landscape and on a regional scale. Adequate management measures, such as staged clearing and staged rehabilitation, would be implemented to reduce the potential impacts to these conservation significant fauna species.

# Section 5 – Conclusion on the likelihood of significant impacts

A checkbox tick identifies each of the matters of National Environmental Significance you identified in section 2 of this application as likely to be a significant impact.

Review the matters you have identified below. If a matter ticked below has been incorrectly identified you will need to return to Section 2 to edit.

### 5.1.1 World Heritage Properties

No

### 5.1.2 National Heritage Places

No

### 5.1.3 Wetlands of International Importance (declared Ramsar Wetlands)

No

### 5.1.4 Listed threatened species or any threatened ecological community

No

### 5.1.5 Listed migratory species

No

### 5.1.6 Commonwealth marine environment

No

### 5.1.7 Protection of the environment from actions involving Commonwealth land

No

### 5.1.8 Great Barrier Reef Marine Park

No

### 5.1.9 A water resource, in relation to coal/gas/mining

No

### 5.1.10 Protection of the environment from nuclear actions

No

### 5.1.11 Protection of the environment from Commonwealth actions

No

### 5.1.12 Commonwealth Heritage places overseas

No

### 5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action.

**Lead to a long-term decrease in the size of a population**

*Northern Quoll*

The development envelope contains 49.1 ha of suitable habitat for the Northern Quoll species to be cleared.

The expansion of the mine and the construction of the gas pipeline will result in clearing of up to 49.1 ha of this habitat occurring within the Major Drainage Line and Rocky Ironstone Ridge/Rocky Ironstone Valley fauna habitat in mostly ‘Very Good’ and ‘Good’ condition. Suitable habitat for the species is not isolated to the development envelope, whereby the Rocky Habitat appears extensive and continuous throughout the region. The wider habitat within the region is more likely to support greater Northern Quoll population densities than the habitat within the development envelope due the extensive area of habitat, high connectivity and lack of proposed mining activities.

It is not considered that the Northern Quoll populations within the surveyed areas are large or of a ‘High’ density. In addition, only three of the Quoll scats recorded during the surveys were considered recent, suggesting the species have not frequently utilised the area for a number of months.

It is not likely that the expansion of the already existing mine site and the construction of a gas pipeline would have a significant impact on the habitat available that would lead to a long term decrease in the size of the Northern Quoll population in the area. Extensive suitable habitat within the region and low evidence of recent Quoll activity within the development envelope suggests that a population would not be subject to a long-term decrease in size.

*Bilby*

Surveys undertaken to date have identified a total of 2,223 ha of suitable habitat for the Bilby within the surveyed areas. Approximately 222 ha of suitable habitat is proposed to be cleared

as part of the Project. Suitable habitat for the Bilby was identified as the Grassland – Flat plain on sand with Low Eucalyptus woodland and Low Woodland/Shrubland – Eucalyptus and Acacia over Triodia Grassland fauna habitats, which occur along the Pipeline envelope. These habitats are considered well-represented within the development envelope and regionally. The species was recorded within the development envelope during the surveys but considered to have low population densities. Locally, it is expected that the Project would have an impact on any individuals that inhabit the proposed clearing areas; however, due to low population densities and extensive suitable habitat with the surrounding region it is unlikely that the Project would lead to a long-term decrease in the size of a population of Bilby regionally.

*Pilbara Leaf-nosed Bat*

The development envelope contains a total of 109.1 ha of suitable habitat for the Pilbara Leafnosed Bat (PLNB), of which, 19.4 ha will be cleared as part of the Project. The surveys identified four caves that were potentially large enough to be used by the PLNB and other bats for diurnal or nocturnal roosting, but unlikely suitable for maternal roosting. Three of the four caves are located outside of the clearing areas and one cave that was not big enough for utilisation by the PLNB is within the clearing area.

No evidence of the PLNB was recorded during the surveys, but the species is considered highly likely to occur within the development envelope for airborne foraging. The nearest confirmed known dirunal roost is located at Lalla Rookh, approximately 58 km northeast of the mine site envelope (DoE 2016a). The habitat suitable for the PLNB is considered extensive within the region (DoE 2016a). As such, it is considered highly unlikely that the Project would produce significant impacts to the species at a local or regional level.

