



Clearing Permit Decision Report

1. Application details and outcomes

1.1. Permit application details

Permit number:	9985/1
Permit type:	Purpose Permit
Applicant name:	Hamersley Iron Pty Ltd
Application received:	29 November 2022
Application area:	30 hectares
Purpose of clearing:	Establishment and operation of a managed aquifer recharge scheme and associated activities, fauna/flora monitoring access, groundwater/hydrogeological monitoring access, infrastructure access, and Aboriginal Heritage survey/access.
Method of clearing:	Mechanical Removal
Tenure:	<i>Iron Ore (Hamersley Range) Agreement Act 1963</i> , Mineral Lease 4SA (AML 70/4) <i>Iron Ore (Hamersley Range) Agreement Act 1963</i> , Mining Lease 272SA (AM 70/272)
Location (LGA area/s):	Shire of Ashburton
Colloquial name:	Silvergrass East – Managed Aquifer Recharge (MAR) scheme

1.2. Description of clearing activities

Hamersley Iron Pty Ltd proposes to clear up to 30 hectares of native vegetation within a boundary of approximately 275 hectares, for the purpose of establishment and operation of a managed aquifer recharge scheme and associated activities, fauna/flora monitoring access, groundwater/hydrogeological monitoring access, infrastructure access, and Aboriginal Heritage survey/access (Hamersley Iron Pty Ltd, 2022b; Rio Tinto, 2024). The project is located approximately 65 km northwest of Tom Price, within the Shire of Ashburton (GIS Database).

The application is to allow for the establishment of a Managed Aquifer Recharge (MAR) scheme and associated activities (Hamersley Iron Pty Ltd, 2022b). The project is an environmental management strategy for mitigation of potential impacts to groundwater dependent vegetation communities as a result of dewatering at Silvergrass East Iron Ore Mine (Hamersley Iron Pty Ltd, 2022a).

1.3. Decision on application and key considerations

Decision:	Granted
Decision date:	18 April 2024
Decision area:	30 hectares of native vegetation

1.4. Reasons for decision

This clearing permit application was submitted, accepted, assessed, and determined in accordance with sections 51E and 51O of the *Environmental Protection Act 1986* (EP Act). The Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) advertised the application for a public comment for a period of 21 days, and no submissions were received.

In making this decision, the Delegated Officer had regard for the site characteristics (Appendix C), relevant datasets (Appendix I), the clearing principles set out in Schedule 5 of the EP Act (Appendix D), proposed avoidance and minimisation measures (Section 3.1), relevant planning instruments and any other matters considered relevant to the assessment (Section 3.3).

The assessment identified that the proposed clearing may result in:

- the potential introduction and spread of weeds into adjacent vegetation, which could impact on the quality of the adjacent vegetation and its habitat values;
- potential impacts to adjacent priority ecological community; and
- potential impacts to conservation significant fauna habitat.

After consideration of the available information, as well as the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined the proposed clearing is unlikely to lead to have adverse impacts on the conservation of significant flora and fauna and the impacts of clearing can be minimised and managed to be unlikely to lead to an unacceptable risk to environmental values

The Delegated Officer decided to grant a clearing permit subject to conditions to:

- avoid, minimise to reduce the impacts and extent of clearing;
- take hygiene steps to minimise the risk of the introduction and spread of weeds;

- vegetation management – avoid riparian vegetation and where a watercourse is to be impacted by clearing, the permit holder shall ensure that the existing surface flow is maintained, or reinstated downstream into existing natural drainage lines; and
- retain cleared vegetation and topsoil and respread this on a cleared area of equivalent size within the permit boundary within 12 months of clearing to ensure fauna habitat is not permanently lost.

1.5. Site map

A site map of proposed clearing is provided in Figure 1 - 2 below.

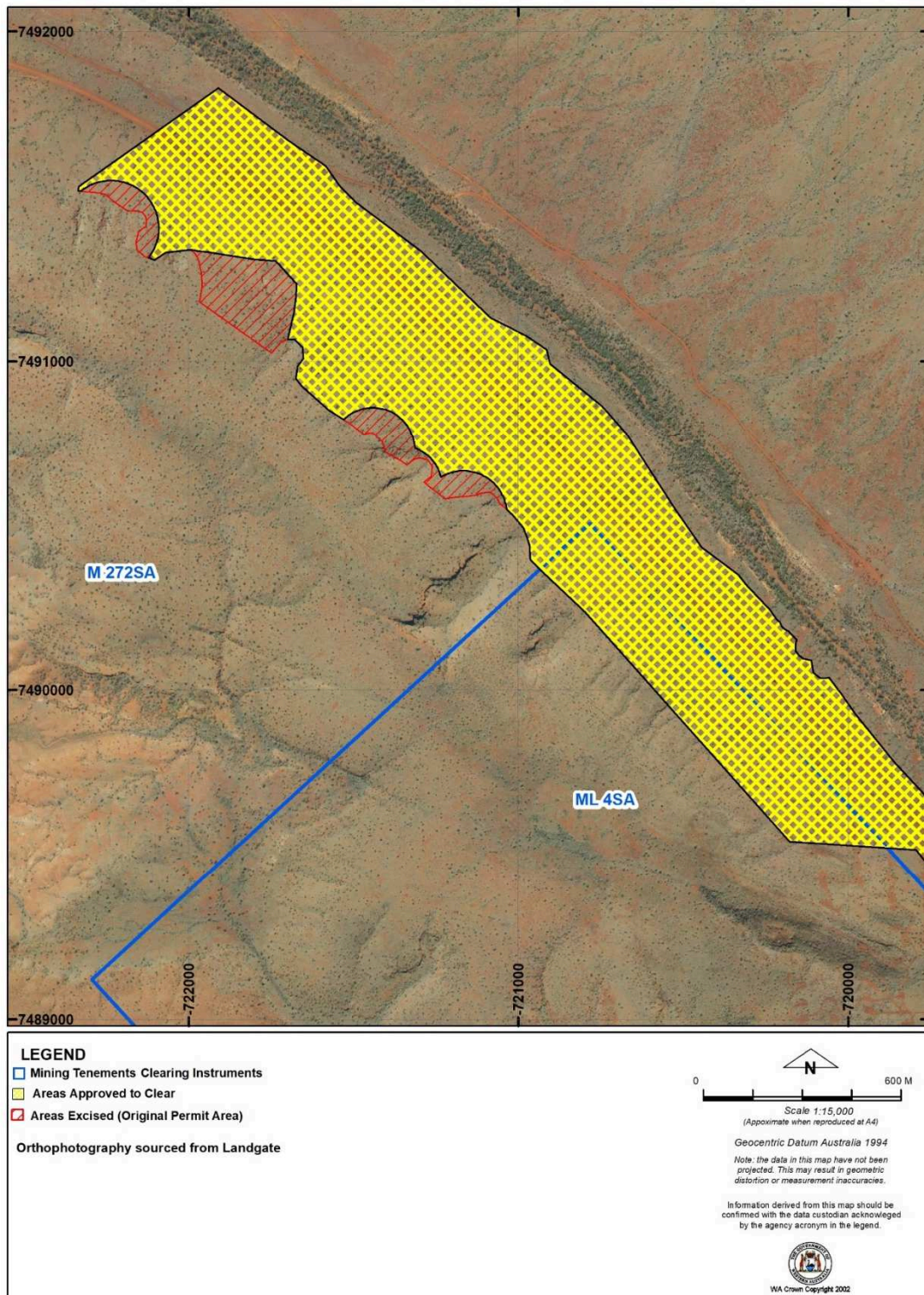


Figure 1. Map of the permit area. The yellow area indicates the area of authorised clearing under the granted clearing permit. The red hatched areas represent areas excised from the original application.

