Department of Energy, Mines, Industry Regulation and Safety

GOVERNMENT OF WESTERN AUSTRALIA

Clearing Permit Decision Report

1. Application details and outcomes

1.1. Permit application details

Permit number:	10502/1
Permit type:	Purpose Permit
Applicant name:	Hamersley HMS Pty Ltd
Application received:	15 January 2024
Application area:	10.2 hectares
Purpose of clearing:	Hydrogeological drilling, fauna/flora monitoring, groundwater/hydrogeological monitoring, infrastructure access, Aboriginal Heritage survey/access and associated activities.
Method of clearing:	Mechanical Removal
Tenure:	*Iron Ore (Hope Downs) Agreement Act 1992,* Mining Lease 282SA
Location (LGA area/s):	Shire of East Pilbara
Colloquial name:	Hope Downs 1 – Hydrogeology Drilling Program

1.2. Description of clearing activities

Hamersley HMS Pty Ltd proposes to clear up to 10.2 hectares of native vegetation within a boundary of approximately 143.6 hectares, for the purpose of hydrogeological drilling, fauna/flora monitoring, groundwater/hydrogeological monitoring, infrastructure access, Aboriginal Heritage survey/access and associated activities (Hamersley HMS Pty Ltd, 2024b). The project is located approximately 70 kilometres northwest of Newman, within the Shire of East Pilbara.

The application is primarily to allow for a mine aquifer recharge trial program, consisting of approximately 28 monitoring bores, four vibrating wire piezometers, five production bores up to 200 metres in depth and up to 5 kilometres of new tracks (Rio Tinto, 2023).

1.3. Decision on application and key considerations

Decision:	Grant
Decision date:	18 July 2024
Decision area:	10.2 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 B), relevant datasets (Appendix J), supporting information provided by the applicant (Appendix A), including the results of a flora and vegetation survey, the clearing principles set out in Schedule 5 of the EP Act (Appendix C), 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,
- impact on two priortiy flora species (*Acacia subtiliformis* (P3) and *Goodenia* sp. East Pilbara (P3)),
- potential impacts to groundwater depedent ecosystem,
- impact on habitat for the Western pebble-mound mouse,
- potential impacts to habitat that may be utilised for foraging and dispersal by conservation significant fauna, and
- potential secondarty impacts of a Priority Ecological Community.

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 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 to avoid riparian vegetation and ensure existing surface flow is maintained;
- 10-metre buffer surrounding the active and inactive mounds of the Western pebble-mound mouse;
- undertake slow, progressive one-directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity; and
- retain cleared vegetation and topsoil and respread this on a cleared area of equivalent size within application area within 12 months of clearing to ensure native vegetation and fauna habitat is not permanently lost.

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)
- *Rights in Water and Irrigation Act 1914*
- *Iron Ore (Hope Downs) Agreement Act 1992*

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 2021)
- 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

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. Applicant operational control measures (Rio Tinto, 2023):

- clearing will be undertaken with raised blade technique, where possible;
- access will be mainly along existing tracks to minimise new disturbance, where possible;
- Ground Disturbance, Re-entering a Rehabilitated Area and Track maintenance Standard Work Practice;
- Equipment Hygiene Inspection Work Practice;
- Operational Control Procedure: Drilling; and
- Closure, Rehabilitation and Monitoring Standard Work Practice; and
- Discharge Management Plan.

3.2. Assessment of impacts on environmental values

In assessing the application, the Delegated Officer has had regard for the site characteristics (see Appendix A) 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 identified that the impacts of the proposed clearing present a risk to conservation biological and water resources values. The consideration of these impacts, and the extent to which they can be managed through conditions applied in line with sections 51H and 51I of the EP Act, is set out below.

3.2.1. Biological values (Flora) - Clearing Principles (a)

Assessment

A flora and vegetation survey was conducted over the application area by Rio Tinto (2023) during a field trip between 1 and 5 May 2023. Two priority 3 flora were recorded within the application area, one undescribed species and potentially suitable habitat for seven priority flora recorded in the surrounding area (50 kilometres) (Rio Tinto, 2023; GIS Database):

- *Aristida lazaridis* (P2);
- *Kohautia australiensis* (P2);
- *Acacia subtiliformis* (P3);
- *Goodenia* sp. East Pilbara (A.A Mitchell PRP 727) (P3);
- *Rostellularia adscendens* var. *latifolia* (P3);
- *Stylidium weeliwolli* (P3);
- *Triodia basitricha* (P3);
- *Vittadinia* sp. Coondewanna Flats (S. van Leeuwen 4684) (P3);

- *Lepidium catapycnon* (P4); and
- Plant of special interest (PSI) - *Euploca glandulifera*

***Acacia subtiliformis* (P3)**
Acacia subtiliformis is a priority 3 flora species limited to the Pilbara region, with records in Fortescue and Hamersley subregions (Western Australian Herbarium, 1998-). The current extent of occurrence is from approximately 60 kilometres east of Tom Price, 30 kilometres northwest of Newman and approximately 17 kilometres south of Fortescue marsh (Western Australian Herbarium, 1998-). There are herbarium records in similar habitat approximately 700 metres north and 1.8 kilometres south of the application area, however there are currently no records for this species within conservation areas and all DBCA records occur within current or pending mining tenements, that could lead to potential cumulative impacts to this species (DBCA, 2024). *Acacia subtiliformis* occurs in low, undulating country on calcareous rises adjacent to drainage lines and has been recorded throughout the application area (Rio Tinto, 2023; Western Australian Herbarium, 1998-). A total of 9,722 individuals from 133 records occur within the application area and 55,437 individuals from 314 records outside the application area in the local surrounds (20 kilometres) (Hamersley HMS Pty Ltd, 2024a; Rio Tinto, 2023; Appendix I). Rio Tinto's database has 223,279 records of uncleared individuals of *Acacia subtiliformis* across 128 kilometres in the Pilbara (Hamersley HMS Pty Ltd, 2024a). Herbarium information on this species indicate it is likely to be fire responsive and it has potentially been recorded in high numbers due to recent fire event in the area (DBCA, 2024). This species was dominant within the V1 vegetation type that is described as widespread and extending outside the application boundary (Rio Tinto, 2023). An additional 320 individuals were recorded outside the application area during a targeted flora survey in May 2024 (Rio Tinto, 2024). The area proposed to be cleared is 10.2 hectares (7.1%) within a boundary of 143.6 hectares, therefore, the maximum number of individuals likely to be impacted is approximately 680, which is approximately 1.04% of individuals within the local area. Given the abundance of individuals and suitable adjacent habitat, the proposed clearing may potentially impact the local population but is unlikely to be significant at a regional or species level.

***Goodenia* sp. East Pilbara (P3)**
Goodenia sp. East Pilbara is a priority 3 flora species occurring across the Gascoyne and Pilbara regions and four subregions (Western Australian Herbarium, 1998-). The current extent of occurrence is from approximately 45 kilometres west of Tom Price, 80 kilometres south of Karijini National Park, and 70 kilometres west of Karlamilyi National Park (Western Australian Herbarium, 1998-). The preferred habitat is low undulating or swampy plains with red-brown clay soil and calcrete pebbles (Western Australian Herbarium, 1998-). There are herbarium records within 2 kilometres of the application area indicating this species occurs in similar surrounding habitat (DBCA, 2024). *Goodenia* sp. East Pilbara has been recorded throughout the application area, in V1 and V2 vegetation types, on calcrete low hills or drainage lines (Rio Tinto, 2023). A total of 308 individuals from 71 records occur within the application area and 3,629 individuals from 213 records outside of the application area in the local surrounds (20 kilometres) (Hamersley HMS Pty Ltd, 2024a; Appendix I). Rio Tinto's database has 86,496 records of uncleared individuals of *Goodenia* sp. East Pilbara outside the application area across 324 kilometres in the Pilbara region (Hamersley HMS Pty Ltd, 2024a). An additional 20 individuals were recorded outside the application area during a targeted flora survey in May 2024 (Rio Tinto, 2024). While some of the local records are from 2006, the area proposed to be cleared is 10.2 hectares (7.1%) within a boundary of 143.6 hectares, therefore, the maximum number of individuals likely to be impacted is approximately 22, which is approximately 0.6% of individuals within the local area. Given the broad species occurrence and suitable adjacent habitat, the proposed clearing may potentially impact the local population but is unlikely to be significant at a regional or species level. Considerations should be taken into account during planning to minimise local impacts to the conservation status of this species when determining the location of monitoring bores, piezometers and production bores.

Plant of special interest - *Euploca glandulifera*
One taxon was recorded within the application area that did not match any current known flora species and was considered to represent a novel, undescribed species (Rio Tinto, 2023). Approximately 6 individuals were recorded within the application area that resembled *Euploca glandulifera,* however glandular hairs only appeared to be present on sepals (Rio Tinto, 2023; Appendix I). The proponent undertook an additional targeted field survey on 3 May 2024 and results from the survey identified the undescribed species to be *Euploca glandulifera* (DBCA, 2024; Rio Tinto, 2024). The additional 14 specimens collected during the targeted survey were examined by the Western Australian Herbarium and noted mericarps were flanged on the margins, which is a typical characteristic of *Euploca glandulifera* (DBCA, 2024). This species occurs across seven IBRA regions and is common and widespread across the northern parts of Western Australia (Western Australian Herbarium, 1998-; Appendix H). *Euploca glandulifera* has several different holotypes, with this form potentially only occurring in the Pilbara region usually on calcrete or mudstone, however molecular studies may be required to determine taxonomic issues (DBCA, 2024). While calcrete landform may be restricted in the landscape, where these individuals were recorded, this landform is common and widespread throughout the Pilbara region (DBCA, 2024).

Other priority flora
Two priority flora species (*Rostellularia adscendens* var. *latifolia* (P3) and *Stylidium weeliwolli* (P3)) potentially occur within habitat associated with drainage lines, however, were not recorded during field survey (Rio Tinto, 2023). Three minor drainage lines under 10 metres in width occur within the application area, however no permanent wetlands or watercourses were identified (Rio Tinto, 2023; GIS Database). *Rostellularia adscendens* var. *latifolia* occurs across three subregions within the Pilbara bioregion inhabiting ironstone soils, near creeks and rocky hills (Western Australian Herbarium, 1998-). *Stylidium weeliwolli* occurs across five subregions in the Gascoyne and Pilbara regions occurring in areas of low undulating plains or swampy plains along the edges of watercourses generally dominated by *Eucalyptus victrix* (Rio Tinto, 2023; Western Australian Herbarium, 1998-). There are records of both species along Weeli Wolli Creek one kilometre north of the application area (Hamersley HMS Pty Ltd, 2024a; GIS Database). A targeted survey in May 2024 identified habitat within the application area was unlikely to support *Stylidium weeliwolli* (Rio Tinto, 2024). Potential impacts to priority flora likely to inhabit this area can be mitigated with a watercourse management condition to avoid riparian vegetation.