*Fork-tailed Swift and other Migratory/Marine species*

The Fork-tailed Swift was recorded during the surveys within the northern extent of the pipeline envelope. However, the species is migratory and almost entirely airborne; the species does not depend significantly on terrestrial habitat. It is unlikely that the Project would lead to a long-term reduction in a population of the Fork-tailed Swift due to its high mobility, extensive home range and lack of dependence on terrestrial habitats. The Oriental Pratincole, Red-necked Stint, Wood Sandpiper, Common Greenshank and Marsh Sandpiper were considered likely to utilise the low-lying habitats within the pipeline envelope after heavy rainfall resulting in ephemeral wet areas. Suitable wet habitat is only temporarily available for these species and as such, the clearing within the pipeline envelope would not lead to a long term decline in size of a population.

**Reduce the area of occupancy of the species**

It is unlikely the Project would significantly reduce the area of occupancy for the Northern Quoll, Bilby, PLNB and migratory/marine species. Although the areas to be cleared contain suitable habitat for the species', the habitats identified during the surveys are considered extensive and common within the wider region.

Scat evidence of Northern Quolls suggests the species may not be utilising the development envelope regularly or recently, and as such, it is highly likely the species utilise a wider habitat

outside the development envelope.

Suitable Bilby habitat proposed to be cleared represents 13.6% of suitable habitat surveyed within the wider area. This suggests, in addition to aerial imagery review, that suitable habitat for the species is widespread and common within the region. The clearing for the Project is not expected to have a significant reduction in the area of occupancy of the Bilby in a regional context.

The PLNB was considered highly likely to occur within the development envelope due to suitable habitat for airborne foraging. Suitable habitat identified for the species is considered extensive within the region and unlikely to reduce the area of occupancy on a regional scale. The Rocky Ridge/Rocky Valley habitat occurs in small patches throughout the landscape while the Major Drainage Line is continuous within the landscape associated with watercourses. The width of habitat to be cleared is up to approximately 50 km in width however nearby patches of the habitat is available for the species.

The Fork-tailed Swift and the other Migratory/Marine species (Oriental Pratincole, Red-necked Stint, Wood Sandpiper, Common Greenshank and Marsh Sandpiper) are considered to have dependence upon rainfall to utilise the low lying areas within the development envelope. As the Fork-tailed Swift is not dependent upon terrestrial habitats and the other Migratory/Marine species habitat within the development envelope are considered temporary (ephemeral wet areas), it is not considered likely that the Project would reduce the area of occupancy of the species'. These species are migratory and have extensive habitats. The Fork-tailed Swift forages above the tree canopy while the other Migratory/Marine species are waterbirds that are dependent upon submerged areas for foraging and feeding. There are no permanently submerged areas within the mine site envelope and the gas pipeline is not likely to have a significant impact to the wide range of this habitat type closer to the coast.

**Fragment an existing population into two or more populations**

It is not likely that the Project would fragment existing populations of the Northern Quoll, Bilby, PLNB into two or more populations due to extensive suitable habitat surrounding the development envelope and within the wider region. The reduction in suitable habitats is not considered significant in a regional context, the surrounding landscape is largely uncleared and would provide more suitable habitat for these species than the areas proposed for the mine site expansion and the gas pipeline.

The other Migratory/Marine species populations are unlikely to be fragmented into two or more populations by the Project. These species are migrants of Australia and suitable habitat is in ephemeral or permanently wet areas. Of which, ephemeral areas within the development envelope is dependent upon large rainfall events. In addition, these species are highly mobile with extensive home ranges. The clearing of suitable habitat is not considered to have an impact on fragmenting populations and not considered to have a significant impact on the species' populations.

**Adversely affect habitat critical to the survival of a species**

The Rocky Ridge/Valley habitat has been identified as the most important Northern Quoll habitat within the development envelope and wider surveyed areas. However, this habitat was relatively fragmented and did not form continuous large corridors of habitat that would be preferred by the species. Aerial imagery has identified a substantial area of this habitat occurring within a regional context outside of the development envelope. As such, the surrounding landscape would be able to support greater Northern Quoll population densities than habitat within the development envelope due to its size and greater connectivity (360 Environmental 2018a;b). It is not likely the clearing of suitable habitat within the development envelope would adversely affect the Northern Quoll species' survival.

The Bilby's habitat is considered to be well represented beyond the development envelope and the surrounding landscape (360 Environmental 2018a;b). Furthermore, the population densities of the Bilby are considered to be low within the development envelope. The clearing of 290 ha of suitable habitat for the species may have local impacts, however, is not likely to have a significant impact to the survival of the species on a regional scale (360 Environmental 2018a;b).