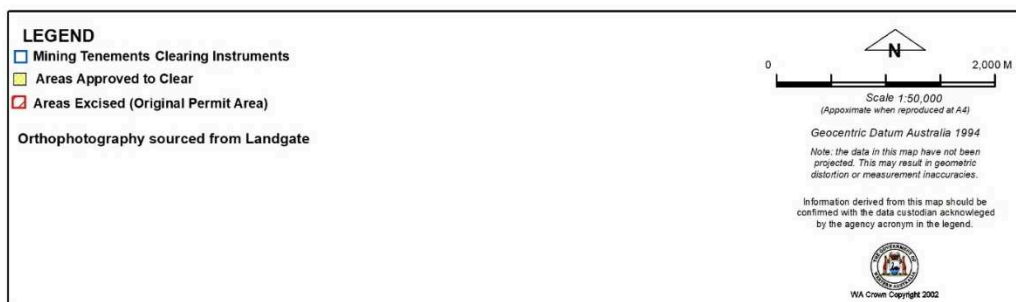
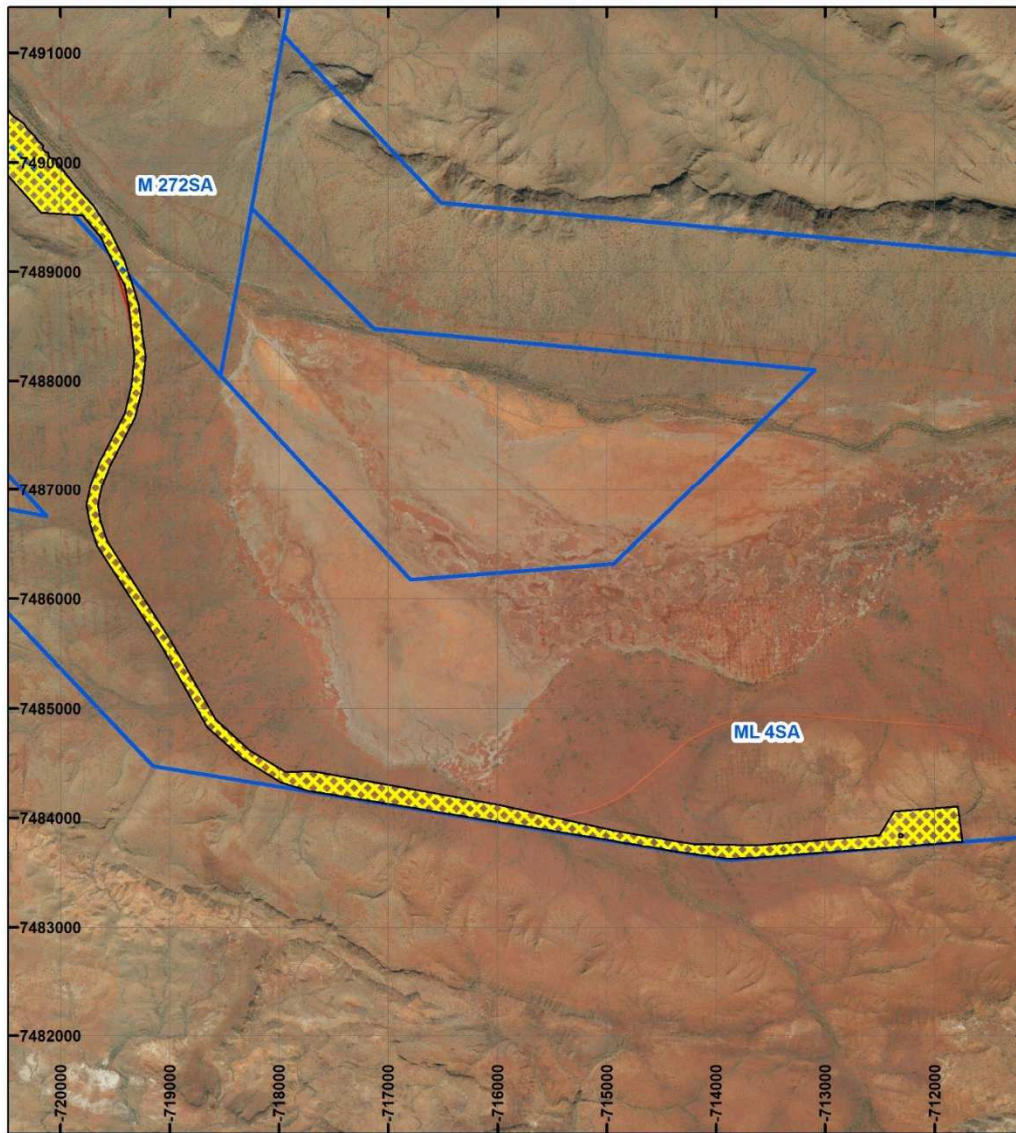


Figure 2. Map of the permit area. The yellow area indicates the area of authorised clearing under the granted clearing permit. The red hatched areas represent areas excised from the original application.

2. Legislative context

The clearing of native vegetation in Western Australia is regulated under the EP Act and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (Clearing Regulations).

In addition to the matters considered in accordance with section 51O of the EP Act (see Section 1.4), the Delegated Officer has also had regard to the objects and principles under section 4A of the EP Act, particularly:

- the precautionary principle
- the principle of intergenerational equity
- the principle of the conservation of biological diversity and ecological integrity.

Other legislation of relevance for this assessment include:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Biosecurity and Agriculture Management Act 2007*
- *Conservation and Land Management Act 1984* (WA) (CALM Act)

- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Iron Ore (Hamersley Range) Agreement Act 1963*

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (DER, December 2014)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)
- *Technical guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016)
- *Technical guidance – Terrestrial Fauna Surveys for Environmental Impact Assessment* (EPA, 2020)

3. Detailed assessment of application

3.1. Avoidance and mitigation measures

During the assessment, and following discussions with DEMIRS, the applicant reduced the permit boundary in order to exclude areas where habitats for conservation significant fauna occur, i.e. northern quoll, Pilbara olive python, ghost bat and Pilbara leaf-nosed bat caves (Rio Tinto, 2023).

The applicant has provided the following avoidance and mitigation measures to support this clearing permit application (Hamersley Iron Ore Pty, 2022a; Rio Tinto, 2022):

- in line with Ministerial Condition (MS 925), the MAR scheme will be implemented to maintain groundwater levels of the underlying aquifer at Caves Creek (Narraminju) to ensure the prevention of long-term impacts to groundwater dependent vegetation communities adjacent to the Silvergrass East Iron Ore Mine;
- utilise existing tracks, where possible, to minimise total clearing required; and
- clearing will be undertaken with a dozer using raised blade clearing technique where possible. Blade down clearing may be required in areas of steep or rough terrain to provide a safe working environment.

The Delegated Officer was satisfied that the applicant has made a reasonable effort to avoid and minimise potential impacts of the proposed clearing on environmental values.

3.2. Assessment of impacts on environmental values

In assessing the application, the Delegated Officer has had regard for the site characteristics (see Appendix C) and the extent to which the impacts of the proposed clearing present a risk to biological, conservation, or land and water resource values.

The assessment against the clearing principles (see Appendix D) identified the impacts of the proposed clearing are limited and able to be managed to be environmentally acceptable with an avoid and minimise, watercourse management, rehabilitation, and hygiene management conditions.

3.2.1. - Clearing Principles (a) and (d)

Assessment

Several flora and vegetation surveys have been undertaken within the MAR project and its surrounding areas. These surveys include but are not limited to:

- Stantec (2021a) Greater Brockman Syncline: Consolidated Vegetation Type and Condition mapping (survey conducted in May and August 2019);
- Biota (2019a) Silvergrass West Detailed flora and vegetation survey Phase 1 and 2. Unpublished report prepared for Rio Tinto (survey conducted in October 2018 and March 2019); and
- Biota (2010) A Vegetation and Flora Survey of Silvergrass West (conducted in February 2010).

Priority flora

A total of 363 species from 158 genera and 56 families were recorded from a combined desktop analysis within 20 kilometres of the application area (Rio Tinto, 2022). This included a total of 43 priority flora species recorded within a 20 kilometre radius; however, the likelihood assessment of occurrence indicated only two species are considered to have the potential to occur within the application area: *Calotis squamigera* (P1) and *Ipomoea racemigera* (P2) (Rio Tinto, 2022).

Calotis squamigera (P1) was recorded from two localities: alongside banks of Caves Creek adjacent to the application area, and 10 kilometres from the application area, within a drainage line, associated with an open mulga woodland (Rio Tinto, 2022; Rio Tinto, 2023). Records from the Western Australian Herbarium (1998-) indicate that this species predominantly occurs in open mulga woodland vegetation associations. The application area lies within Hamersley 18 Beard vegetation unit defined as low woodland, mulga woodland, however, this vegetation unit has not been identified within the application area (Rio Tinto, 2022; Rio Tinto 2023; GIS Database). The Beard vegetation mapping provides broad, state-wide associations, whereas the vegetation mapping provided by Biota (2019a) and Stantec (2021a) provided more detailed local information, which indicated the vegetation unit does not occur within the application area (Rio Tinto, 2023). Given the above, it is unlikely habitat for this species will be present within the application area.