Five priority flora species (*Aristida Lazaridis* (P2), *Kohautia australiensis* (P2), *Triodia basitricha* (P3), *Vittadinia* sp. Coondewanna Flats (S. van Leeuwen 4684) (P3) and *Lepidium catapycnon* (P4)) recorded in the local surrounds have the potential to occur within the application area due to suitable habitat (Rio Tinto, 2023; GIS Database). However, no individuals

were recorded during field survey and suitable habitat extends beyond the boundary of the application. A targeted survey in May 2024 identified habitat within the application area was unlikely to support *Lepidium catapycnon* (Rio Tinto, 2024). If these species were to occur within the application area, there may be some local impact, however, the proposed clearing is unlikely to significantly impact the conservation status of these species.

Priority Ecological Community
The Weeli Wolli Spring is a priority 1 Priority Ecological Community (PEC) in the Pilbara characterised by riparian woodland and forest associations with sedges and herbfield understory that fringe pools and associated water bodies along the main channels of Weeli Wolli Creek (DBCA, 2023; DEC, 2009). The spring and creekline have also recorded a rich microbat assemblage and a high diversity of stygofauna, most likely attributed to the large-scale calcrete and alluvial aquifer system associated with the creek (DBCA, 2023). This PEC is only known to two locations, with the current mapped extent of occurrence of approximately 285 hectares (GIS Database). The application area lies within the buffer region of this PEC (GIS Database). Several herb species and some groundwater dependent species have been recorded within the application area; however, no sedges or permanent waterbodies were recorded (Rio Tinto, 2023). There are three minor non ephemeral drainage lines within the application area that potentially flow downstream into the Weeli Wolli creekline after significant rainfall. Altering flow patterns within the application area has potential to have downstream impacts to this PEC (EPA, 2018). Implementation of a watercourse management condition to ensure the existing surface flow is maintained will minimise potential impacts to the Weeli Wolli Spring community.

Introduced flora
A single record of *Cenchrus ciliaris* was noted within the application area, comprising of approximately 20 individuals on a previously cleared track (Rio Tinto, 2023). No Weeds of National Significance or declared pest plants in Western Australia under the *Biosecurity and Agriculture Management Act 2007* have been recorded within the application area, however weeds have potential to out-compete native flora and reduce biodiversity of an area. Potential impacts to biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed management condition.

Conclusion
For the reasons set out above, it is considered that the impacts of the proposed clearing on conservation significant flora and potential secondary impacts to a PEC can be managed by weed management, watercourse management and rehabilitation of the cleared areas post clearing activities.

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;
- vegetation management to avoid riparian vegetation and ensure existing surface flow is maintained; and
- retain cleared vegetation and topsoil and respread this on a cleared area of equivalent size within application area within 12 months of clearing to ensure native vegetation is not permanently lost.

3.2.2. Biological values (Fauna) - Clearing Principles (b)

Assessment

A fauna habitat assessment was undertaken by Rio Tinto (2023) during a field trip between 1 and 5 May 2023. Two broad fauna habitats and disturbance areas were identified and mapped over the application area (Rio Tinto, 2023; Appendix E; Appendix G):

- **Low hills and slopes**: 86.8% (124.7 hectares)
- **Minor drainage**: 11.1% (16 hectares)
- **Disturbance**: 2% (2.9 hectares)

Both fauna habitat types are not considered to be restricted at a local or regional level and extend beyond the application area (Rio Tinto, 2023). The low hills and slopes habitat is considered to be of high value for the Western pebble-mound mouse and moderate value for other conservation significant fauna species (Rio Tinto, 2023). *Triodia* hummocks were reduced in size due to a fire that has impacted the vegetation and habitat within the application area, with some areas showing signs between 2-5 years and other areas between 5-10 years (Rio Tinto, 2023). Minor drainage habitat contains moderate habitat value, as it may provide suitable foraging and dispersal habitat for conservation significant fauna such as northern quoll, ghost bat, Pilbara leaf-nose bat, grey falcon, peregrine falcon and Western pebble-mound mouse (Rio Tinto, 2023).

According to available database information, the conservation significant fauna species listed in Appendix B.3 have been recorded within the local area (50 kilometres) (Rio Tinto, 2023; GIS Database). Noting the findings of field survey for the application area, habitat requirements and the distribution of potentially occurring species, the application area may comprise of suitable habitat for the following conservation significant fauna (Rio Tinto, 2023; GIS Database):

Mammals

- Northern quoll (*Dasyurus hallucatus*) (EN)
- Ghost bat (*Macroderma gigas*) (VU)
- Pilbara leaf-nose bat (Pilbara form) (*Rhinonicteris aurantia*) (VU)
- Western pebble-mound mouse (*Pseudomys chapmani*) (P4)

Birds

- Grey Falcon, (*Falco hypoleucos*) (VU)
- Peregrine Falcon, (*Falco peregrinus*) (OS)

Northern quoll (EN)
The northern quoll can be found in a variety of habitats, with a preference to complex rocky areas in the Pilbara (DNREAS, 2010). Daytime den sites provide important shelter and protection from predators and weather, occurring in rocky outcrops, tree hollow, hogs, termite mounds and goanna burrows (DNREAS, 2010). Drainage habitat associated with watercourses may hold local significance as it facilitates connectivity for dispersal and foraging (Cowan *et al*., 2022; Shaw *et al*., 2023). While the application area does not contain denning habitat, there is potential for the northern quoll to opportunistically utilise minor drainage habitat within the application area for dispersal.

Ghost bat (VU) and Pilbara leaf-nose bat (VU)
The Pilbara leaf-nose bat is a slightly divergent form of the orange leaf-nose bat that occurs only in the Pilbara region. The Pilbara leaf-nose bat forages in a variety of habitats such as *Triodia* hummock grasslands and complex riparian zones where water is permanently available (Armstrong, 2001; McKenzie and Bullen, 2013). This species roosts during the day in the dark areas of caves and underground mines with stable, warm and humid microclimates (Bat Call WA, 2021b). The ghost bat is a carnivorous species with patchy distribution of isolated populations within the semi-desert Pilbara region (Bat Call WA, 2021a). This species depends on day roosts found deep underground in temperature-stable caves with chambers and/or cavities that trap humidity (Bat Call WA, 2021a). The Pilbara populations forage in productive habitat areas including drainage lines and along riparian corridors, on alluvial plains supporting mulga woodland and tussock grassland, sparse woodland along ridge lines (Cramer *et al*., 2022). The Weeli Wolli Creek located approximately one kilometre north of the application area provides suitable foraging habitat for both these species. The application are does not contain suitable breeding habitat, as no roosting areas were identified, however there is potential for either the ghost bat or the Pilbara leaf-nose bat to occasionally utilise the application area as foraging habitat.

Western pebble-mound mouse (P4)
The Western pebble-mound mouse has a distribution through the non-coastal, central and eastern parts of the Pilbara, with large populations recorded in the major national parks of the region (Karijini, Rudall River, Millstream-Chichester and Collier Range) (Burbidge, 2016). This species is found in area of rocky, hummock grassland with little or no soil and an overstory of *Acacia* (Burbidge, 2016). Individuals live in groups in burrows below mounds of pebbles, typically on low gravelly and stony rises (Burbidge, 2016). The Western pebble-mound mouse has been recorded within the application area, with 18 active mounds and four inactive mounds located (Rio Tinto, 2023; Appendix I). Implementation of a fauna management condition for slow directional clearing and a 10 metre buffer surrounding active and inactive western pebble-mound mouse mounds will minimise the impacts to individuals identified within the application area.

Birds
The grey falcon is an elusive species distributed through central, northern and north-western Australia, associated with arid to semi-arid lowland plains, particularly acacia shrublands crossed by tree-lined watercourses (DAWE, 2020). The peregrine falcon is found across Australia, and typically nests on rocky ledges in tall, vertical cliff faces and gorges, or in tall trees associated with drainage lines (Australian Museum, 2019). While there is potential for both the grey falcon and peregrine falcon to opportunistically fly over the application area, there are minimal tall trees and no rocky cliff faces that could be utilised as potential breeding habitat (DAWE, 2020; Rio Tinto, 2023). The proposed clearing is unlikely to significantly impact the conservation status of either of these species.

Conclusion
For the reasons set out above, it is considered that the impacts of the proposed clearing on conservation significant fauna and habitat can be managed by avoiding active and inactive Western pebble-mouse mounds, slow directional clearing to allow fauna to move into adjacent vegetation, avoid riparian vegetation that facilitates dispersal and rehabilitating the site post clearing activities 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:

- vegetation management to avoid riparian vegetation;
- undertake slow, progressive one-directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity;
- 10 metre buffer surrounding active and inactive mounds of the Western pebble-mound mouse; and
- retain cleared vegetation and topsoil and respread this on a cleared area of equivalent size within application area within 12 months of clearing to ensure fauna habitat is not permanently lost.

3.3. Relevant planning instruments and other matters

The clearing permit application was advertised on 16 February 2024 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 over the area under application (DPLH, 2024). This claim (WCD2018/008) have been determined by the Federal Court on behalf of the claimant, Nyiyaparli people. Two Indigenous Land Use Agreements are registered between RTIO and Nyiyaparli People, inclusive of Hamersley HMS Pty Ltd as applicant (WI2020/001) and other parties (WI2012/007) to agreement. 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 are no 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.