Mining related activities such as vegetation clearing, excavation and earthworks, blasting, drilling, rail and haul road vehicle activity in habitat used by the PLNB has the potential to impact the survival of the species. No PLNB species or evidence of the species occurring within the development envelopes were recorded during the surveys and was identified the species would utilise the development envelope for airborne foraging. Although the species have a high likelihood of occurrence within the development envelope for the purpose of foraging, it is not considered that the species would be significantly impacted by the development.

The Fork-tailed Swift is a Migratory/Marine non-breeding migrant to Australia in Summer. The species has a mostly aerial habitat from <1 m to 1,000 m and is mostly observed across inland plains in Australia and along coastal areas as well as offshore islands. The species has a large area of occupancy and is not isolated to Western Australia (DoE 2015a). The species was recorded during the survey but the habitat within the development envelope is not considered to be critical to the survival of the species. The Fork-tailed Swift does not depend solely on the habitat available within the development envelope.

The seasonal movements of the other Migratory/Marine species identified as likely to occur within the northern portion of the site suggests that the development envelope does not habitat critical to the survival of these species. These Migratory/Marine shorebird species are reliant upon inundated areas for foraging and feeding such as wetlands or rivers (DoE 2015b). The development envelope is not mapped as containing permanent wetlands or other surface water features; it does contain low-lying areas that are ephemeral in nature, inundated only after heavy rainfall events. As only a small portion in the northern pipeline envelope is ephemeral in nature and dependent upon large rainfall events, it is not considered critical habitat for the survival of these Migratory/Marine waterbirds. The temporary availability of suitable habitat within the development envelope is considered not to be critical habitat for these species.

Development of the pipeline will reduce some portions of the low-lying areas becoming inundated after heavy rainfall; however, these low-lying areas extend beyond the pipeline envelope. It is likely that surrounding rivers and permanently inundated wetlands would provide

more suitable habitat critical to the survival of these Migratory/Marine shorebirds.

**Disrupt the breeding cycle or lifecycle of a population**

It is unlikely that the Project would disrupt the breeding cycle or lifecycle of a population of the Northern Quoll species. The habitat is considered to be extensive outside of the development envelope and more likely to support greater Northern Quoll densities than habitat within the development envelope (360 Environmental 2018a; b). The habitat within the development envelope was not considered likely to be essential for the survival or life cycle of the species given the widespread availability of habitat on local and regional scales (360 Environmental 2018a;b).

The Bilby was identified to have a high likelihood of occurrence within the development envelope but low population densities, suggesting that impacts to the Bilby populations from the Project is not expected to be significant on a regional scale (360 Environmental 2018a;b).

Development or mining related activities in close proximity to diurnal roosts have the potential to disrupt the breeding cycle of the PLNB if they occur within the breeding period. The caves identified as suitable habitat for diurnal or nocturnal roosting are located outside of the clearing areas.

The Fork-tailed Swift and the other Migratory/Marine shorebirds (Oriental Pratincole, Red-necked Stint, Wood Sandpiper, Common Greenshank and Marsh Sandpiper) are summer nonbreeding migrants to Australia. These species visit Australia for foraging and feeding important for the life cycle of the species. However, it is highly unlikely that the clearing within the development envelope would disrupt the breeding cycle of a population. Australia's coastal and freshwater habitats are considered to be important habitat for these species to rest, feed, and accumulate energy reserves to travel long distances back to their breeding grounds. Feeding and foraging habitat is important in the breeding cycle for species, however, given the development envelope does not contain permanently inundated areas it is not considered a critical habitat. It is likely these species would utilise the region for more suitable and permanent water habitats nearby.

**Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to extent that the species is likely to decline**

The Northern Quoll targeted surveys identified 49.1 ha of 2,778 ha of suitable habitat to be cleared for the Project. The suitable habitat within the surveyed areas was considered to be fragmented compared to the substantial area of continuous habitat to the west and east of the surveyed areas (360 Environmental 2018a;b). This suggests these larger intact areas would provide more suitable habitat for the Northern Quoll than the development envelope. Only two Northern Quoll individuals were captured on remote motion cameras over a period of 60 trapping nights within the wider surveyed areas. In addition, only 19 scats were recorded during the surveys of which 3 were considered to be recent. The low individual recordings and low scat densities indicates a low population density and suggests the species have not likely utilised the surveyed areas for a number of months and likely utilising surrounding habitat outside of the surveyed areas (360 Environmental 2018a;b). Although the Project involves the clearing of 49.1

ha of suitable Northern Quoll habitat, it is not likely to have a significant impact on the species that would cause the species to decline given the low population density, limited recent evidence of the species and fragmented habitat within the development envelope.