Ipomoea racemigera (P2) species usually occurs in creek beds and banks of major drainage lines (Western Australian Herbarium, 1998-). The main drainage line (Caves Creek) would have potential habitat for this species; however, this creek line is outside of the proposed clearing (GIS Database). Due to the proximity of the Caves Creek, Rio Tinto (2022) considered that there is minimal potential habitat for this species within the application area; however, the proposed clearing is unlikely to pose significant impacts on this species if present, due to the occurrence of more suitable and, largely represented, habitats outside of the application area (Rio Tinto, 2022).

Several other priority flora species from the flora analysis table (C.2) have been identified based on habitat suitability, vegetation and soil types, and information from the flora and vegetation surveys provided by Biota (2019a), Stantec (2021a) and Rio Tinto (2022). These species were: *Helichrysum oligochaetum* (P1), *Euphorbia inappendiculata* var. *inappendiculata* (P2), *Euphorbia inappendiculata* var. *queenslandica* (P2), *Teucrium pilbaranum* (P2), *Euphorbia australis* var. *glabra* (P3), *Glycine falcata* (P3), *Iotasperma sessilifolium* (P3), *Rostellularia adscendens* var. *latifolia* (P3), *Swainsona thompsoniana* (P3), *Triodia basitricha* (P3), and *Vittadinia* sp. Coondewanna Flats (S. van Leeuwen 4684) (P3).

According to Rio Tinto (2023), the application area does not present core/suitable habitat for the majority of priority flora species within 20 kilometres of the application area due to numerous reasons: specific vegetation units for some of the appointed species does not occur within the application area; project design to avoid impacts on priority flora habitat, and the majority of these species occur within crack clays within the 'Brockman Iron cracking clay communities of the Hamersley Range' Priority Ecological Community (PEC) and the 'Themeda grasslands on cracking clays (Hamersley Station)' Threatened Ecological Communities (TEC) landforms found in close proximity to the application area (GIS Database).

Threatened and Priority Ecological Communities

The application area intersects a small portion of the buffer zone of the 'Brockman Iron cracking clay communities of the Hamersley Range' Priority Ecological Community (PEC) (GIS Database). This section of the application area consists of a narrow strip with an existing road corridor (Rio Tinto, 2022). Therefore, considering that the proposed clearing occurs in the buffer zone of the PEC, narrow width of the corridor and existing level of disturbance, the proposed activities are unlikely to significantly impact this community and impacts can be managed through weed management and rehabilitation of areas that are no longer required post clearing activities.

There are no mapped Threatened Ecological Communities (TEC) within the application area (GIS Database). The 'Themeda grasslands on cracking clays (Hamersley Station)' TEC is located within 200 meters east of the application area; however, due to the size and narrow shape of the application area, and existing levels of disturbances, it is unlikely that the proposed activities have the potential to cause significant impacts to this community.

Introduced flora

Thirteen weed species have been recorded within 20 kilometres of the study area, including: *Bidens bipinnata*, *Flaveria trinervia*, *Sigesbeckia orientalis*, *Sonchus oleraceus*, *Citrullus lanatus*, *Vachellia farnesiana*, *Malvastrum americanum*, *Oxalis corniculata*, *Argemone ochroleuca* subsp. *ochroleuca*, *Cenchrus ciliaris*, *Cenchrus setiger*, *Echinochloa colona* and *Setaria verticillata*. None of the species are listed as Weeds of National Significance or declared pest plants in Western Australia under the *Biosecurity and Agriculture Management Act 2007*, however, weeds have potential to out-compete native flora and reduce biodiversity of an area. No weeds have been recorded within the application area; however, they are likely to occur given the level of disturbance of the proposed activities (Rio Tinto, 2022).

Conclusion

For the reasons set out above, it is considered that the proposed clearing is not likely to have significant impacts to Priority flora species or their habitat or nearby TEC and PEC's. Potential impacts to biodiversity as a result of the proposed clearing may be minimised by the implementation of weed management and rehabilitation conditions.

Conditions

To address the above impacts, the following management measures will be required as conditions on the clearing permit:

- avoid, minimise to reduce the impacts and extent of clearing;
- take hygiene steps to minimise the risk of the introduction and spread of weeds; and
- retain cleared vegetation and topsoil and respread this on a cleared area of equivalent size within the permit boundary within 12 months of clearing to ensure vegetation is not permanently lost.

3.2.2. Biological values - Clearing Principle (b)

Assessment

A number of fauna surveys have been undertaken within the application area and in surrounding areas. These surveys include:

- Stantec (2021b) Greater Brockman and Nammuldi – Silvergrass Hub: Consolidated Fauna Habitat Mapping (survey conducted in May, August and September 2019);
- Biologic (2020) Brockman Syncline targeted vertebrate fauna survey (four field surveys conducted between August to November 2019);
- Biologic (2021) Brockman Syncline Fauna Habitat extrapolation mapping memo; and
- Biota (2019b) Silvergrass West Detailed fauna survey Phase 1 and 2 (conducted in November 2018 and March 2019).

Five broad fauna habitat types and disturbed areas were mapped within the application area (Rio Tinto, 2022; Appendix C; Appendix H):

- debris slope/rocky outcrop: 0.13% (0.36 ha)
- gently sloping rise: 12.65% (36.4 ha)
- minor creek line: 0.38% (1.09 ha)
- alluvial plain: 0.08% (0.24 ha)
- colluvial plain: 64.67% (186.01 ha)
- disturbed: 22.09% (63.53 ha)

These fauna habitats are not considered to be restricted at a local or regional level (Rio Tinto, 2022). Rio Tinto (2022), has records of three conservation significant species that have previously occurred within the application area, including the Pilbara olive python (*Liasis olivaceus barroni*) (VU), ghost bat (*Macroderma gigas*) (VU) and Pilbara leaf-nosed bat (Pilbara form) (*Rhinonicteris aurantia*) (VU). The northern quoll (*Dasyurus hallucatus*) (EN) was considered as potentially occurring as it was

recorded within 0.3 kilometres of the application area (Rio Tinto, 2022). Potential significant microhabitats for threatened fauna species may be supported by debris slope/rocky outcrop and minor creek line habitats, which were identified on the western boundary of the application area (Rio Tinto, 2022). Drainage habitat associated with minor creek lines may hold local significance the habitat facilitates connectivity for dispersal and foraging habitat (Cowan et al., 2022; Cramer et al., 2022; Shaw et al., 2023). However, these areas represent a small portion of the application area and habitat extends beyond the application boundary (Rio Tinto, 2022).

Given high likelihood of occurrence of conservation significant fauna species and the existence of small proportions of significant habitats within the application area, the proposed activities would have the potential to pose significant impacts for these species and their habitats (Rio Tinto, 2023). Therefore, the proponent redesigned the proposed clearing activities and removed significant fauna habitats that consisted of debris slope/rocky outcrop from the application area, which consequently reduced the original permit boundary from 288 hectares to 275 hectares (Rio Tinto, 2023; Section 1.5). The proponent also applied a 100 metres buffer from potential nocturnal caves for ghost and Pilbara leaf-nosed bats which were identified outside the permit boundary but in close proximity (Biologic, 2020; Rio Tinto, 2023). The reduced permit boundary and redesign of proposed activities will prevent and/or substantially minimise the potential impacts to significant fauna and their habitats.

Conservation significant fauna is likely to occur in a more transient capacity given important habitats (debris slope/rocky outcrop) for these species have been removed from the current application area, and they are well represented in adjacent areas (Rio Tinto, 2022). Given the extent of clearing proposed, existing infrastructure and roads adjacent to the application area, the removal of significant fauna habitats and inclusion of buffers zones from the application area, the proposed clearing is not likely to impact significant fauna species or their habitats.

Conclusion

For the reasons set out above, it is considered that the impacts of the proposed clearing on native vegetation consisting of potential conservation significant fauna habitat can be managed by slow directional clearing to allow fauna to move into adjacent vegetation, avoid riparian vegetation and rehabilitating areas that are no longer required to ensure the habitat is not permanently lost.

Conditions

To address the above impacts, the following management measures will be required as conditions on the clearing permit:

- undertake slow, progressive one-directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity;
- retain cleared vegetation and topsoil and respread this on a cleared area of equivalent size within the permit boundary within 12 months of clearing to ensure fauna habitat is not permanently lost; and
- vegetation management – avoid riparian vegetation and where a watercourse is to be impacted by clearing, the permit holder shall ensure that the existing surface flow is maintained, or reinstated downstream into existing natural drainage lines.