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 A. Additional information provided by applicant

Summary of comments	Consideration of comment
Results of a targeted survey for *Euploca* sp/PSI identified to be a common and widespread species; *Euploca glandulifera.*	Discussed in 3.2.2

Appendix B. Site characteristics

B.1. Site characteristics

Characteristic	Details
Local context	The area proposed to be cleared is part of an expansive tract of native vegetation in the extensive land use zone of Western Australia (GIS Database). The predominant land use in the region is grazing of native pastures, conservation, mining activities and urban development.
Conservation areas and ecological linkage	There are no conservation areas within or in close proximity to the application area (50 kilometres) (GIS Database). According to available databases, the application area does not contain any known or mapped ecological linkages (GIS Database).
Vegetation description	The application area occurs within the Hamersley subregion of Pilbara (PIL03). The vegetation of the application area is broadly mapped as the following Beard vegetation association: **Hamersley 18**: Low woodland; mulga (*Acacia aneura*) (Government of Western Australia, 2019; GIS Database). A flora and vegetation field survey was conducted over the application area by Rio Tinto during May, 2023. The following vegetation associations were recorded within the application area (Rio Tinto, 2023; Appendix E; Appendix F): Vegetation of undulating plains and low hills: • **V1**: *Eucalyptus socialis* subsp. *eucentrica* and *Corymbia hamersleyana* low open woodland over *Acacia bivenosa* and *Acacia subtiliformis* mid sparse shrubland over *Triodia wiseana* open hummock grassland (117.1 ha/81.5%). • **V3**: *Acacia* spp. low open woodland over *Triodia vanleeuwenii* and *Triodia wiseana* open hummock grassland (7.6 ha/5.3%). Vegetation of drainage lines: • **V2**: *Eucalyptus xerothermica* and *Corymbia hamersleyana* low open woodland over *Petalostylis labicheoides* tall sparse shrubland over *Acacia* spp. mid sparse shrubland over *Triodia wiseana* and *Triodia longiceps* open hummock grassland over *Themeda triandra* isolated tussock grasses (16 ha/11.1%).
Vegetation condition	The vegetation survey indicates the vegetation within the proposed clearing area is in excellent to very good condition (Trudgen, 1991), described as: • **Excellent:** pristine or nearly so, no obvious signs of damage caused by human activities since European settlement. to • **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. The full Trudgen (1991) condition rating scale is provided in Appendix D. Mapping of vegetation condition is provided in Appendix E. The application area consists of mostly excellent vegetation condition (124.3 ha/86.6%), with areas of disturbance (2.9 ha/2%) from access tracks and previous drill pads (Rio Tinto, 2023).
Climate and landform	The application area is mapped within elevations of 600-615 metres Australian Height Datum (GIS Database). The climate for the Pilbara region is semi-arid to tropical with an annual rainfall of 321.8 millimetres recorded at Newman Aero (BoM, 2024; CALM, 2002)
Soil description and land degradation risk	One land system occurs over the entire application area and is mapped as (DPIRD, 2024; Rio Tinto, 2023; Van Vreeswyk, 2004; GIS Database): • **Oakover system (2850k)**: described as breakaways, mesas, plateaux and stony plains of calcrete supporting hard spinifex shrubby grasslands. The soil is characterised as calcareous shallow loam, red shallow loam and red/brown non-cracking clay. This land system is not generally prone to degradation or susceptible to soil erosion (Van Vreeswyk, 2004). Results from a field survey described soil as (Rio Tinto, 2023): • orange and brown clay loam with calcrete rock cover, • red brown clay loam with ironstone, basalt, calcrete and quartz rock cover, and • brown sandy clay loam with calcrete, ironstone and basalt rocks.
Waterbodies and hydrogeography	The desktop assessment and aerial imagery indicated that three minor ephemeral drainage lines that transect the area proposed to be cleared (Rio Tinto, 2023; GIS Database). There are no permanent waterbodies or major watercourses that intersect the application area (Rio Tinto, 2023; GIS Database). There are no Public Drinking Water Source areas, Wetlands of International Importance or Nationally Important Wetlands that occur within the application area or within close proximity (30 kilometres) (GIS Database). The application area is located within the Pilbara Ground Water Area proclaimed under the *Rights in Water and Irrigation Act 1914.*

Flora	No threatened flora have been recorded within the application area (Rio Tinto, 2023; GIS Database). The nearest record of threatened flora is 28 kilometres from the application area (GIS Database). Two priority 3 flora have been recorded within the application area (Rio Tinto, 2023). One plant of special interest has been recorded within the application area (Rio Tinto, 2023). There is potentially suitable habitat for seven priority flora occurring in the local surrounds (50 kilometres) (Rio Tinto, 2023; GIS Database).
Ecological communities	The application area falls within the buffer region of Priority Ecological Community (PEC); Weeli Wolli Spring Community (Priority 1), that is located approximately 1 kilometre north (GIS Database). There are an additional seven PEC's within the surrounding area and no records of Threatened Ecological Communities within the application area or surrounding area (50 kilometres) (GIS Database).
Fauna and fauna habitat	One priority 4 species has been recorded within the application area and records of 24 conservation significant fauna within the local area (50 kilometres) (Rio Tinto, 2023; GIS Database). Two broad habitat types have been described within the application area and 2.9 hectares of disturbed areas (Rio Tinto, 2023): • **Low hills and slopes**: low undulating hills and extensive foot slopes with a gradual gradient. Low hills have rounded summits with plateaus. This habitat does not contain cliff faces or outcropping. Microhabitats generally include high *Triodia* cover, exposed bedrock and small rock piles. Vegetation types found within this habitat consisted of V1 and V3. • **Minor drainage**: small drainage channels less than 10m in width. Often with *Acacia* growth along banks. Does not include the minor drainage depressions that flow from high ground features. This habitat is less likely to support surface water for long after rains. Microhabitats within this habitat type include occasional mature *Eucalyptus* or *Corymbia* and leaf litter. Drainage channel supports fauna dispersal, are subject to seasonal inundation and support richer floristic diversity than surrounds. Vegetation type found within this habitat consisted of V2.

B.2. Flora analysis table

Assessment of the likelihood of occurrence of conservation significant flora identified by desktop assessment in the vicinity of the study area (Rio Tinto, 2023).

Taxa	Conservation Status		Source			Distance to Nearest Record (km)	Flowering Period	Preferred Habitat	Habitat occurs within the Survey Area	Pre-Survey Likelihood of Occurrence	Habitat and discussion (post-field)	Post-Survey Likelihood of Occurrence
	DBCA	EPBC	NatureMap	PMST	RTIO							
Acacia bromilowiana	P4		X		X	8	Jul - Aug	Red skeletal stony loam, orange-brown pebbly, gravel loam, laterite, banded ironstone, basalt. Rocky hills, breakaways, scree slopes, gorges, creek beds.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Acacia subtilliformis	P3		X		X	2.8	Jun - Aug	On rocky calcrete plateau.	Potential	Likely	This taxon was recorded throughout the study area.	Recorded
Aristida jerichoensis var. subspinulifera	P3		X		X	15.5	Mar - May or Jul or Sep	Hardpan plains, cracking clay flats. Dolerite outcropping. Red light clay.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Aristida lazaridis	P2		X		X	11	Apr	Sand or loam.	Potential	Potential	Suitable habitat occurs within the study area. The survey occurred the month following the flowering period for this taxon (April), therefore it is possible that it would have been missed during the survey.	Potential
Cladium procerum	P2		X		X	5.8	Nov	Perennial pools.	Potential	Potential	No suitable habitat recorded within the study area.	Unlikely
Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3				X	18.1	Mar - May or Jul	Flat crabhole plains, cracking clay, gilgai self-mulching plains, gentle slopes, flow lines. Red-brown cracking clay/loam. Basalt and ironstone rocks and pebbles, pisolitic gravel.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Eremophila magnifica subsp. magnifica	P4		X		X	9.3	Jul - Sep	Skeletal soils over ironstone. Rocky screes.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Eremophila magnifica subsp. velutina	P3				X	9.9	Jul - Sep	Skeletal soils over ironstone. Summits.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Eremophila naaykensii	P3		X		X	11.4	Aug - Sep	Hillslopes, scree slopes, ironstone outcrops. Brown-red soil, silty loam.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Eremophila sp. West Angelas (S. van Leeuwen 4068)	P2				X	8.9	Aug - Oct	High in landscape, summit of hills and hillslopes, outcrops, ironstone ranges. Brown silty loam.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Eremophila youngii subsp. lepidota	P4				X	8.9	Jan or Mar or Jun or Aug - Sep	Stony red sandy loam. Flats plains, floodplains, sometimes semi-saline, clay flats.	Potential	Potential	No suitable habitat recorded within the study area.	Unlikely
Fimbristylis sieberiana	P3		X		X	2.7	May - Jun	Mud, skeletal soil pockets. Pool edges, sandstone cliffs.	Potential	Likely	No suitable habitat recorded within the study area.	Unlikely
Goodenia lyrata	P3				X	10.7	Aug	Red sandy loam. Near claypan.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Goodenia sp. East Pilbara (A.A. Mitchell PRP 727)	P3		X		X	1.6	Aug - Sep	Red-brown clay soil, calcrete pebbles. Low undulating plain, swampy plains.	Potential	Likely	This taxon was recorded throughout the study area.	Recorded
Grevillea saxicola	P3		X		X	8.4	Feb - Mar	Hillslopes, incised gully systems, steep cliffs. Loamy soils.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Gymnanthera cunninghamii	P3		X		X	16.3	Apr or Dec	Sandy soils.	Potential	Unlikely	The study area contains suitable habitat for this taxon (sandy soils), however it has not been recorded within 15 km of the study area.	Unlikely
Hibiscus sp. Gurinbiddy Range (M.E. Trudgen MET 15708)	P2		X		X	11.7	May - Jul	Rocky slopes, gullies, breakaways, scree slopes, creeks. Gravelly, red brown loam.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Indigofera gilesii	P3		X		X	12.7	May or Aug	Pebbly loam. Amongst boulders & outcrops, hills.	Potential	Potential	The study area contains suitable habitat for this taxon (pebbly loam, hills). The survey occurred during this taxon's flowering time (May or Aug), therefore it is unlikely that it would have been missed during the survey.	Unlikely
Ipomoea racemigera	P2				X	19.1	Apr	On sandy soils along watercourses.	Potential	Unlikely	The study area contains suitable habitat for this taxon (sandy soils along watercourses), however it has not been recorded within 15 km of the study area.	Unlikely
Isotropis parviflora	P3		X		X	14.3	Feb - Mar or May	Valley slope of ironstone plateau.	Potential	Potential	The study area contains suitable habitat for this taxon (slopes of ironstone plateaus). The survey occurred during this taxon's flowering time (Feb – Mar or May), therefore it is unlikely that it would have been missed during the survey.	Unlikely