Habitat suitable for the Bilby is not restricted to the development envelope, the habitat is considered to be widespread and common within the surrounding landscape and region. The clearing of 290 ha of the surveyed 2,140 ha of suitable habitat is not considered to result in a reduction in availability or quality of habitat that is necessary for the species' survival (360 Environmental 2018a;b).

No PLNBs were recorded during the surveys however suitable habitat was identified as having a total area of 104.9 ha within the wider surveyed areas, of which 64.2 ha is proposed to be cleared for the Project. Shallow cave sizes are common in the Pilbara area, which are considered unsuitable for the PLNB. It is not likely that the suitable habitat identified would impact the habitat available causing the species to decline. Suitable habitat for the species is considered widespread and common on a regional scale.

The Fork-tailed Swift is a mostly exclusively aerial forager from <1m to 1000 m and was recorded within the northern portion of the pipeline envelope. As the species has a widespread foraging and feeding areas within Australia, it is not considered that the clearing within the development envelopes would have a significant impact on the availability or quality of habitat that would cause the species to decline.

Habitat important to the other Migratory/Marine shorebirds requires the habitat to support 0.1 % of the flyway population or at least 2000 migratory shorebirds or at least 15 migratory shorebird species (DoE 2015b). None of these Migratory/Marine shorebirds were recorded during the surveys but were considered likely to occur due to the ephemeral nature of low-lying areas within the pipeline envelope and nearby historical occurrences of the species. However, as the habitat is only considered suitable to the species when inundated (subject to heavy rainfall), it is not likely that the development within a portion of this habitat would modify, destroy, remove, isolate or decrease the availability or quantity of habitat that causes these species to decline.

These species are highly mobile and would have greater association with permanent waterbodies and rivers in the surrounding landscape.

**Result in invasive species that are harmful to listed species becoming established in that species' habitat**

The clearing within the development envelope is not likely to result in invasive species becoming established. The invasive species Gamba Grass (*Andropogon gayanus*) is listed as a key threatening process under the EPBC Act for the Northern Quoll species. The surveys did not identify the Gamba Grass weed species within the development envelope or wider surveyed areas. It is not likely that the clearing within the development envelope would result in the introduction of the Gamba Grass. Weed management measures will be taken during clearing and construction activities to ensure weeds are not spread or introduced as part of the Project.

No invasive weed species recorded within the development envelope are listed as being

harmful to the Migratory/Marine shorebirds. There are no significant threats to the Fork-tailed Swift in Australia. Potential threats to the species include predation by feral animals, however, due to the wide range of the species the potential impacts are considered to be negligible (Birdlife International 2009).

Four weed species were recorded during the surveys, of which one (**Calotropis procera*) is listed as WONS and Declared under the BAM Act. Clearing may ameliorate weed species, however if invasive species do result in the uncleared area from the development they are not seen to be key threats to the Bilby, PLNB, Northern Quoll, Fork-tailed Swift and the other Migratory/Marine species. Best practice management will be undertaken to ensure that the machinery and equipment used on Site will not increase the risk of introducing weeds or disease, or spread weeds across the site from already infested areas.

Feral cats (*Felis catus*) and the European Red Fox (*Vulpes vulpes*) are listed as key threatening processes under the EPBC Act for the Northern Quoll. In particular, Feral cats have the potential to impact upon Northern Quoll Populations either through competition for food or direct predation.

Invasive species are unlikely to have a significant effect overall on the PLNB (DoE 2016a).

**Introduce disease that may cause the species to decline**

It is unlikely that vegetation clearing, construction and mining activities of the Project would introduce disease that would cause a decline in the Northern Quoll populations. The key listed threatened process to the Northern Quoll is the spread of Cane Toads and the lethal toxic ingestion of the invasive species. It is unlikely that the development itself would introduce Cane Toads into the area (DEH 2005).

There are no listed diseases that are threatening to the Bilby. It is unlikely that the clearing within the development envelope would introduce disease that would cause the species to decline.