3.3. Relevant planning instruments and other matters

The clearing permit application was advertised on 9 December 2022 by the Department of Energy, Mines, Industry Regulation and Safety inviting submissions from the public. No submissions were received in relation to this application.

There is one native title claim (WCD2007/001) over the area under application (DPLH, 2024). This claim has been determined by the Federal Court on behalf of the claimant group, Eastern Guruma. However, the mining tenure has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore, the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There is one (Place 37670 - Narraminju (Caves Creek)) registered Aboriginal Sites of Significance within the application area (DPLH, 2024). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

On 8 June 2023, the Environmental Protection Authority (EPA) advised DEMIRS that the application was constrained under section 41(3) of the *Environmental Protection Act 1986* (EPA, 2023). DEMIRS received subsequent response from the EPA on 9 April 2024 advising the application is not constrained and Delegated Officer could proceed with decision (EPA, 2024).

Other relevant authorisations required for the proposed land use include:

- A Programme of Work approved under the *Mining Act 1978*

It is the proponent's responsibility to liaise with the Department of Water and Environmental Regulation and the Department of Biodiversity, Conservation and Attractions, to determine whether a Works Approval, Water Licence, Bed and Banks Permit, or any other licences or approvals are required for the proposed works.

End

Appendix C. Site characteristics

C.1. Site characteristics

Characteristic	Details
Local context	The project is located approximately 65 kilometres northwest of Tom Price, within the Shire of Ashburton in the extensive land use zone (GIS Database). The predominant land use in the region is grazing of native pastures, conservation and mining activity.
Ecological linkage and conservation areas	According to available databases, the application area does not contain any known or mapped ecological linkages neither it is located within or in close proximity to any conservation areas (50 kilometres radius) (GIS Database).
Vegetation description	<p>The application area occurs within the Hamersley subregion of Pilbara (PIL03) (GIS Database). The vegetation of the application area is broadly mapped as the following Beard vegetation associations (GIS Database):</p> <ul style="list-style-type: none"> • 565: Hummock grasslands, low tree steppe; bloodwood over soft spinifex, • 18: Low woodland; mulga (<i>Acacia aneura</i>), and • 82: Hummock grasslands, low tree steppe; snappy gum over <i>Triodia wiseana</i>. <p>A flora and vegetation survey was conducted over the application area by Stantec (2021a). The following four vegetation associations were recorded within the application area (Rio Tinto, 2022; Stantec, 2021a):</p> <p><i>Vegetation of hillslopes</i></p> <ul style="list-style-type: none"> • ElAmaiAhiTw: <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>, (<i>Corymbia hamersleyana</i>) low open woodland over <i>Acacia maitlandii</i> open shrubland over <i>Amyema hillian</i> low open shrubland over <i>Triodia wiseana</i> hummock grassland (86.75 ha/ 30.15%), and • ElAmTw: <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia maitlandii</i> shrubland over <i>Triodia wiseana</i> open hummock grassland (11 ha/ 3.82%). <p><i>Vegetation of minor flowline</i></p> <ul style="list-style-type: none"> • ExChAsppGgTe: <i>Eucalyptus xerothermica</i> and/or <i>Corymbia hamersleyana</i> low open woodland over <i>Acacia</i> spp. and <i>Gastrolobium grandiflorum</i> open shrubland over <i>Triodia epactia</i> (<i>Triodia wiseana</i>) open hummock grassland (0.66 ha/ 0.23%). <p><i>Mixed woodlands on flats</i></p> <ul style="list-style-type: none"> • ElEgAatAeAbTeTw: <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> (<i>Corymbia deserticola</i> subsp. <i>deserticola</i> and <i>C. hamersleyana</i>) scattered low trees and/or <i>Eucalyptus gamophylla</i> scattered low mallees over <i>Acacia atkinsiana</i>, <i>Acacia exigua</i> and <i>Acacia bivenosa</i> shrubland over <i>Triodia epactia</i> and/or <i>Triodia wiseana</i> hummock grassland (125.6 ha/ 43.64%). <p>Disturbed areas (63.76 ha/ 22.16%)</p>
Vegetation condition	<p>The vegetation survey and aerial imagery (Rio Tinto, 2022; Stantec, 2021a; GIS Database) indicates the vegetation within the proposed clearing area is in excellent to completely degraded condition (Trudgen, 1991), described as:</p> <ul style="list-style-type: none"> • Excellent - Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement. <p>to</p> <ul style="list-style-type: none"> • Completely Degraded – Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs. <p>Some areas presented existing vehicle tracks due to mine access and activities, hence those areas are degraded (63.76 ha/ 22.16%) (Rio Tinto, 2022; GIS Database). However, most the vegetation adjacent to these tracks was in an Excellent to Very Good Condition (212.51 ha/ 73.84%) (Rio Tinto, 2022; GIS Database). The full Trudgen (1991) condition rating scale is provided in Appendix E. Mapping of vegetation condition is provided in Appendix H.</p>
Climate and landform	The application area is mapped within elevations of 540 – 620 meters AHD (GIS Database). The climate of the region is semi-arid to tropical with an annual rainfall average of approximately 319 millimetres recorded at Paraburdoo Aero (BoM, 2024; CALM, 2002).
Soil description and land degradation risk	<p>The soil is mapped as part of the following landform systems (DPIRD, 2024; Rio Tinto, 2022):</p> <ul style="list-style-type: none"> • Boolgeeda system (285Bg): Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands (206.48 ha/ 71.76%), and • Newman system (285Ne): Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands (81.25 ha/ 28.24%). <p>Two major geological units mapped within the application area (Rio Tinto, 2022; GIS Database):</p> <ul style="list-style-type: none"> • Alluvium and colluvium (Czc): red brown sandy and clayey soil, on low slope and sheetwash areas, and • Marra Marra Iron Formation (AHm): chert, banded iron-formation, and pelite. <p>The application area is adjacent to existing infrastructure corridors and part of its area has been previously disturbed by mining activities and access road (Rio Tinto, 2022; GIS Database).</p>

Characteristic	Details
Waterbodies and Hydrogeography	There are several ephemeral drainage lines within the application area (GIS Database). The application area is located within the Pilbara Ground Water Area proclaimed under the <i>Rights in Water and Irrigation Act 1914</i> (GIS Database). The nearest Public Drink Water Source Areas is Millstream Water Reserve, which is located approximately 12.5 kilometres northeast of the application area. There are no Wetlands of International Importance or Nationally Important Wetlands that occur within the application area or surrounding area (50 kilometres) (GIS Database). The application area is located approximately 1.5 kilometres south of Upper Robe River that is a Priority one area described in "Wild Rivers of Western Australia" (Water and Rivers Commission, 1999). The mapped groundwater salinity is 500-1,000 milligrams per litre total dissolved solids which is described as marginal (GIS Database).
Flora	There are 43 records of Priority flora species within 20 kilometres of the application area (Rio Tinto, 2022; GIS Database). A desktop analysis of Rio Tinto's internal data from previous surveys in the area did not record any Threatened or Priority flora species within the application area (Rio Tinto, 2022). The nearest record of Threatened Flora is over 50 kilometres from the application area (GIS Database). Two Priority flora species have the potential to occur within the application area (Rio Tinto, 2022).
Ecological communities	There are records of one Threatened Ecological Community (TEC) and two Priority Ecological Communities (PEC) within 20 kilometres of the application area (Rio Tinto, 2022; GIS Database): <ul style="list-style-type: none"> • Themeda grasslands on cracking clays (Hamersley Station) (T-CR) is located approximately 0.2 kilometres east, • Brockman Iron cracking clay communities of the Hamersley Range (P1) is located approximately 0.1 kilometres north, with the buffer intersecting part of the application area, and • Riparian communities of springs and pools Pilbara (P2) is located approximately 0.9 kilometres east.
Fauna	There are 195 records of conservation significant fauna species within 20 kilometres of the application area (GIS Database). Three conservation significant fauna species have been previously recorded, and five species have potential to occur within the application area (Rio Tinto, 2022).
Fauna habitat	Fauna habitat within the application area has been mapped into six types (Rio Tinto, 2022): <ul style="list-style-type: none"> • debris slope/rocky outcrop: debris slope - a moderately inclined to steep slope, consisting of rock accumulated by gravity. Rocky outcrop - a visible exposure of rock. Significant microhabitat: potential caves and rocky outcrops for threatened fauna, • gently sloping rise: A gently inclined slope located towards the base of the footslope, • minor creekline: a linear, generally sinuous open depression forming the floor of a minor drainage line channel (less than 10 m) that is eroded or aggraded (built up) by stream flow, • alluvial plain: flat land area adjacent to a drainage line, composed of unconsolidated sedimentary deposits (alluvium) and subject to periodic inundation by the drainage line, • colluvial plain: a large very gently inclined or level element, formed by loose unconsolidated material being deposited by either rain wash, sheet wash, slow continuous downslope creep, or a variable combination of these processes, and • disturbed: associated with clearing for exploration and/or mining activities. Mapping of fauna habitat is provided in Appendix H.