Lepidium catapycnon	P4		X		X	4.5	Oct - Jan	Stony hill slopes, open woodland in hilly areas, more frequently on south facing slopes, hill hummock grasslands, and road verges.	Potential	Likely	The study area contains suitable habitat for this taxon (stony hill slopes, open woodlands in hilly areas, hill hummock grasslands, and road verges). Additionally, the survey was undertaken outside of this taxon's flowering time (Oct – Jan), so it is possible that it would have been missed during the survey.	Likely
Oxalis sp. Pilbara (M.E. Trudgen 12725)	P2			X	11.4	May	Shaded gullies, below cliffs, drainages, creeklines. Red-brown clayey loam, rocky loam among boulders.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Ptilotus mollis	P4		X	X	9.7	May or Sep	Stony hills and screes.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Rhagodia sp. Hamersley (M. Trudgen 17794)	P3		X	X	15.5	Mar - May or Sep or Nov	Red sandy loam over gravelly ironstone. Plains.	Potential	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Rhynchosia bungarensis	P4			X	11.2	May - Dec	Pebbly, shingly coarse sand amongst boulders. Banks of flow line in the mouth of a gully in a valley wall.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Rostellularia adscendens var. latifolia	P3		X	X	1.1	Apr - May	Ironstone soils. Near creeks, rocky hills.	Potential	Likely	The study area contains suitable habitat for this taxon (near creeks, rocky hills). The survey occurred the month following the flowering period for this taxon (April), therefore it is possible that it would have been missed during	Potential
Sida sp. Barlee Range (S. van Leeuwen 1642)	P3		X	X	12.5	Jul - Aug	Skeletal red soils pockets. Steep slope.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Streptoglossa sp. Cracking clays (S. van Leeuwen et al. PBS 7353)	P3			X	18.1	Jun or Sep	Cracking clays, plains, floodplains. Red-brown sandy clay. Ironstone.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Stylidium weeliwolli	P3		X	X	1.1	Aug - Sep	Gritty sand soil, sandy clay. Edge of watercourses.	Potential	Likely	The study area contains suitable habitat for this taxon (sandy soils on the edge of watercourses) Additionally, the survey was undertaken outside of this taxon's flowering time (Aug - Sep), so it is possible that it would have	Likely
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	P3		X	X	18.7	Aug	Red clay. Clay pan, grass plain.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely
Triodia sp. Mt Ella (M.E. Trudgen 12739)	P3		X	X	9.4	Feb or May or Jul or Sep	Light orange-brown, pebbly loam. Amongst rocks & outcrops, gully slopes.	No	Unlikely	No suitable habitat recorded within the study area.	Unlikely

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

Additionally, through a search of available databases, several species were identified to occur within 50 kilometres of the application area (GIS Database).

Species name	Suitable habitat features?	Suitable vegetation type?	Suitable soil type?	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify?
Threatened						
Synostemon hamersleyensis	N	N	N	28	30	Y
Priority 1						
Calotis squamigera	N	N	Y	34	5	Y
Paranotis sp. Pilbara (H. Ajduk HAOP04a)	N	N	N	36	7	Y
Priority 2						
Eragrostis sp. Mt Robinson (S. van Leeuwen 4109)	N	Y	N	25	8	N (Fl. Sep)
Euphorbia inappendiculata var. *inappendiculata*	N	N	N	48	14	Y
Kohautia australiensis	Y	Y	Y	42	9	Y
Teucrium pilbaranum	N	N	Y	44	21	Y
Triodia karijini	N	N	N	30	14	Y
Priority 3						
Acacia effusa	N	N	Y	41	32	Y
Amaranthus centralis	N	N	N	20	7	Y
Atriplex flabelliformis	N	N	N	47	9	Y
Dampiera metallorum	N	N	Y	22	21	Y
Eremophila spongiocarpa	N	N	Y	47	39	Y
Euphorbia australis var. *glabra*	N	N	Y	40	23	Y
Glycine falcata	N	N	N	42	14	Y
Goodenia lyrata	N	N	Y	37	18	N (Fl. Aug)
Pilbara trudgenii	N	N	N	29	12	N (Fl. Sep)
Solanum kentrocaule	N	N	N	32	21	Y
Triodia basitricha	Y	N	Y	31	40	Y
Vittadinia sp. Coondewanna Flats (S. van Leeuwen 4684)	Y	Y	Y	25	26	Y

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B.3. Fauna analysis table

Assessment of the likelihood of occurrence of conservation significant fauna identified by desktop assessment in the vicinity of the study area (Rio Tinto, 2023).

Family	Scientific Name	Common Name	Conservation Code		Source			Distance to Nearest Record	Habitat and discussion (pre-field)	Likelihood of Occurrence (pre-field)	Habitat and discussion (post-field)	Likelihood of Occurrence (post-field)
			State	Federal	NM	RTIO	PMST					
Birds												
Pardalotidae	*Aphelocephala leucopsis*	Southern Whiteface	0	VU			X	7.1	Southern Whitefaces live in a wide range of sparsely treed woodlands and shrublands where there is an understorey of grasses or shrubs or both, usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands and plains (BirdLife International, 2023).	Potential	Whilst this species has been recorded within 20km, the study area does not contain suitable habitat for occurrence.	Unlikely
Apodidae	*Apus pacificus*	Fork-tailed Swift	MI	MI	X	X		19.1	The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over a wide range of habitats from inland plains, dry or open habitats, riparian woodland, tea-tree swamps, low scrub, heathland, saltmarsh, over cliffs, beaches, islands and well out to sea, above foothills or in coastal areas. They also occur over settled areas, including towns, urban areas and cities (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	Whilst this species has been recorded within 20km, the study area does not contain suitable habitat for occurrence.	Unlikely
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	CR	CR & MI			X	81.2	The Curlew Sandpiper prefers habitats such as tidal mudflats, saltmarsh, salt fields, fresh, brackish or saline wetlands and sewerage ponds (Pizzey & Knight, 2012). It is also found at lagoons and mangroves, as well as beaches, rocky shores and around lakes, dams and floodwaters. The Curlew Sandpiper does not breed in Australia (BirdLife International, 2023).	Unlikely	The study area does not contain suitable habitat for occurrence.	Unlikely
Charadriidae	*Charadrius veredus*	Oriental Plover	MI	MI		X		19.8	Immediately after the Oriental Plover arrives in their non-breeding grounds in northern Australia, they spend a few weeks in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland (Department of Climate Change, Energy, the Environment and Water, 2023). Thereafter they usually inhabit flat, open, semi-arid or arid grasslands, where the grass is short and sparse, and interspersed with hard, bare ground, such as claypans, dry paddocks, playing fields, lawns and cattle camps, or open areas that have been recently burnt (Menkhorst et al., 2017).	Unlikely	Whilst this species has been recorded within 20km, the study area does not contain suitable habitat for occurrence.	Unlikely
Accipitridae	*Erythrotriorchis radiatus*	Red Goshawk	VU	VU			X	696.8	The Red Goshawk occurs in coastal and sub-coastal areas in wooded and forested lands of tropical and warm-temperate Australia (Marchant & Higgins 1993). Riverine forests are also used frequently. The Red Goshawk nests in large trees, frequently the tallest and most massive in a tall stand, and nest trees are invariably within one km of permanent water (Department of Climate Change, Energy, the Environment and Water, 2023).	Unlikely	The study area does not contain suitable habitat for occurrence.	Unlikely
Falconidae	*Falco hypoleucos*	Grey Falcon	VU	0			X	25.1	The Grey Falcon is a wide roaming species and prefers habitats such as lightly treed inland plains, gibber deserts, sand ridges, pastoral lands, timbered watercourses. They are seldom in the driest deserts (Pizzey & Knight, 2012).	Unlikely	The study area does not contain suitable habitat for occurrence. This species may overfly study area.	Unlikely
Falconidae	*Falco peregrinus*	Peregrine Falcon	OS	0	X	X		11.5	The Peregrine Falcon occupies most environments with suitable nest sites: cliff faces are preferred, including man-made ones, and it commonly uses stick nests built by other species (Menkhorst et al., 2017).	Unlikely	The study area does not contain suitable habitat for occurrence. This species may overfly study area.	Unlikely
Procellariidae	*Macronectes giganteus*	Southern Giant Petrel	MI	EN & MI	X			550.1	The Southern Giant Petrel is a seabird found in the southern oceans. Its habitat is primarily marine, over open seas and inshore waters favouring the edges of the continental shelf and pack ice (Morcombe 2021). Routinely ashore to feed and rest (Menkhorst et al., 2017). It has been found to gather at carrion, offal and sewage outlets. Breeding does not occur on Australia.	Unlikely	The study area does not contain suitable habitat for occurrence.	Unlikely
Strigidae	*Ninox connivens connivens*	Barking owl	P3	0	X			5	Barking Owls are found in open woodlands and the edges of forests, often adjacent to farmland. They are less likely to use the interior of forested habitat (BirdLife International, 2023). They are usually found in habitats that are dominated by eucalytpus species, particularly red gum, and, in the tropics, paperbark species. They prefer woodlands and forests with a high density of large trees and particularly sites with hollows that are used by the owls as well as their prey. Roost sites are often located near waterways or wetlands.	Unlikely	Whilst the species, *Ninox connivens* , was recorded within 20km, it is only the southwest subpopulation which is listed as a priority species, and not the species as it occurs outside the south west of Western Australia. The subspecies *Ninox connivens connivens* southwest population is unlikely to occur within the study area.	Unlikely
Psittaculidae	*Pezoporus occidentalis*	Night Parrot	CR	EN			X	343.3	The Night Parrot is a highly cryptic bird which was presumed extinct until its rediscovery in 2013. As such, habitat requirements are still being researched. At the time of this report Night Parrots are thought to roost and nest in clumps of dense vegetation, primarily old and large spinifex (Triodia) clumps, but sometimes other vegetation types are used. Little is known about foraging sites, but favoured sites are considered likely to vary across the range of the species. Triodia is also likely to provide a good food resource for night parrots, in times of mass flowering and seeding, but they also rely heavily on a range of other food species. Sclerolaena has been shown to be a source of food and moisture (Department of Biodiversity, Conservation and Attractions, 2017).	Unlikely	Although this species is cryptic, the small-sized study area does not contain suitable habitat for occurrence.	Unlikely
Rostratulidae	*Rostratula australis*	Australian Painted Snipe	EN	EN			X	54.9	The Australian Painted Snipe is usually found in shallow inland wetlands, either freshwater or brackish, that are either permanently or temporarily filled. Suitable wetlands usually support a mosaic of low, patchy vegetation, as well as lignum and canegrass (BirdLife International, 2023). The Australian Painted Snipe can use modified habitats, such as low-lying woodlands converted to grazing pasture, sewage farms, dams, bores and irrigation schemes (Marchant & Higgins, 1993), however they do not necessarily breed in such habitats.	Unlikely	The study area does not contain suitable habitat for occurrence.	Unlikely
Mammals												
Dasyuridae	*Dasyurus hallucatus*	Northern Quoll	EN	EN	X	X	X	11.6	The Northern Quoll occupies a diverse range of habitats including rocky areas, eucalypt forest, woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert (Threatened Species Scientific Committee, 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 (Threatened Species Scientific Committee, 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	This species may opportunistically utilise the minor drainage habitat to cross the study area when males disperse. No denning habitat is found in the study area.	Potential
Megadermatidae	*Macroderma gigas*	Ghost Bat	VU	VU	X	X	X	12	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 & Knight, 2021).	Potential	This species may opportunistically use the study area for foraging, however no roosting habitat is present within the study area.	Potential