There are no known diseases threatening the PLNB. The only known risk to the species is White Nose Syndrome which can be controlled by limiting human access to roost sites (DoE 2016a). All caves identified as potential roosting habitats are located outside of the clearing areas, with the exception of one cave that was identified as too small to be utilised by the species.

There are no significant threats to the Fork-tailed Swift in Australia (DoE 2015a).

Modification of wetland habitats may increase invasive species and pollution which can modify the habitat suitable for these Migratory/Marine shorebirds. The site does not contain permanent water bodies and development of the pipeline and mine site expansion is not likely to increase invasive species and pollution into nearby suitable wetland habitats for these species.

Management measures for pollution and invasive species control have and will be further considered at a State level through EPA and other agency approvals processes and

management plans.

No domestic animals or pets will be permitted on site to prevent the introduction or spread of disease, and to prevent predation on native fauna.

Standard hygiene controls and management of ground engaging equipment will be undertaken to ensure weeds and diseases are not introduced or spread.

**Interfere with the recovery of the species**

The reduction in the habitat surveyed is not likely interfere with the recovery of the Northern Quoll. Although the clearing will increase local habitat fragmentation, the surrounding landscape contains greater extents of suitable habitat than the development envelope. Particularly, the surrounding uncleared landscape has not been significantly subject to mining or development activities. The habitat within the development envelope was not considered likely to be essential for the recovery of the species within a local or regional scale (360 Environmental 2018a;b).

Habitat loss and fragmentation are threatening processes to the Bilby but the severity of these are dependent upon location (DoE 2016b). The Project is located in a largely remote inland area with large areas of intact remnant vegetation. Land clearing would reduce some habitat availability; however, there are significant areas of suitable Bilby habitat in the surrounding landscape. The clearing of Bilby habitat within the development envelope represents only

13.5% of the habitat within the wider surveyed area. In addition, only two Bilby individuals were recorded during the surveys indicating the species has a low population density within the development envelope and the wider surveyed area (360 Environmental 2018a;b). As such, it is not likely that the clearing of of suitable Bilby habitat within the development envelope would interfere with the recovery of the species.

As no PLNB species or suitable roosting habitat were observed during the surveys, it is not likely that the Project would interfere with the recovery of the species. The surrounding landscape and region contains suitable habitat for the species, which is considered widespread. In addition, no caves suitable for diurnal or nocturnal roosting are located within clearing areas.

The clearing of habitat within the low-lying areas of the northern portion of the pipeline envelope is not considered to interfere with the recovery of the Fork-tailed Swift or the other Migratory/Marine shorebirds. Due to the ephemeral nature of the northern portion of the pipeline envelope, these species would likely utilise permanent wetlands or waterbodies to rest, forage and feed to build up required energy reserves to migrate back to breeding grounds overseas.

These more permanent waterbodies would be considered more important habitat than temporary or ephemeral natured low lying areas that are dependent upon large rainfall events for inundation. In addition the Fork-tailed Swift is a mostly aerial forager and would have ease in identifying more suitable foraging habitat areas than the site during and post construction due to its high mobility and extensive home range.

# Section 6 – Environmental record of the person proposing to take the action

Provide details of any proceedings under Commonwealth, State or Territory law against the person proposing to take the action that pertain to the protection of the environment or the conservation and sustainable use of natural resources.

**6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Please explain in further detail.**

Wodgina Lithium Pty Ltd (WLPL) are part of the larger Mineral Resources Limited (MRL) group and have an extensive history of mining in Western Australia. To date no serious environmental non-compliance has been registered against WLPL or MRL. As a leading regional mining services, contracting and resource development company, MRL acknowledges that their operations have the potential to impact on environmental, community and heritage values. For this reason, MRL has adopted a systematic approach to understanding and managing potential impacts and to meet their commitments under legislation.

**6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application.**

Not applicable

**6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation's environmental policy and framework?**

Yes

**6.3.1 If the person taking the action is a corporation, please provide details of the corporation's environmental policy and planning framework.**

Mineral Resources Limited will be undertaking the proposed action in accordance with their Environment, Community and Heritage Policy (attached).

**6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?**

Yes

### 6.4.1 EPBC Act No and/or Name of Proposal.

**EPBC 2016/7637:** Mineral Resources Limited/Mining/90km north-west of Newman/Western Australia/Pilbara Bulk Ore Transport System Project, WA

**EPBC 2015/7494:** Mineral Resources Limited/Mining/Shire of Yilgarn/Western Australia/J5 and Bungalbin East Iron Ore Project, Shire of Yilgarn, WA

# Section 7 – Information sources

You are required to provide the references used in preparing the referral including the reliability of the source.