C.2. Flora analysis table

Flora analysis of records within 20 kilometres of the application area their likelihood of occurrence (Rio Tinto, 2022). Updates to Priority flora species name and status include but are not limited to the following species: *Triodia karijini* (P2), *Triodia lutiteana* (name change), *Vittadinia* sp. Coondewanna Flats (S. van Leeuwen 4684) (P3), *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P4), *Goodenia nuda* (no longer listed) (Western Australian Herbarium, 1998-).

Species	Status	NM	RT	Distance to nearest record (km)	Habit, habitat and discussion	Likelihood of occurrence
<i>Calotis squamigera</i>	P1		x	10 km	Prostrate annual herb to 0.2m tall with yellow flowers. Occurs on pebbly loam (WAH 2022). This species is also known from multiple locations across Queensland and in the Northern Territory. One record is held by the South Australian Herbarium, collected from Karijini National Park in the Pilbara (Atlas of Living Australia 2022).	Potential Habitat may occur within study area.
<i>Hibiscus</i> sp. Mt Brockman (E. Thoma ET 1354)	P1	x	x	5 km	Perennial shrub to 2.5m tall with mauve flowers. Grows in rocky drainage lines below cliff lines or rocky ridges (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Triodia</i> sp. Karijini (S. van Leeuwen 4111)	P1		x	96 km	Perennial grass (spinifex) forming lax hummocks. Occurs on upper slopes and summits of hills around Karijini National Park (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Triodia</i> sp. Silvergrass (P.-L. de Kock BES 00808)	P1		x	3.6 km	Perennial grass (spinifex) forming hummocks. Occurs on shale (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)	P1		x	1.1 km	Somewhat woody, annual herb or subshrub to 1m tall with white flowers. Occurs on clay-loams, cracking clays and gilgai, usually associated with low open woodland and mulga (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.

Species	Status	NM	RT	Distance to nearest record (km)	Habit, habitat and discussion	Likelihood of occurrence
<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)	P1		x	1.1 km	Somewhat woody, annual herb or subshrub to 1m tall with white flowers. Occurs on clay-loams, cracking clays and gilgai, usually associated with low open woodland and mulga (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	P2	x		11 km	Prostrate herb to 0.3m long. Occurs on loamy depressions, floodplains (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Euphorbia inappendiculata</i> var. <i>queenlandica</i>	P2	x	x	1 km	Prostrate herb to 0.3m long. Occurs on loamy depressions, floodplains (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Teucrium pilbaranum</i>	P2	x	x	1.3 km	Upright shrub to 0.2m tall with white flowers. Occurs on clay, crab hole plains, floodplains or margin of calcrete table (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Aristida lazardis</i>	P2		x	5.5 km	Tufted perennial grass to 1.5m tall. Occurs on sand or loam mostly east of Karjini National Park (WAH 2022). This species is also known from multiple locations across Queensland and in the Northern Territory. One record held by the WAH, is collected from Karjini National Park in the Pilbara (Atlas of Living Australia 2022).	Unlikely No core/potential habitat within study area.
<i>Ipomoea racemigera</i>	P2		x	1.6 km	Creeping annual, herb or climber with white flowers. Occurs on sandy soils along watercourses (WAH 2022; Rio Tinto and Parks and Wildlife 2015).	Potential Potential habitat occurs directly adjacent to study area.
<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	P2		x	5.2 km	Small, trailing or tufted herb with yellow flowers. Occurs in shaded areas around rocky outcrops and gullies (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Pentalepis trichodesmoides</i> subsp. <i>hispida</i>	P2		x	21.3 km	Much-branched shrub to 1m tall. Leaves are conspicuously hispid. Occurs on summits and slopes of low hills, basaltic soils (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Astrebula lappacea</i>	P3	x	x	< 500 m	Tufted perennial grass to 0.8m tall. Occurs on clay, loam (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3		x	900 m	Small, spreading annual herb to 0.2m with blue to white flowers. Occurs on seasonally inundated clays on gibber plains (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Eremophila magnifica</i> subsp. <i>velutina</i>	P3	x	x	< 300 m	Shrub to 1.5m tall with blue-purple flowers. Occurs on skeletal soils over ironstone on hills and summits (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Euphorbia australis</i> var. <i>glabra</i>	P3	x	x	100 m	Prostrate, annual herb. Occurs on cracking clay loamy soils (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Fimbristylis sieberiana</i>	P3	x	x	2.3 km	Shortly rhizomatous, tufted perennial sedge to 0.6m tall. Occurs on mud, skeletal soil pockets on pool edges and sandstone cliffs (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Glycine falcata</i>	P3	x	x	700 m	Mat-forming perennial herb to 0.2m tall with blue-purple flowers. Occurs along drainage depressions in crabhole plains and floodplains (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Gymnanthera cunninghamii</i>	P3	x	x	2.1 km	Erect shrub to 2m tall, with cream-yellow-green flowers. Occurs on sandy soils (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Indigofera gilesii</i>	P3		x	15 km	Shrub to 1.5m tall with purple-pink flowers. Occurs on pebbly loam, amongst boulders and outcrops on hills (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Indigofera rivularis</i>	P3		x	100 m	Tall shrub to 2m high with white-pink-violet flowers. Occurs on coarse alluvium in and along creeklines (Rio Tinto and Parks and Wildlife 2015). Has been recorded from vegetation association EIEgAatAeAbTeTw and EIAmaiAhiTw adjacent to the study area, however as study area is well-surveyed this perennial shrub would likely have been recorded if present within the study area.	Unlikely Potential habitat may occur within the study area however it has been comprehensively surveyed and was not recorded in previous surveys.
<i>Iotasperma sessilifolium</i>	P3	x		5.4 km	Erect herb with pink flowers. Occurs on cracking clay, black loam along edges of waterholes and on plains (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Ptilotus subspinescens</i>	P3	x	x	6.7 km	Compact shrub to 0.8m tall. Occurs on gentle rocky slopes, screes and bases of screes (WAH 2022).	Unlikely No core/potential habitat within study area.