Thylacomyidae	*Macrotis lagotis*	Bilby, Dalgyte, Ninu	VU	VU			X	76.7	The Bilby inhabits a variety of habitats including acacia shrublands and hummock grassland, stony downs country of cracking clays, desert sandplains and dune fields sometimes containing laterite (Menkhorst & Knight, 2021; Van Dyck & Strahan, 2008).	Unlikely	The study area does not contain suitable habitat for occurrence.	Unlikely
Muridae	*Pseudomys chapmani*	Western Pebble-mound Mouse, Ngadji	P4	0	X	X		10.7	The Western Pebble-mound Mouse is found on stony hillsides with hummock grassland (Menkhorst & Knight, 2021). This species favors 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	Secondary evidence of its presence has been recorded within the study area.	Recorded
Rhinonycteridae	*Rhinonicteris aurantia* (Pilbara form)	Pilbara Leaf-nosed Bat	VU	VU	X	X	X	14.5	The Pilbara Leaf-nosed Bat (PLNB) 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 & Strahan, 2008). During the dry season, the PLNB roosts in deep, warm, humid caves or mines and forages nearby, while during the wet season, it is more widespread and may not require caves for roosting (Menkhorst & Knight, 2021). The PLNB forages low in open habitats, including grasslands and along roads.	Potential	Whilst this species has been recorded within 20 km of the study area, there is no roosting habitat in the study area and the habitat represents limited foraging potential.	Potential
Reptiles												
Typhlopidae	*Anilios ganei*	Gane's Blind Snake (Pilbara)	P1	0	X	X		18.1	The Gane's Blind Snake inhabits hill crests and slopes, outcroppings, gullies. This taxon is associated with rocky and stony habitats (Wilson and Swan, 2017).	Unlikely	Whilst this species has been recorded within 20 km of the study area, the study area does not contain suitable habitat for occurrence.	Unlikely
Pythonidae	*Liasis olivaceus barroni*	Pilbara Olive Python	VU	VU	X	X	X	12.8	The Pilbara Olive Python is found in arid to subhumid areas of northern Australia, it is often encountered along watercourses, especially those associated with rocky areas (Wilson & Swan, 2017). The preferred habitat of this taxon includes escarpments, gorges and water holes in the ranges of the Pilbara region (Wilson & Swan, 2017). Individuals are usually recorded in close proximity to water and rock outcrops that attract suitably sized prey species (Pearson, 1993). Males have been recorded travelling up to 4 km to locate mates during the breeding season (Tutt, Mitchell, Brace, & Pearson, 2002).	Potential	Whilst this species has been recorded within 20 km of the study area, the habitat in the study area has limited sheltering and foraging capacity with no permanent or semi-permanent water.	Unlikely
Scincidae	*Liopholis kintorei*	Great Desert Skink	VU	VU			X	638.1	The Great Desert Skins is found in arid sandflats and clay-based or loamy soils with spinifex (Wilson and Swan, 2017).	Unlikely	The study area does not contain suitable habitat for occurrence.	Unlikely
Carphodactylidae	*Underwoodisaurus seorsus*	Pilbara Barking Gecko	P2	0	X			29.6	The Pilbara Barking Gecko is known from an isolated population in West Angelas and Paddlesack Range in the central Hamersley Range (Wilson & Swan, 2017).	Unlikely	The study area does not contain suitable habitat for occurrence.	Unlikely

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

Additionally, through a search of available databases, several species were identified to occur within 50 kilometres of the application area (GIS Database).

Species name	Conservation status	Suitable habitat features?	Suitable vegetation type?	Distance of closest record to application area (km)	Are surveys adequate to identify?
Mammals					
Brush-tailed mulgara (*Dasycercus blythi*)	P4	N	Y	22	Y
Long-tailed dunnart (*Sminthopsis longicaudata*)	P4	N	Y	39	N
Northern short-tailed mouse (*Leggadina lakedownensis*)	P4	N	Y	48	N
Reptiles					
Unpatterned robust slider (Robertson Range) (*Lerista macropisthopus remota*)	P2	N	Y	21	N
Birds					
Letter-winged kite (*Elanus scriptus*)	P4	N	N	31	N
Caspian tern (*Hydroprogne caspia*)	MI	N	N	24	N
Common greenshank (*Tringa nebularia*)	MI	N	N	33	N
Common sandpiper (*Actitis hypoleucos*)	MI	N	N	49	N
Osprey (*Pandion haliaetus*)	MI	N	N	28	N

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B.4. Ecological community analysis table

Conservation significant ecological communities within 50 kilometres of the application area (GIS Database).

Community name	Suitable habitat features?	Suitable vegetation type?	Suitable soil type?	Distance of closest record to application area (km)	Mapped extent of occurrence (ha)	Are surveys adequate to identify?
Priority 1						
Coolibah - Lignum Flats: sub type 2	N	N	N	40 km	567 ha	Y
Fortescue Marsh (Marsh Land System)	N	N	N	47 km	101,049	Y
Weeli Wolli Spring Community	N	Partially	N	1.0 km	285 ha	Y
West Angelas Cracking-Clays	N	N	N	43 km	475 ha	Y

Community name	Suitable habitat features?	Suitable vegetation type?	Suitable soil type?	Distance of closest record to application area (km)	Mapped extent of occurrence (ha)	Are surveys adequate to identify?
Priority 2						
Riparian flora and plant communities of springs and river pools with high water permanence of the Pilbara Region	N	N	N	19 km	430 ha	Y
Priority 3						
Coolibah - Lignum Flats: sub type 1	N	N	N	26 km	2,464 ha	Y
Kumina Land System	N	N	N	18 km	15,093 ha	Y
Vegetation of sand dunes of the Hamersley Range/Fortescue Valley	N	N	N	36 km	5,185 ha	Y

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Appendix C. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
Principle (a): *"Native vegetation should not be cleared if it comprises a high level of biodiversity."* Assessment: The area proposed to be cleared contains two conservation significant flora, potential habitat for seven conservation significant flora and is within one kilometre of a Priority Ecological Community.	At variance	Yes *Refer to Section 3.2.1, above.*
Principle (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."* Assessment: The area proposed to be cleared contains potential foraging and dispersal habitat for conservation significant fauna.	May be at variance	Yes *Refer to Section 3.2.2, above.*
Principle (c): *"Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."* Assessment: The area proposed to be cleared is unlikely to contain habitat for flora species listed under the BC Act. There is record of one threatened flora species approximately 28 kilometres north of the application area; *Synostemon hamersleyensis* that is only known to the Hamersley subregion (Western Australian Herbarium, 1998-: GIS Database). This species has been recorded mostly on rocky slopes of detrital iron formations and gorges/gullies on Newman land system in association with open shrubland with low scattered trees of *Eucalyptus leucophloia* and *Eucalyptus gamophylla* and hummock grassland of *Triodia* spp (DPIRD, 2024; Western Australian Herbarium, 1998-; GIS Database). The habitat within the application area is unlikely to support *S. hamersleyensis* (Rio Tinto, 2023; Western Australian Herbarium, 1998-). Given the above, it is unlikely this species will be impacted by proposed clearing.	Not likely to be at variance	No
Principle (d): *"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community."* Assessment: There are no records of Threatened Ecological Communities within the area proposed to be cleared or the local surrounds (50 kilometres) (Rio Tinto, 2023; GIS Database).	Not likely to be at variance	No
Environmental value: significant remnant vegetation and conservation areas		
Principle (e): *"Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared."* Assessment:	Not at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
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): • Hamersley 18: 99.3% (676,556.72 ha) The vegetation proposed to be cleared is not considered to be part of a significant ecological linkage in the local area (GIS Database).		
Principle (h): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area."* Assessment: Given the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on the environmental values of nearby conservation areas.	Not at variance	No
Environmental value: land and water resources		
Principle (f): *"Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland."* Assessment: There are no permanent watercourses or wetlands recorded within the application area, however there are three minor, ephemeral drainage lines (GIS Database). Approximately 16 hectares (11.1%) of the application area is mapped as vegetation associated with drainage lines (Rio Tinto, 2023; Appendix F). The closest groundwater dependent ecosystem is the Weeli Wolli Springs, located approximately one kilometre north of the application area (Rio Tinto, 2023; GIS Database). Within vegetation type V2, several species are associated with low or moderate level ground dependent species, which include *Eucalyptus xerothermica*, *Atalaya hemiglauca*, *Stylobasium spathulatum* and *Dodonaea lanceolata* (Rio Tinto, 2023). These species were not common or abundant (Rio Tinto, 2023). Potential impacts to the vegetation associated with minor ephemeral drainage lines may be minimised by the implementation of a condition limiting clearing within this vegetation type.	At variance	No
Principle (g): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation."* Assessment: The mapped soils are not generally susceptible to erosion or land degradation. Noting the extent of the proposed clearing is not likely to have an appreciable impact on land degradation.	Not likely to be at variance	No
Principle (i): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water."* Assessment: Given no major watercourses or Public Drinking Water Sources Areas are recorded within the application area, the proposed clearing is unlikely to impact surface or ground water quality (GIS Database).	Not likely to be at variance	No
Principle (j): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding."* Assessment: The mapped soils and topographic contours in the surrounding area do not indicate the proposed clearing is likely to contribute to increased incidence or intensity of flooding (GIS Database). Given no major watercourses or wetlands are recorded within the application area, the proposed clearing is unlikely to contribute to waterlogging.	Not likely to be at variance	No

Appendix D. 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.
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 E. Mapping of various features in the application area