**7.1 List references used in preparing the referral (please provide the reference source reliability and any uncertainties of source).**

| Reference Source | Reliability | Uncertainties |
|---|---|---|
| 360 Environmental, 2018a. Flora, Vegetation and Fauna Survey - Wodgina Mine Site and Proposed Airstrip. Prepared for Mineral Resources. West Leederville. | Environmental survey undertaken using the current guideline specifications. | Portions of the survey areas were not accessible due to steep slopes. The fauna habitats for these areas were extrapolated based on aerial imagery and the knowledge of the fauna personnel's site visit. |
| 360 Environmental, 2018b. Flora, Vegetation and Targeted Northern Quoll Survey – Wodgina Mine and Additional Gas Pipeline. Prepared for Mineral Resources. West Leederville. | Environmental survey undertaken using the current guideline specifications. | N/A |
| Beard, J. S. 1975. Vegetation Survey of Western Australia. University of Western Australia Press, Nedlands. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Cramer, V, Dunlop, J, Davids, R, Ellis, R, Barnett, B, Cook, A, Morris, K & van Leeuwen, S, 2016, Research Priorities for the northern quoll (Dasyurus hallucatus) in the Pilbara region of Western Australia. Australian Mammalogy. 38: pp. 135-148. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Agriculture and Food WA (DAFWA), 2012. Soil Landscapes and Land Systems. GIS Dataset. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Biodiversity Conservation and Attractions (DBCA), 2017. DBCA Managed | All references are peer reviewed papers in reputable journals or are government | N/A |

| Reference Source | Reliability | Uncertainties |
|---|---|---|
| Lands and Waters. GIS Dataset. Government of Western Australia. | publications or data. | |
| Department of the Environment (DoE), 2008a. Wetlands of National Importance. GIS Dataset. Commonwealth of Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of the Environment (DoE), 2013. Matters of National Environmental Significance – Significant Impact Guidelines 1.1. Commonwealth of Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of the Environment and Energy (DEE), 2018. Protected Matters Search Tool (PMST). Available at http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf. Commonwealth of Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Parks and Wildlife (DPaW), 2016. Geomorphic Wetlands. GIS Dataset. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Planning, Lands and Heritage. Aboriginal Heritage Inquiry System. Available at https://maps.daa.wa.gov.au/AHIS/. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Water (DoW), 2010.Groundwater Salinity. GIS Dataset, Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Water (DoW), 2014. Hydrography. GIS Dataset. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Water (DoW), 2016a. Public Drinking Water Source Areas. GIS Dataset. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Department of Water (DoW), | All references are peer | N/A |

| Reference Source | Reliability | Uncertainties |
|---|---|---|
| 2016b. Water Quality Protection Note 25 – Land Use Compatibility Table. Government of Western Australia. | reviewed papers in reputable journals or are government publications or data. | |
| Department of Water and Environmental Regulation (DWER), 2018a. Environmentally Sensitive Areas – Clearing Permit System. Available at https://cps.der.wa.gov.au/main.html. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Menkhorst, P, & Knight, F, 2004, A field guide to the mammals of Australia, Second Edition. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Menkhorst, P, Rogers, D, Clarke, R, Davies, J, Marsack, P, & Franklin, K, 2017, The Australian Bird Guide. CSIRO Publishing. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Shepherd, D. P., Beeston, G. R., and Hopkins, A. J. M. 2001. Native Vegetation in Western Australia (Technical Report 249). Perth: Department of Agriculture. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| State Heritage Office (SHO), 2018. State Heritage Places, available at http://inherit.stateheritage.wa.gov.au/Public/. Department of Planning, Lands and Heritage. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Van Vreeswyk, A. M. E., Payne, A. L., Leighton, K. A., and Hennig, P. 2004. An Inventory and Condition Survey of the Pilbara Region of Western Australia (Technical Bulletin 92). Perth: Department of Agriculture. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Water Corporation 1996. Yule River Borefield, Hydrogeology | All references are peer reviewed papers in reputable | N/A |