Species	Status	NM	RT	Distance to nearest record (km)	Habit, habitat and discussion	Likelihood of occurrence
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	P3		x	18 km	Lax, scrambling shrub to 4m tall. Occurs in mulga on cracking clays (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	P3	x	x	< 100 m	Herb or shrub to 0.3m tall with blue-purple-violet flowers. Occurs on ironstone soils, near creeks and rocky hills (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	P3		x	14.5 km	Spreading shrub to 0.5m tall with yellow flowers. Occurs on skeletal red soils on steep slopes (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Sida</i> sp. Hamersley Range (K. Newbey 10692)	P3		x	1.9 km	Open shrub to 2m tall with yellow flowers. Occurs on rocky outcrops and breakaways (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Swainsona thompsoniana</i>	P3	x	x	350 m	Prostrate, annual herb to 0.1m tall with blue-mauve flowers. Occurs on gibber plains, crabhole plains and gilgai (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3	x	x	< 100 m	Robust, perennial grass to 2m tall. Occurs on drainage lines, clay flats, crabhole plains and self-mulching clays (Rio Tinto and Parks and Wildlife 2015). Has been recorded from vegetation association ElEgAatAeAbTeTw adjacent to the study area, however as study area is well-surveyed this perennial grass would likely have been recorded if present within the study area.	Unlikely Potential habitat may occur within the study area however it has been comprehensively surveyed and was not recorded in previous surveys.
<i>Triodia basitricha</i>	P3	x	x	200 m	Tussock-forming perennial grass to 0.4m tall. Occurs on slopes or crests of rocky hills (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Triodia pisoliticola</i>	P3		x	20 km	Perennial, tufted grass (spinifex) to 0.5m tall. Occurs on skeletal soils on ironstone, associated with summits of mesas or hilly areas (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Amaranthus centralis</i>	P3		x	13.7 km	Annual herb to 0.6m tall. Occurs on ephemeral watercourses, sandy to clayey loam river banks and edges of permanent pools (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	P3		x	18.1 km	Compactly tufted, perennial grass to 0.8m tall. Occurs on hardpan plains (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Dampiera anonyma</i>	P3		x	15.6 km	Multi-stemmed perennial herb to 0.5 (-1)m tall, with blue-purple flowers. Occurs on hill summits and upper slopes above 1,000m (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Eragrostis surreyana</i>	P3		x	4.1 km	Small, tufted annual grass to 0.1m tall. Occurs in seasonally wet areas (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Eremophila naaykensis</i>	P3		x	15.7 km	Rounded shrub to small tree to 2.5m tall. Occurs on tops of ironstone ranges, breakaways and on upper slopes, often in and around rocky gullies and gorges (Curtis et al. 2022).	Unlikely No core/potential habitat within study area.
<i>Grevillea saxicola</i>	P3		x	2.0 km	Upright shrub or small tree to 2.5-7m tall with cream to pale yellow flowers. Occurs on upper scree/breakaway slopes and crests often associated with banded ironstone outcropping and mulga woodlands (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Acacia bromilowiana</i>	P4		x	1 km	Tree or shrub to 12m tall. Occurs on red skeletal soil on laterite, banded ironstone, basalt, on rocky hills, breakaways, scree slopes, gorges and creek beds (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	P4		x	2.1 km	Shrub to 1.5m tall with blue flowers. Occurs on skeletal soils over ironstone, on rocky screes (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Goodenia nuda</i>	P4	x	x	1.2 km	Erect to ascending herb to 0.5m tall with yellow flowers (WAH 2022). Occurs on seasonally inundated clay soils and drainage lines, often in mulga (Rio Tinto and Parks and Wildlife 2015).	Unlikely No core/potential habitat within study area.
<i>Livistona alfredii</i> Millstream Fan-palm	P4	x	x	13.3 km	Palm tree to 10m high. Occurs on the edges of permanent pools (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Ptilotus mollis</i>	P4	x	x	4 km	Compact, perennial shrub to 0.5m tall. Occurs on stony hills and screes (WAH 2022).	Unlikely No core/potential habitat within study area.
<i>Rhynchosia bungarensis</i>	P4	x	x	2.3 km	Compact, prostrate shrub to 0.5m tall with yellow flowers. Occurs on pebbly, coarse sand amongst boulders and banks of flow lines and in gullies (WAH 2022).	Unlikely No core/potential habitat within study area.

NM – NatureMap; RT – Rio Tinto Priority Flora Database.

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

C.3. Fauna analysis table

Fauna analysis of records within 20 kilometres of the application area their likelihood of occurrence (Rio Tinto, 2022).

Species (Common name)	Status	NM	RT	Distance to nearest record	Habitat and discussion	Likelihood of occurrence
<i>Dasyurus hallucatus</i> (northern quoll)	EN	x	x	300 m	Northern quoll occupy a diverse range of habitats including rocky areas, eucalypt forest, woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert (Department of Climate Change, Energy, the Environment and Water 2005). Habitat generally encompasses some form of rocky area for denning purposes with surrounding vegetated habitats used for foraging and dispersal. Dens are made in rock crevices, tree holes or occasionally termite mounds (Department of Climate Change, Energy, the Environment and Water 2005). In the Pilbara region, the species appears to prefer the Rocklea, Macroy and Robe land systems (Biota Environmental Services 2008). The northern quoll has also been recorded in other land systems which comprise sandstone and dolomite hills and ridges, shrublands, sandy plains, clay plans and tussock grasslands and coastal fringes including dunes islands and beaches (Biota Environmental Services 2008).	Potential Recorded within 300 m of study area (opportunistic sighting) and also motion camera and scats. The study area does not contain core habitat for this species although it may pass through the area.
<i>Macroderma gigas</i> (ghost bat)	VU	x	x	Previously recorded	The ghost bat is patchily distributed across the northern half of Australia. This species requires undisturbed roost sites which are often complex and contain multiple entrances; it has been known to utilise old abandoned mine shafts (Menkhorst and Knight 2017).	Previously Recorded The study area does not contain core habitat for this species although it may pass through the area.
<i>Rhinonicteris aurantia</i> (Pilbara leaf-nosed bat)	VU	x	x	Previously recorded	The Pilbara leaf-nosed bat inhabits abandoned mine shafts, granite rock pile terrain of the east Pilbara and caves formed in gorges that dissect sedimentary geology in the west Pilbara (Van Dyck and Strahan 2008). This species is more influenced by the availability of suitable roost caves than by habitat type and high humidity is particularly important to this species (Churchill 1998).	Previously Recorded The study area does not contain core habitat for this species although it may pass through the area.
<i>Liasis olivaceus barroni</i> (Pilbara olive python)	VU		x	Previously recorded	Pilbara olive python habitat includes escarpments, gorges and water holes in the ranges of the Pilbara region (Pearson 1993; Wilson & Swan 2008). Individuals are usually recorded in close proximity to water and rock outcrops that attract suitably sized prey species (Pearson 2003).	Previously Recorded The study area does not contain core habitat for this species although it may pass through the area.

Species (Common name)	Status	NM	RT	Distance to nearest record	Habitat and discussion	Likelihood of occurrence
<i>Leggadina lakedowensis</i> (Lakeland Downs mouse)	P4	x	x	200 m	This species occurs on a variety of habitats, most of which are seasonally inundated sandy-clay soils. In the Pilbara this species occurs in spinifex and tussock grasslands (van Dyck and Strahan 2008) and are strongly correlated with cracking clay communities or heavily clay-laden soils supporting tussock grasslands.	Potential The study area does not contain core habitat to support this species, although it occurs in nearby areas and may opportunistically pass through the habitat within the study area.
<i>Notoscincus butleri</i> (lined soil-crevice skink)	P4	x	x	50 m	Spinifex dominated areas near creeks and river margins in arid, rocky, near-coastal areas (Wilson and Swan 2010).	Potential Adjacent water course and vegetation may provide suitable habitat, especially as this species has been previously recorded from the study area.
<i>Pseudomys chapmani</i> (western pebble-mound mouse)	P4	x	x	215 m	This species is found on stony hillsides with hummock grassland (Menkhorst & Knight 2017). This species favours scree and stony plains habitat where it constructs conspicuous, extensive mounds of small stones. The pebble-mounds are found on gently sloping hills where the ground is stony with continuous small pebbles.	Potential Mounds recorded in close proximity and potential habitat present within the study area.
<i>Sminthopsis longicaudata</i> (long-tailed dunnart)	P4	x		8 km	Common in rocky screes with hummock grassland and acacia shrubs, tall open shrub and woodlands (Menkhorst & Knight 2017).	Unlikely The study area is not expected to contain core habitat for this species.
<i>Falco peregrinus</i> (Peregrine falcon)	OS		x	Not available	The peregrine falcon inhabits cliffs, gorges, timbered waterways, riverine environments, wetlands, plains and open woodlands. It also inhabits pylons, spires and buildings. Nesting habitat includes cliff edges or crevices, large tree hollows, other raptor or corvid nests and ledges of city buildings (Pizzey & Knight 2012).	Potential This species is wide ranging and may occur within the study area opportunistically to forage.

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

Appendix D. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
<p><u>Principle (a):</u> "Native vegetation should not be cleared if it comprises a high level of biodiversity."</p> <p><u>Assessment:</u></p> <p>According to available databases and flora surveys, there are no known Threatened or Priority flora within the application area (Rio Tinto, 2022; 2023; GIS Database). The likelihood of occurrence assessment for priority flora indicated that two species had the potential to occur within the application area (<i>Calotis squamigera</i> - P1 and <i>Ipomoea racemigera</i> - P2). However, the majority of the application area does not have suitable habitat for these species as it either has minimal similar habitats to support these species or it lacks core vegetation types associated with them (Rio Tinto, 2022; GIS Database). Furthermore, suitable habitats are largely represented outside the application area (Rio Tinto, 2022). Therefore, given the small scale of the proposed activities, existing disturbances i.e. access tracks, and habitats not being restricted to the application area, it is unlikely that the proposed clearing will significantly impact the status of these species if present (Rio Tinto, 2022; 2023).</p>	May be at variance	Yes <i>Refer to Section 3.2.1, above.</i>