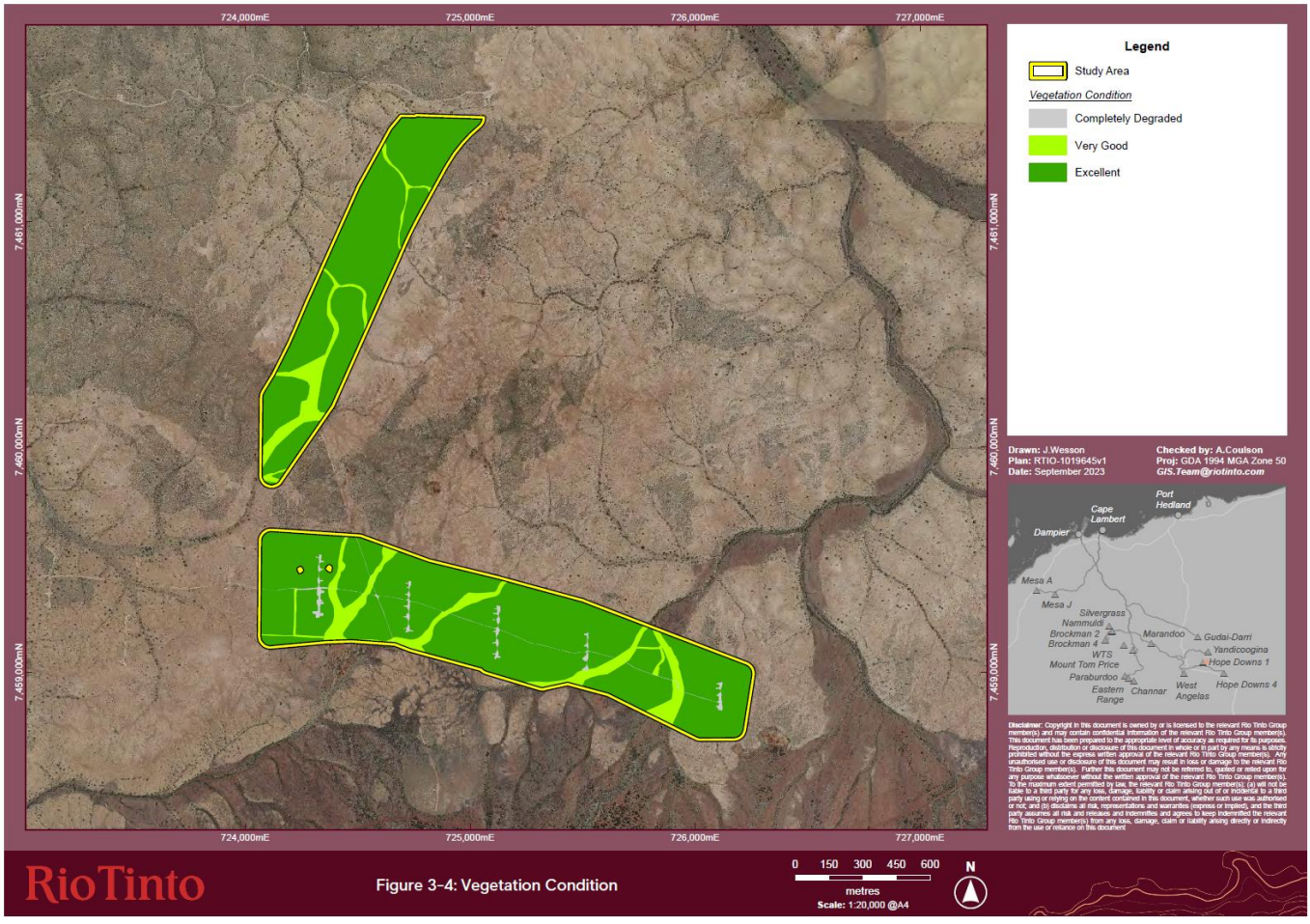

Figure 1. Map of vegetation condition (Rio Tinto, 2023).

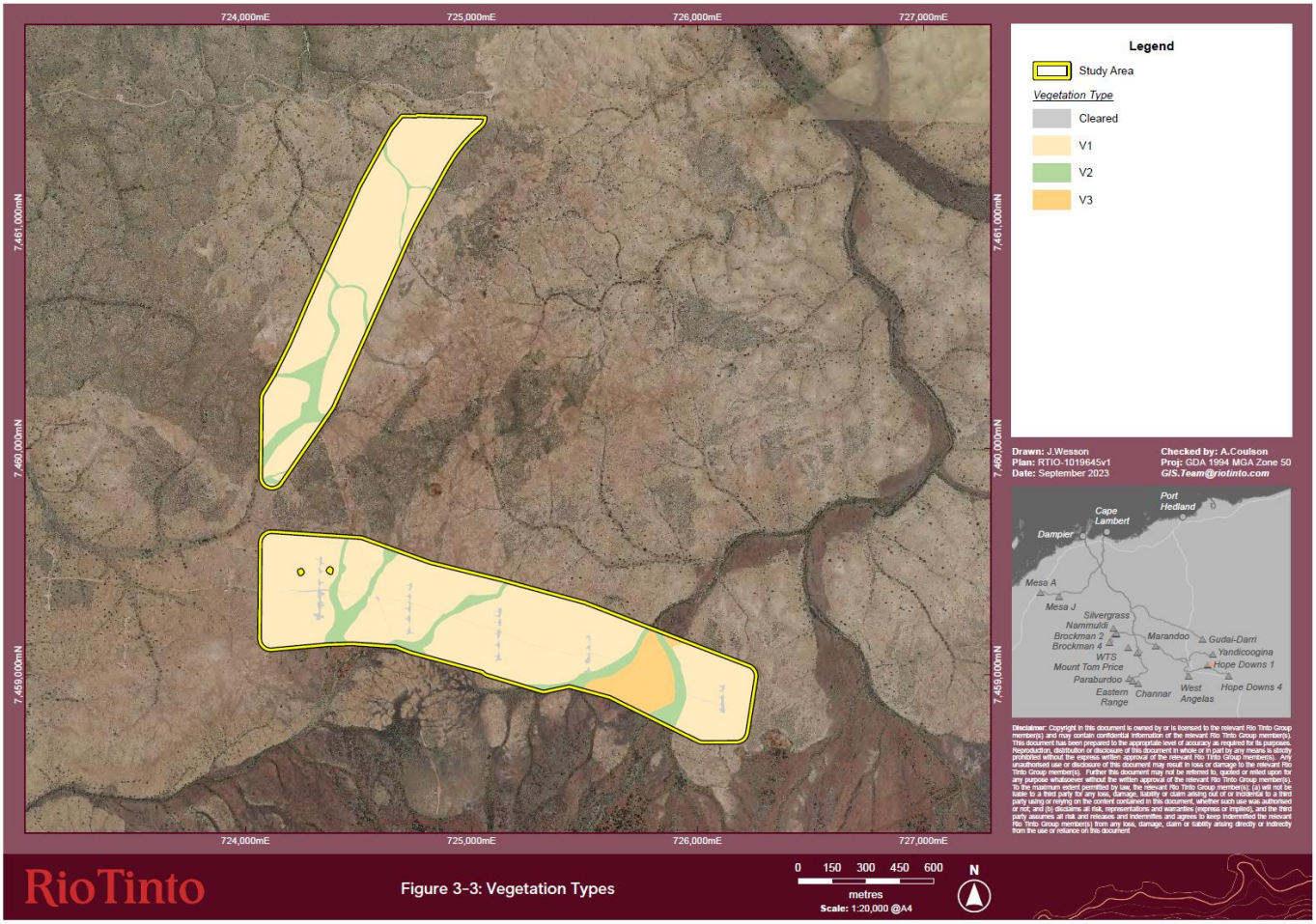

Figure 2. Map of vegetation types (Rio Tino, 2023).

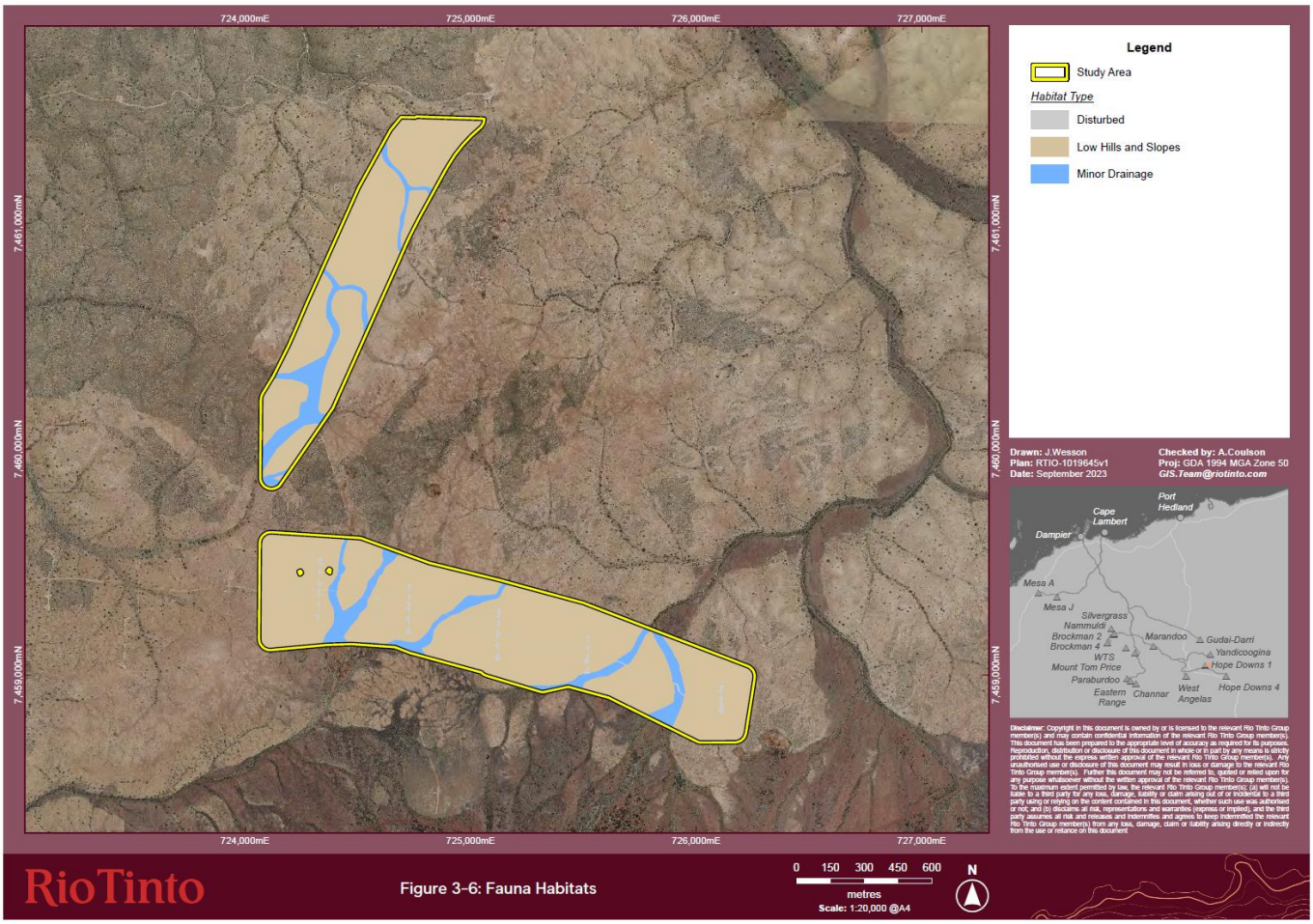

Figure 3. Map of fauna habitat types (Rio Tino, 2023).