| Reference Source | Reliability | Uncertainties |
|---|---|---|
| and Investigation Plan. Infrastructure Planning Branch, Planning and Development Division. | journals or are government publications or data. | |
| Water and Rivers Commission (WRC), 2000. Yule River Water Reserve Water Source Protection Plan. Port Hedland Regional Water Supply. Available from https://www.water.wa.gov.au/__data/assets/pdf_file/0005/5549/10117.pdf. Government of Western Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Woinarski, J, Oakwood, M, Winter, J, Burnett, S, Milne, D, Foster, P, Myles, H, & Holmes, B, 2008, Surviving the toads: patterns of persistence of the Northern Quoll Dasyurus hallucatus in Queensland. Report to Australian Government's National Heritage Trust. Tropical Savannas Cooperative Research Centre, Darwin. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Woinarski, J, Burbidge, A, & Harrison, P, 2014, The Action Plan for Australian Mammals 2012. CSIRO Publishing, Victoria, Australia. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |
| Southgate, R, 1990, Habitats and diet of the greater bilby Macrotis lagotis (Marsupialia: Peramelidae). In: Seebeck, J. H., P.R. Brown, R.L. Wallis & C. M. Kemper, eds. Bandicoots and Bilbies. pp. 303-309. Surrey Beatty & Sons: Chipping Norton, NSW. | All references are peer reviewed papers in reputable journals or are government publications or data. | N/A |

# Section 8 – Proposed alternatives

You are required to complete this section if you have any feasible alternatives to taking the proposed action (including not taking the action) that were considered but not proposed.

**8.0 Provide a description of the feasible alternative?**

Not applicable.

**8.1 Select the relevant alternatives related to your proposed action.**

**8.27 Do you have another alternative?**

No

# Section 9 – Contacts, signatures and declarations

Where applicable, you must provide the contact details of each of the following entities: Person Proposing the Action; Proposed Designated Proponent and; Person Preparing the Referral. You will also be required to provide signed declarations from each of the identified entities.

**9.0 Is the person proposing to take the action an Organisation or an Individual?**

Organisation

**9.2 Organisation**

**9.2.1 Job Title**

General Manager

**9.2.2 First Name**

Timothy

**9.2.3 Last Name**

Berryman

**9.2.4 E-mail**

timothy.berryman@mrl.com.au

**9.2.5 Postal Address**

Locked Bag 3

Canning Bridge
Applecross WA 6153
Australia

**9.2.6 ABN/ACN**

ABN

33118549910 - MINERAL RESOURCES LIMITED

**9.2.7 Organisation Telephone**

Australian Government
Department of the Environment and Energy

08 9329 3600

**9.2.8 Organisation E-mail**

reception@mineralresources.com.au

**9.2.9 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:**

Not applicable

**Small Business Declaration**

I have read the Department of the Environment and Energy's guidance in the online form concerning the definition of a small a business entity and confirm that I qualify for a small business exemption.

Signature:..... Date: .....

**9.2.9.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations**

No

**9.2.9.3 Under sub regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made**

**Person proposing the action - Declaration**

I, TIMOTHY BERRYMAN, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature:..... Date: 8/5/18

I, TIMOTHY BERRYMAN, the person proposing the action, consent to the designation of MRL as the proponent of the purposes of the action describe in this EPBC Act Referral.

Signature:..... Date: 8/5/18

Australian Government
Department of the Environment and Energy

**9.3 Is the Proposed Designated Proponent an Organisation or Individual?**

Organisation

**9.5 Organisation**

**9.5.1 Job Title**

General Manager

**9.5.2 First Name**

Timothy

**9.5.3 Last Name**

Berryman

**9.5.4 E-mail**

timothy.berryman@mrl.com.au

**9.5.5 Postal Address**

Locked Bag 3

Canning Bridge
Applecross WA 6153
Australia

**9.5.6 ABN/ACN**

ABN

33118549910 - MINERAL RESOURCES LIMITED

**9.5.7 Organisation Telephone**

08 9329 3600

**9.5.8 Organisation E-mail**

reception@mineralresources.com.au

**Proposed designated proponent - Declaration**

Australian Government
Department of the Environment and Energy

I, TIMOTHY BERRIMAN, the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature:..... Date: 8/5/18

**9.6 Is the Referring Party an Organisation or Individual?**

Organisation

**9.8 Organisation**

**9.8.1 Job Title**

Principal Consultant

**9.8.2 First Name**

Felicity

**9.8.3 Last Name**

Jones

**9.8.4 E-mail**

admin@360environmental.com.au

**9.8.5 Postal Address**

PO Box 14
West Perth WA 6872
Australia

**9.8.6 ABN/ACN**

ABN

50109499041 - 360 Environmental Pty Ltd

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Department of the Environment and Energy

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**Referring Party - Declaration**

I, FELICITY JONES, I declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence.