Assessment against the clearing principles	Variance level	Is further consideration required?
<p>The application area falls within the buffer region of 'Brockman Iron cracking clay communities of the Hamersley Range' priority ecological community (PEC), listed as Priority 1 under the BC Act 2016 (Rio Tinto, 2022; GIS Database). There are no mapped Threatened Ecological Communities (TEC) within the application area; however, 'Themeda grasslands on cracking clays (Hamersley Station)' TEC is located within 200 meters east of the application area (Rio Tinto, 2022; GIS Database).</p>		
<p><u>Principle (b):</u> <i>"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna."</i></p> <p><u>Assessment:</u></p> <p>The application area contains habitats for conservation significant fauna.</p>	May be at variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><u>Principle (c):</u> <i>"Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."</i></p> <p><u>Assessment:</u></p> <p>There are no known records of Threatened flora within the application area or in local surrounds (GIS Database). A desktop and flora survey of the application area did not record any species of Threatened flora (Rio Tinto, 2022), and the vegetation proposed to be cleared is not expected to support any species of Threatened flora (GIS Database).</p>	Not likely to be at variance	No
<p><u>Principle (d):</u> <i>"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community."</i></p> <p><u>Assessment:</u></p> <p>There are no mapped Threatened Ecological Communities (TEC) within the application area; however, 'Themeda grasslands on cracking clays (Hamersley Station)' TEC, listed as Vulnerable under the <i>BC Act 2016</i>, is located approximately 200 meters east of the application area (Rio Tinto, 2022).</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.1, above.</i>
Environmental value: significant remnant vegetation and conservation areas		
<p><u>Principle (e):</u> <i>"Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared."</i></p> <p><u>Assessment:</u></p> <p>The extent of the mapped vegetation type is consistent with the national objectives and targets for biodiversity conservation in Australia. The current extent of vegetation associations remaining (Government of Western Australia, 2019):</p> <ul style="list-style-type: none"> • Hamersley 18: 99.3% (676,556.72 ha) • Hamersley 29: 99.87% (1,131,712.01 ha) • Hamersley 567: 99.66% (774,213.03 ha) <p>The vegetation proposed to be cleared is not considered to be part of a significant ecological linkage in the local area (GIS Database).</p>	Not at variance	No
<p><u>Principle (h):</u> <i>"Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area."</i></p> <p><u>Assessment:</u></p> <p>Given the distance to the nearest conservation area (GIS Database), the proposed clearing is unlikely to have an impact on the environmental values of any conservation areas.</p>	Not likely to be at variance	No
Environmental value: land and water resources		
<p><u>Principle (f):</u> <i>"Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland."</i></p> <p><u>Assessment:</u></p> <p>There are no permanent waterbodies or watercourses within the application area (GIS Database). However, the application area presents several ephemeral drainage lines and it is situated adjacent to Caves Creek (GIS Database). As the vegetation associated with this ephemeral drainage line may be cleared, it is recommended to maintain surface water flow or reinstate downstream into existing natural drainage</p>	At variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
lines. Potential impacts to these vegetation units as a result of the proposed clearing may be minimised by the implementation of a watercourse management condition.		
<p><u>Principle (g):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</i></p> <p><u>Assessment:</u></p> <p>The mapped Boolgeeda and Newman Land Systems within the application are generally not susceptible to wind or water erosion (DPIRD, 2024; Van Vreeswyk et al., 2004). In addition, part of the application area has previously been disturbed by mining activities. Therefore, the proposed activities to clear up to 30 hectares of native vegetation is unlikely to have an appreciable impact on land degradation.</p>	Not likely to be at variance	No
<p><u>Principle (i):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.”</i></p> <p><u>Assessment:</u></p> <p>Given no permanent water courses, wetlands, or Public Drinking Water Source Areas are recorded within the application area (GIS Database), the proposed clearing is unlikely to impact surface or ground water quality.</p> <p>The proponent declared to be in accordance of the Ministerial Condition (MS 925), which states that the implementation of the MAR scheme are planned to maintain groundwater levels of the underlying aquifer at Caves Creek (Narraminju) to guarantee the prevention of long-term impacts to groundwater dependent vegetation communities adjacent to the Silvergrass East Iron Ore Mine (Hamersley Iron, 2022a).</p>	Not likely to be at variance	No
<p><u>Principle (j):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.”</i></p> <p><u>Assessment:</u></p> <p>There are no permanent water courses or waterbodies within the application area (GIS Database). The proposed clearing of 30 hectares within a permit boundary of approximately 275 hectares is not likely to cause an increase in the incidence or intensity of flooding in the local area. Therefore, the application area is unlikely to cause the incidence or intensity of flooding.</p>	Not likely to be at variance	No

Appendix E. Vegetation condition rating scale

Vegetation condition is a rating given to a defined area of vegetation to categorise and rank disturbance related to human activities. The rating refers to the degree of change in the vegetation structure, density and species present in relation to undisturbed vegetation of the same type. The degree of disturbance impacts upon the vegetation’s ability to regenerate. Disturbance at a site can be a cumulative effect from a number of interacting disturbance types.

Considering its location, the scale below was used to measure the condition of the vegetation proposed to be cleared. This scale has been extracted from Trudgen, M.E. (1991) *Vegetation condition scale* in National Trust (WA) 1993 Urban Bushland Policy. National Trust of Australia (WA), Wildflower Society of WA (Inc.), and the Tree Society (Inc.), Perth.

Measuring vegetation condition for the Eremaean and Northern Botanical Provinces (Trudgen, 1991)

Condition	Description
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Very poor	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.

Condition	Description
Completely degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

Appendix H. Mapping of various features in the application area

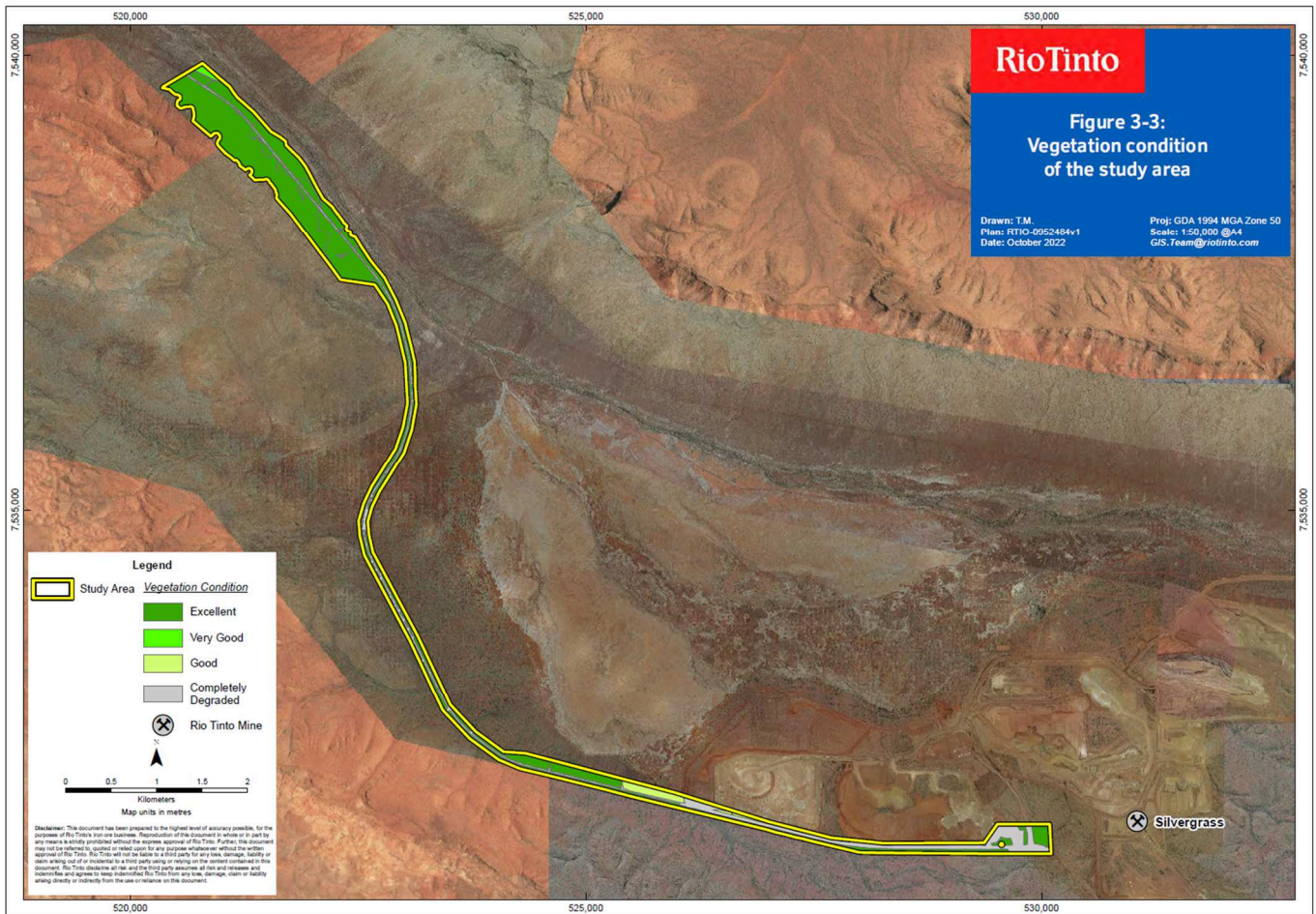


Figure 3. Map of vegetation condition (Rio Tinto, 2022).