Appendix F. Photographs of vegetation types within the application area (Rio Tinto, 2023)

Photo 1: V1.

Photo 2: V3.

Photo 3: V2.

Appendix G. Photographs of fauna habitat types within the application area (Rio Tinto, 2023)

Photo 4: 'low hills and slopes'.

Photo 5: 'minor drainage'.

Appendix H. Distribution map of *Euploca glandulifera*

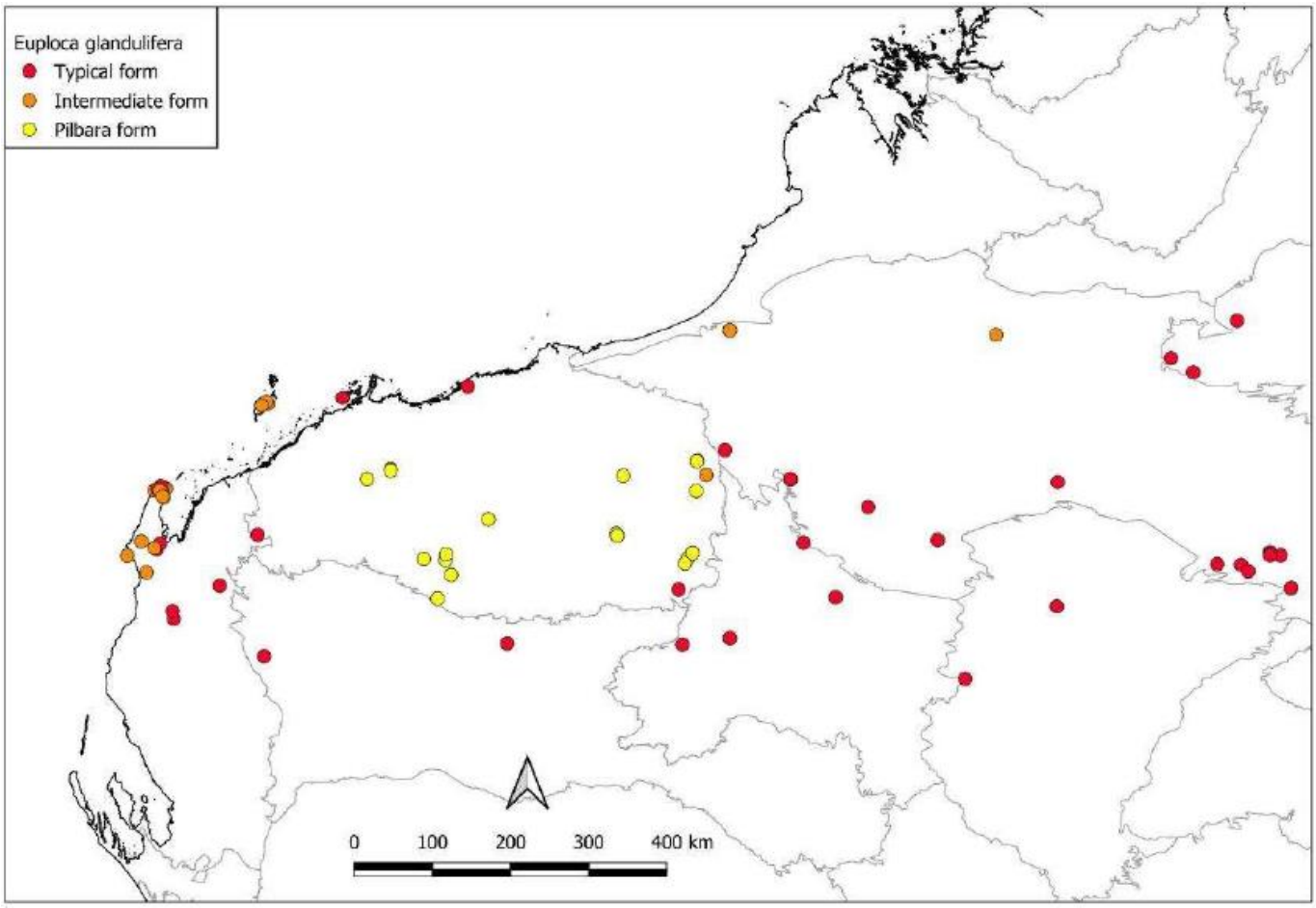

Figure 4. Distribution map of *Euploca glandulifera* in Western Australia provided by Western Australian Herbarium (Rio Tinto, 2024).

Appendix I. Distribution of conservation significant flora and fauna within the application area

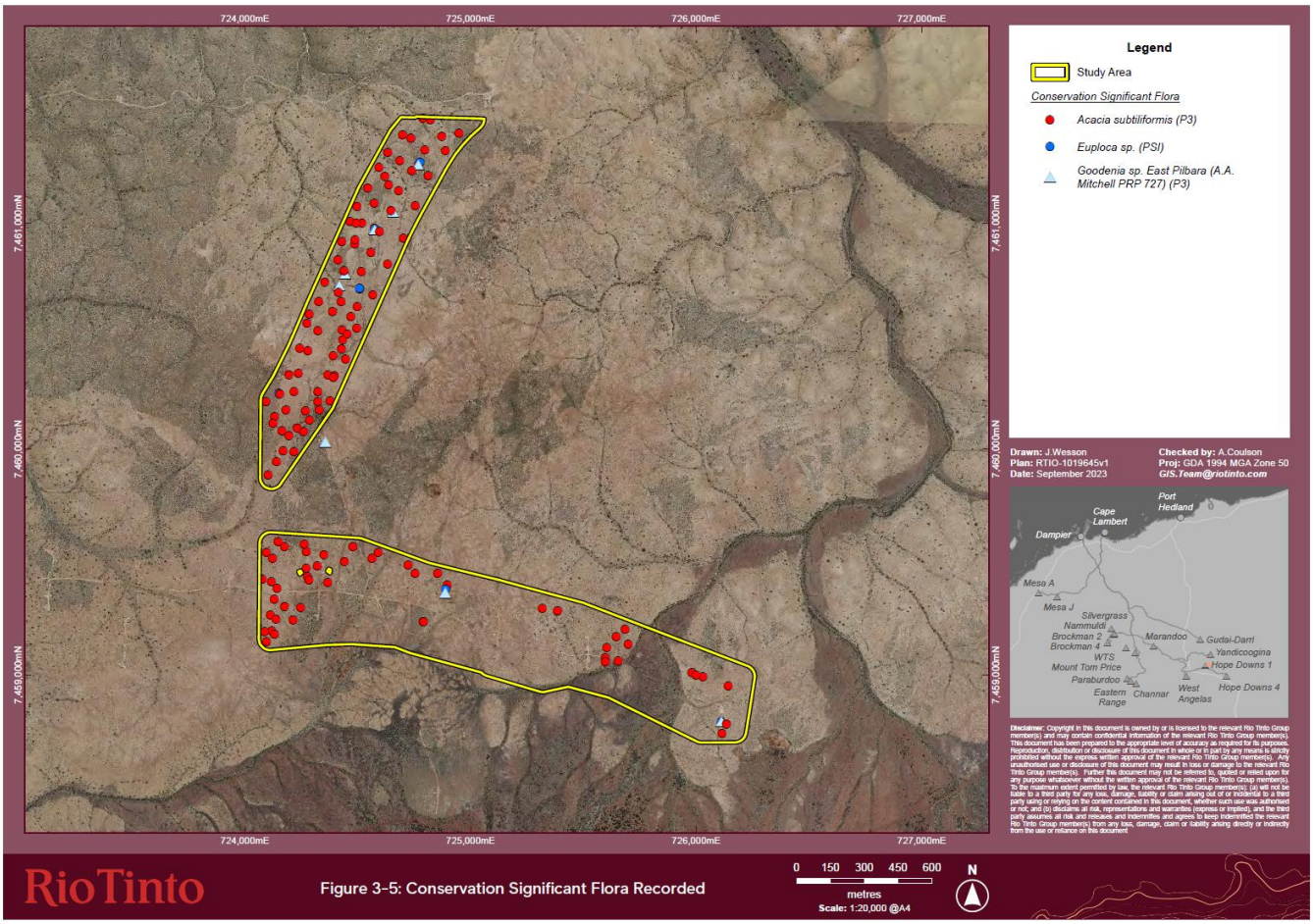

Figure 5. Conservation significant flora recorded within the application area (Rio Tinto, 2023).