Signature: ..... Date: 8/5/17

## Appendix A - Attachments

The following attachments have been supplied with this EPBC Act Referral:

1. 2681_figure_1_site_location.pdf
2. 2681_figure_2_disturbance_envelope.pdf
3. 2681_figure_3_flora_and_fauna_survey_areas.pdf
4. 2681_figure_4a_northern_quoll_targeted.pdf
5. 2681_figure_4b_northern_quoll_targeted.pdf
6. 2681_figure_4c_northern_quoll_targeted.pdf
7. 2681_figure_4d_northern_quoll_targeted.pdf
8. 2681_figure_4e_northern_quoll_targeted.pdf
9. 2681_figure_4f_northern_quoll_targeted.pdf
10. 2681_figure_5a_fauna_habitat.pdf
11. 2681_figure_5b_fauna_habitat.pdf
12. 2681_figure_5c_fauna_habitat.pdf
13. 2681_figure_5d_fauna_habitat.pdf
14. 2681_figure_5e_fauna_habitat.pdf
15. 2681_figure_5f_fauna_habitat.pdf
16. 2681_figure_5g_fauna_habitat.pdf
17. 2681_figure_6_threatened_species_distribution.pdf
18. 2681_figure_7_hydrology.pdf
19. 2681_figure_8_landsystems.pdf
20. 2681_figure_9_pre_european_vegetation_extent.pdf
21. 2681_figure_10a_vegetation_condition_mine.pdf
22. 2681_figure_10b_vegetation_condition_tsf.pdf
23. 2681_figure_10c_vegetation_condition.pdf
24. 2681_figure_10d_vegetation_condition.pdf
25. 2681_figure_10e_vegetation_condition.pdf
26. 2681_figure_10f_vegetation_condition.pdf
27. 2681_figure_10g_vegetation_condition.pdf
28. 2681_figure_10h_vegetation_condition.pdf
29. 2681_figure_10i_vegetation_condition.pdf
30. 2681_figure_10j_vegetation_condition.pdf
31. 2681_figure_10k_vegetation_condition.pdf
32. 2681_figure_10l_vegetation_condition.pdf
33. 2681_figure_11a_aboriginal_heritage_-_pipeline_envelope.pdf
34. 2681_figure_11b_aboriginal_heritage_-_mine_site.pdf
35. development_evelopes.cpg
36. development_evelopes.dbf
37. development_evelopes.prj
38. development_evelopes.sbn
39. development_evelopes.sbx
40. development_evelopes.shp
41. development_evelopes.shp.xml
42. development_evelopes.shx
43. mrl-en-pol-0001_01_-_mrl_policy_-_environment_community_and_heritage.pdf

44. tenements.pdf
45. wodgina_flora_and_fauna_survey_reduced_-_part_1.pdf
46. wodgina_flora_and_fauna_survey_reduced_-_part_2.pdf
47. wodgina_flora_and_fauna_survey_reduced_-_part_3.pdf
48. wodgina_flora_and_fauna_survey_reduced_-_part_4.pdf
49. wodgina_flora_and_fauna_survey_reduced_-_part_5.pdf
50. wodgina_flora_and_fauna_survey_reduced_-_part_6.pdf
51. wodgina_gas_pipeline_borefield_flora_and_fauna_survey_-_part_1.pdf
52. wodgina_gas_pipeline_borefield_flora_and_fauna_survey_-_part_2.pdf
53. wodgina_gas_pipeline_borefield_flora_and_fauna_survey_-_part_3.pdf
54. wodgina_gas_pipeline_borefield_flora_and_fauna_survey_-_part_4.pdf
55. wodgina_gas_pipeline_borefield_flora_and_fauna_survey_-_part_5.pdf
56. wodgina_gas_pipeline_borefield_flora_and_fauna_survey_-_part_6.pdf
57. wodgina_gas_pipeline_borefield_flora_and_fauna_survey_-_part_7.pdf
58. wodgina_gas_pipeline_borefield_flora_and_fauna_survey_-_part_8.pdf
59. wodgina_gas_pipeline_borefield_flora_and_fauna_survey_-_part_9.pdf
60. wodgina_gas_pipeline_borefield_flora_and_fauna_survey_-_part_10.pdf