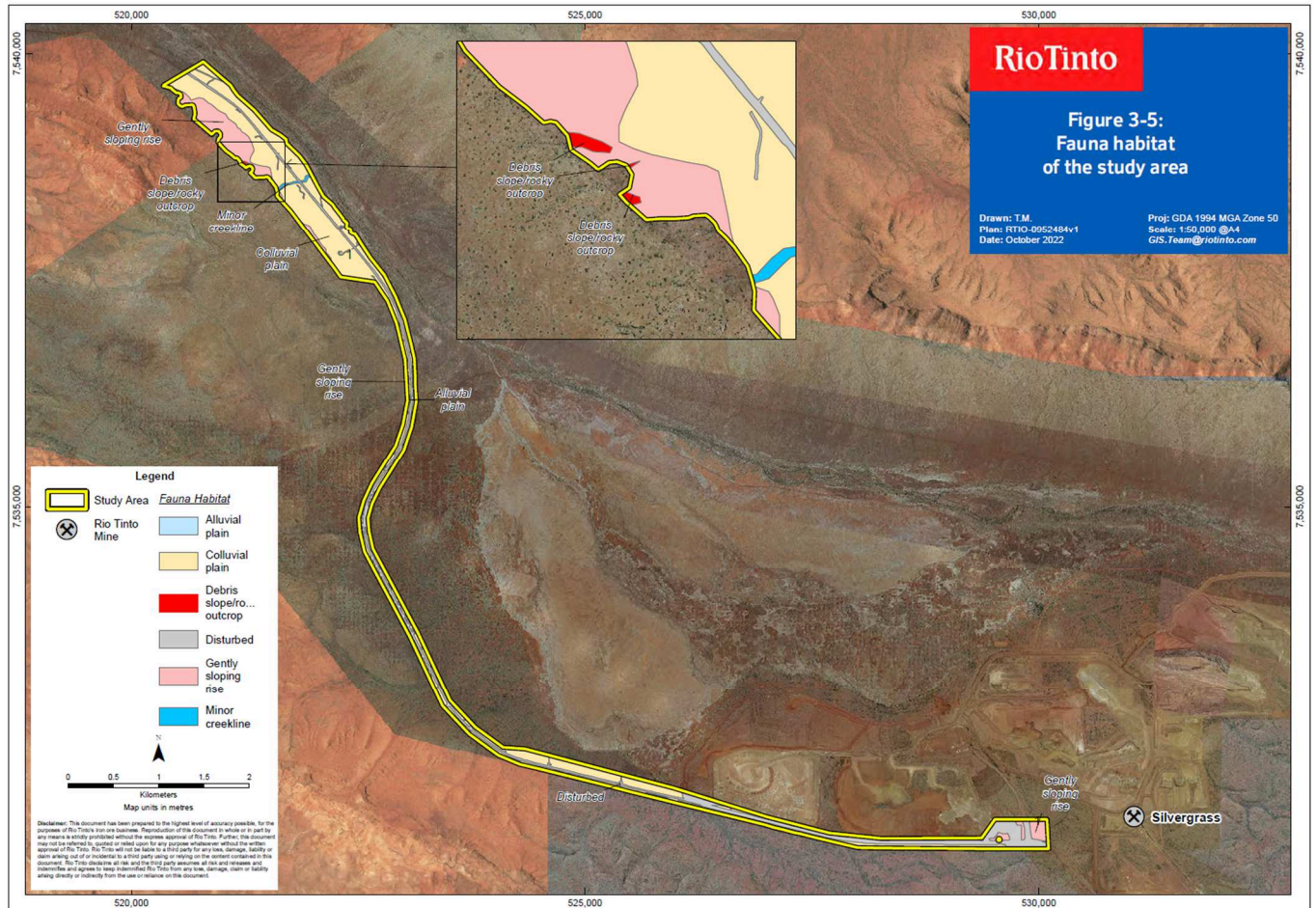


Figure 4. Map of fauna habitat (Rio Tinto, 2022).

Appendix I. Sources of information

I.1. GIS databases

Publicly available GIS Databases used (sourced from www.data.wa.gov.au):

- 10 Metre Contours (DPIRD-073)
- Aboriginal Heritage Places (DPLH-001)
- Clearing Regulations – Schedule One Areas (DWER-057)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Directory of Important Wetlands in Australia – Western Australia (DBCA-045)
- Environmentally Sensitive Areas (DWER-046)
- Groundwater Salinity Statewide (DWER-026)
- Hydrographic Catchments – Catchments (DWER-028)
- Hydrography – Inland Waters – Waterlines
- Hydrography, Linear (DWER-031)
- Hydrological Zones of Western Australia (DPIRD-069)
- IBRA Vegetation Statistics
- Native Title (ILUA) (LGATE-067)
- Pre-European Vegetation Statistics
- Remnant Vegetation, All Areas
- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil Landscape Mapping – Best Available (DPIRD-027)
- Soil Landscape Mapping – Rangelands (DPIRD-064)
- WA Now Aerial Imagery
- Wild Rivers (DWER-087)

Restricted GIS Databases used:

- Threatened Flora (TPFL)
- Threatened Flora (WAHerb)
- Threatened Fauna
- Threatened Ecological Communities and Priority Ecological Communities
- Threatened Ecological Communities and Priority Ecological Communities (Buffers)

I.2. References

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4. Glossary

Acronyms:

BC Act	<i>Biodiversity Conservation Act 2016</i> , Western Australia
BoM	Bureau of Meteorology, Australian Government
DAA	Department of Aboriginal Affairs, Western Australia (now DPLH)
DAFWA	Department of Agriculture and Food, Western Australia (now DPIRD)
DAWE	Department of Agriculture, Water and the Environment, Australian Government
DBCA	Department of Biodiversity, Conservation and Attractions, Western Australia
DER	Department of Environment Regulation, Western Australia (now DWER)
DMIRS	Department of Mines, Industry Regulation and Safety, Western Australia
DMP	Department of Mines and Petroleum, Western Australia (now DMIRS)
DoEE	Department of the Environment and Energy (now DAWE)
DoW	Department of Water, Western Australia (now DWER)
DPaW	Department of Parks and Wildlife, Western Australia (now DBCA)
DPIRD	Department of Primary Industries and Regional Development, Western Australia
DPLH	Department of Planning, Lands and Heritage, Western Australia
DRF	Declared Rare Flora (now known as Threatened Flora)
DWER	Department of Water and Environmental Regulation, Western Australia
EP Act	<i>Environmental Protection Act 1986</i> , Western Australia
EPA	Environmental Protection Authority, Western Australia
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Federal Act)
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
PEC	Priority Ecological Community, Western Australia
RIWI Act	<i>Rights in Water and Irrigation Act 1914</i> , Western Australia
TEC	Threatened Ecological Community

Definitions:

{DBCA (2019) Conservation Codes for Western Australian Flora and Fauna. Department of Biodiversity, Conservation and Attractions, Western Australia}:-

T **Threatened species:**

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of ‘Specially Protected Fauna’ listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of ‘Rare Flora’ listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR **Critically endangered species**

Threatened species considered to be “*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*”.

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

EN **Endangered species**

Threatened species considered to be “*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*”.

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU **Vulnerable species**
Threatened species considered to be “*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*”.

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct Species:

EX **Extinct species**
Species where “*there is no reasonable doubt that the last member of the species has died*”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW **Extinct in the wild species**
Species that “*is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species:

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI **Migratory species**
Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD **Species of special conservation interest (conservation dependent fauna)**
Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS **Other specially protected species**
Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P **Priority species:**
Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories

are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

P1 Priority One - Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

P2 Priority Two - Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

P3 Priority Three - Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

P4 Priority Four - Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Principles for clearing native vegetation:

- (a) Native vegetation should not be cleared if it comprises a high level of biological diversity.
- (b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna.
- (c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.
- (d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.
- (e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.
- (f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.
- (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.
- (h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.
- (i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.
- (j) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.