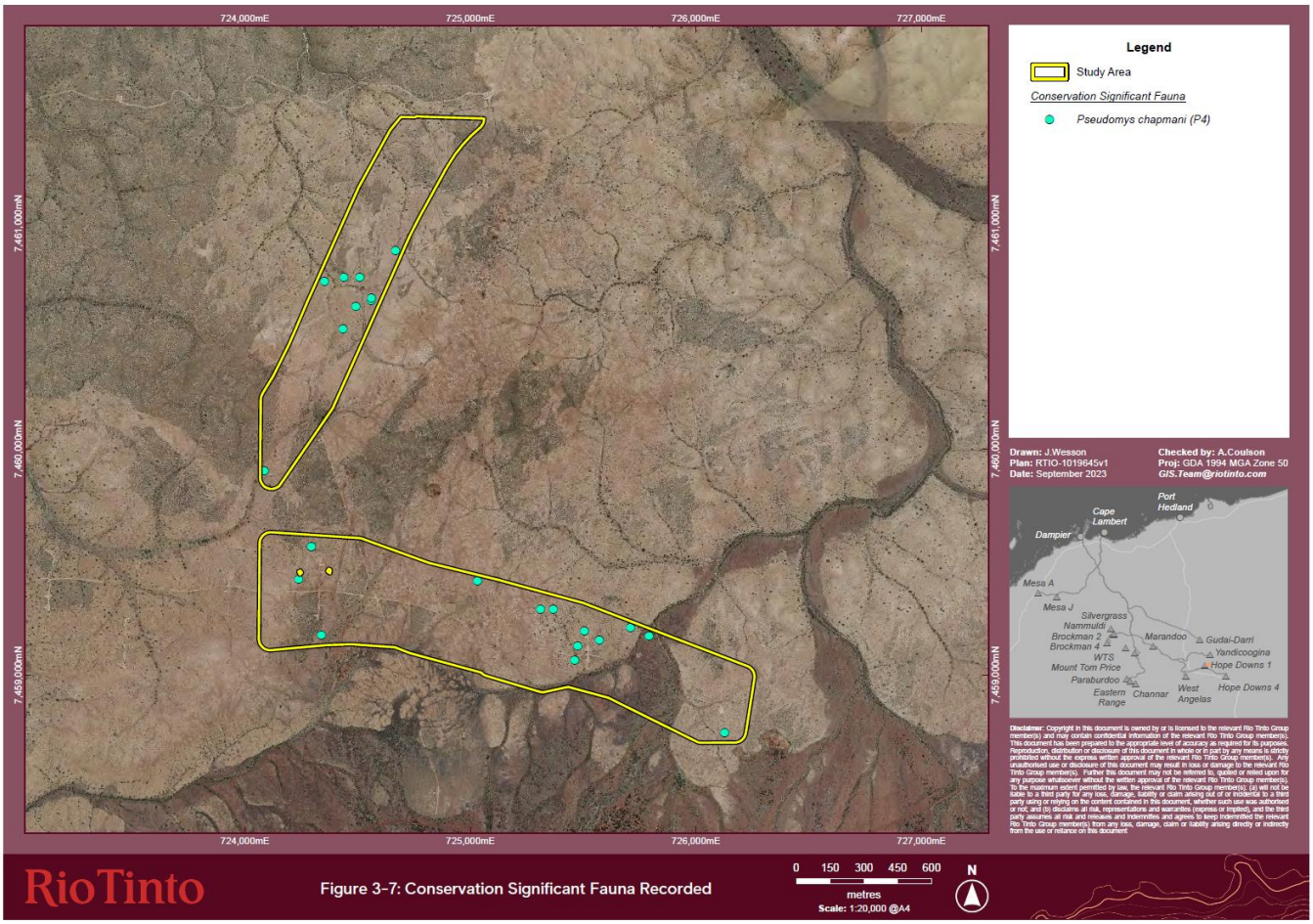

Figure 6. Distribution of active and inactive mounds of western pebble-mound mouse *(Pseudomys chapmani*) (Rio Tinto, 2023).

Appendix J. Sources of information

J.1. GIS databases

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

- Aboriginal Heritage Places (DPLH-001)
- Contours (DPIRD-073)
- 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)
- 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 Land Quality – Flood Risk (DPIRD-007)
- Soil Landscape Land Quality – Phosphorus Export Risk (DPIRD-010)
- Soil Landscape Land Quality – Water Erosion Risk (DPIRD-013)
- Soil Landscape Land Quality – Waterlogging Risk (DPIRD-015)
- Soil Landscape Land Quality – Wind Erosion Risk (DPIRD-016)
- Soil Landscape Mapping – Best Available (DPIRD-027)
- Soil Landscape Mapping – Rangelands (DPIRD-064)
- WA Now Aerial Imagery

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)

J.2. References

Armstrong, K.N. (2001) The distribution and roost habitat of the orange leaf-nosed bat, *Rhinonicteris aurantius*, in the Pilbara region of Western Australia. Wildlife Research 28: 95-104. Available from: https://doi.org/10.1071/WR00011.

Australian Museum (2019) Peregrine falcon (*Falco peregrinus*). The Australian Museum, New South Wales. Available from: https://australian.museum/learn/animals/birds/peregrine-falcon/ (Accessed June 2024).

Bat Call WA (2021a) A review of ghost bat ecology, threats and survey requirements. Report prepared for the Department of Agriculture, Water and the Environment, Canberra. Available from: https://www.dcceew.gov.au/sites/default/files/documents/review-ghostbat-ecology-threats.pdf.

Bat Call WA (2021b) A review of Pilbara leaf-nosed bat ecology, threats and survey requirements. Report prepared for the Department of Agriculture, Water and the Environment, Canberra. Available from: https://www.dcceew.gov.au/sites/default/files/documents/review-pilbara-leaf-nosed-bat-ecology-threats.pdf.

Burbidge, A.A. (2016) *Pseudomys chapmani*. The IUCN Red List of Threatened Species 2016: e.T42648A115198963. Available from: http://dx.doi.org/10.2305/IUCN.UK.2016- 3.RLTS.T42648A22398949.en.

Bureau of Meteorology (BoM) (2024) Bureau of Meteorology Website – Climate Data Online, Newman Aero (7176). Bureau of Meteorology. https://reg.bom.gov.au/climate/data/ (Accessed 27 March 2024).

CALM (2002) A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002. Department of Conservation and Land Management, Western Australia.

Cowan, M.A., Moore, H.A., Hradsky, B.A., Jolly, C.J., Dunlop, J.A., Wysong, M.L., Hernandez-Santin, L., Davis, R.A., Fisher, D.O., Michael, D.R., Turner, J.M., Gibson, L.A., Knuckey, C.G., Henderson, M., Nimmo, D.G. (2022) Non-preferred habitat increases the activity area of the endangered northern quoll (*Dasyurus hallucatus*) in a semi-arid landscape. Australian Mammalogy 45: 138-150. Available from: https://doi.org/10.1071/AM22006.

Cramer, V.A., Armstrong, K.N., Bullen, R.D., Cross, S.L., Gibson, L., Hanrahan, N., Knuckey, C.G., Ottewell, K., Reiffer, S., Ruykys, L., Shaw, R.E., Thavornkanlapachai, R., Thompson, S.A., Wild, S., van Leeuwen, S. (2022) Research priorities for the ghost bat (*Macroderma gigas*) in the Pilbara region of Western Australia. Australian Mammalogy 45: 1-12. Available from: https://doi.org/10.1071/AM21042.

Department of Agriculture, Water and the Environment (DAWE) Commonwealth of Australia (2020) Conservation Advice Falco hypoleucos Grey Falcon. Canberra. Available from: https://www.environment.gov.au/biodiversity/threatened/species/pubs/929-conservation-advice-09072020.pdf.

Department of Biodiversity, Conservation and Attractions (DBCA) (2023) Priority Ecological Communities for Western Australia Version 35. https://www.dbca.wa.gov.au/wildlife-and-ecosystems/threatened-ecological-communities (Accessed June 2024).

Department of Biodiversity, Conservation and Attractions (DBCA) (2024) Advice received in relation to Clearing Permit Application CPS 10502/1. Species and Communities Branch, Department of Biodiversity, Conservation and Attractions, Western Australia, July 2024.

Department of Environment and Conservation (DEC) (2009) Biodiversity values of Weeli Wolli Spring: A priority ecological community. Available from: https://library.dbca.wa.gov.au/static/Journals/080525/080525-03.pdf.

Department of Environment Regulation (DER) (2014) *A guide to the assessment of applications to clear native vegetation*. Perth. https://www.der.wa.gov.au/images/documents/your-environment/native-vegetation/Guidelines/Guide2_assessment_native_veg.pdf.

Department of Natural Resources, Environment, The Arts and Sport (DNREAS) Northern Territory (2010) National Recovery Plan for the Northern Quoll *Dasyurus hallucatus*. Darwin. Available from: https://www.dcceew.gov.au/sites/default/files/documents/northern-quoll.pdf.

Department of Planning, Lands and Heritage (DPLH) (2024) Aboriginal Heritage Inquiry System. Department of Planning, Lands and Heritage. https://espatial.dplh.wa.gov.au/AHIS/index.html?viewer=AHIS (Accessed 28 March 2024).

Department of Primary Industries and Regional Development (DPIRD) (2024) NRInfo Digital Mapping. Department of Primary Industries and Regional Development. Government of Western Australia. https://dpird.maps.arcgis.com/apps/webappviewer/index.html?id=662e8cbf2def492381fc915aaf3c6a0f (Accessed 28 March 2024).

Department of Water and Environmental Regulation (DWER) (2021) Procedure: Native vegetation clearing permits. Joondalup. https://dwer.wa.gov.au/sites/default/files/Procedure_Native_vegetation_clearing_permits_v1.pdf.

Environmental Protection Authority (EPA) (2018) Evaluating the environmental condition of Weeli Wolli Creek. Available from: https://www.epa.wa.gov.au/sites/default/files/Publications/Weeli%20Wolli%20evaluation%20report%2014-02-18c.pdf.

Environmental Protection Authority (EPA) (2016) Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment. http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA%20Technical%20Guidance%20-%20Flora%20and%20Vegetation%20survey_Dec13.pdf.

Environmental Protection Authority (EPA) (2020) Technical Guidance – Terrestrial Fauna Surveys. https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/2020.09.17%20-%20EPA%20Technical%20Guidance%20-%20Vertebrate%20Fauna%20Surveys%20-%20Final.pdf.

Government of Western Australia (2019) 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions. https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics.

Hamersley HMS Pty Ltd (2024a) Clearing permit additional information, CPS 10502/1, emails received May and June 2024.

Hamersley HMS Pty Ltd (2024b) Clearing permit application form, CPS 10502/1, received 15 January 2024.

McKenzie, N., Bullen, B., 2013. Ecology of Rhinonicteris aurantia in the Pilbara, Microsoft PowerPoint presentation prepared by Norm McKenzie and Bob Bullen. Available from: https://www.researchgate.net/publication/309628706_Ecology_of_Rhinonicteris_aurantiain_the_Pilbara.

Rio Tinto (2023) Flora, Vegetation and Fauna Habitat Assessment at Hope Downs 1, prepared for Hamersley HMS, October 2023.

Rio Tinto (2024) Targeted flora survey at Hope Downs 1, prepared for Hamersley HMS, May 2024.

Shaw, R.E., Spencer, P.B., Gibson, L.A., Dunlop, J.A., Kinloch, J.E., Mokany, K., Byrne, M., Moritz, C., Davie, H., Travouillon, K.J., Ottewell, K.M. (2023) Linking life history to landscape for threatened species conservation in a multi-use region. Conservation Biology 37: e13989. Available from: https://doi.org/10.1111/cobi.13989.

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.

Van Vreeswyk, A.M.E., Payne, A.L., Leighton, K.A. and Hennig, P. (2004) An inventory and condition survey of the Pilbara Region, Western Australia. Technical Bulletin No. 92. Department of Agriculture, South Perth, Western Australia.

Western Australian Herbarium (1998-) FloraBase - the Western Australian Flora. Department of Biodiversity, Conservation and Attractions, Western Australia. https://florabase.dpaw.wa.gov.au/ (Accessed June 2024).

4. Glossary

Acronyms:

BC Act	*Biodiversity Conservation Act 2016,* 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)
DCCEEW	Department of Climate Change, Energy, the Environment and Water, Australian Government
DBCA	Department of Biodiversity, Conservation and Attractions, Western Australia
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety
DER	Department of Environment Regulation, Western Australia (now DWER)
DMIRS	Department of Mines, Industry Regulation and Safety, Western Australia (now DEMIRS)
DMP	Department of Mines and Petroleum, Western Australia (now DEMIRS)
DoEE	Department of the Environment and Energy (now DCCEEW)
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	*Environmental Protection Act 1986*, Western Australia
EPA	Environmental Protection Authority, Western Australia
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (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	*Rights in Water and Irrigation Act 1914*, 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.