



Clearing Permit Decision Report

1. Application details and outcomes

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| Permit number: | 4594/9 |
| Permit type: | Purpose Permit |
| Applicant name: | Hamersley Iron Pty Ltd |
| Application received: | 12 June 2023 |
| Application area: | 251.4 hectares |
| Purpose of clearing: | Mineral exploration, geotechnical investigations, hydrogeological investigations, construction camp and associated activities. |
| Method of clearing: | Mechanical Removal |
| Tenure: | <i>Iron Ore (Hamersley Range) Agreement Act 1968</i> , Mineral Lease 246SA (AML 70/246) |
| Location (LGA area/s): | Shire of Ashburton |
| Colloquial name: | Western Range Project |

1.1. Description of clearing activities

Hamersley Iron Pty Ltd proposes to clear up to 251.4 hectares of native vegetation within a boundary of approximately 7,683 hectares, for the purpose of mineral exploration, geotechnical investigations, hydrogeological investigations, construction camp and associated activities. The project is located approximately 8 kilometres west of Paraburdoo, within the Shire of Ashburton and Hamersley sub-regions of Gascoyne and Pilbara.

Clearing permit CPS 4594/1 was granted by the Department of Mines and Petroleum (now the Department of Energy, Mines, Industry Regulation and Safety) on 15 December 2011 and was valid from 12 January 2012 to 30 November 2021. The permit authorised the clearing of up to 202 hectares of native vegetation within a boundary of approximately 5,018 hectares, for the purpose of mineral exploration, geotechnical investigations, hydrogeological drilling and access tracks.

CPS 4594/2 was granted on 12 February 2015, amending the permit to increase the total clearing area by approximately 18 hectares and to increase the total boundary by approximately 488 hectares.

CPS 4594/3 was granted on 21 April 2017, amending the permit to increase the duration of the clearing by four years and amend the annual reporting date.

CPS 4594/4 was granted on 5 July 2018, amending the purpose of clearing to 'mineral exploration, geotechnical investigations, hydrogeological investigations and associated activities,' increase the permit boundary by 2.3 hectares and the amount of approved clearing by 1.4 hectares.

CPS 4594/4 was amended on 18 October 2018 to increase the permit boundary by approximately 2,056 hectares, increase the amount of clearing by 30 hectares, and add construction camp to the purpose of the permit. The CPS number assigned to this amendment clearing permit was 4594/7 due to system errors. Therefore, the CPS 4594/5 and 4594/6 does not exist.

CPS 4594/8 was granted 30 April 2020 to extend the duration of the permit to 31 December 2028.

On 12 June 2023, the Permit Holder applied to amend CPS 4594/8 to extend the period in which clearing is authorised to 30 June 2028 and extend the permit duration to 31 December 2033. The amount of clearing authorised and permit boundary remain the same. Following review of current surveys, conservation significant habitat has been excised from the permit boundary, reducing the permit boundary from 7,683 hectares to 6,145 hectares.

1.2. Decision on application and key considerations

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| Decision: | Grant |
| Decision date: | 18 December 2023 |
| Decision area: | 251.4 hectares of native vegetation |

1.3. Reasons for decision

This clearing permit application was made in accordance with section 51KA (1) of the *Environmental Protection Act 1986* (EP Act) and was received by the Department of Mines, Industry Regulation and Safety (DMIRS) (now Department of Energy, Mines, Industry Regulation and Safety) on 12 June 2023. DMIRS advertised the application for a public comment for a period of seven days, and no submissions were received.

In making this decision, the Delegated Officer had regard for the site characteristics (Appendix B), and relevant datasets including the results of a flora and vegetation surveys, the clearing principles set out in Schedule 5 of the EP Act (Appendix D), proposed avoidance and minimisation measures (Section 3.1), and any other matters considered relevant to the assessment.

The assessment has not changed since the assessment for CPS 4594/8, except in the case of Principles (a), (b) and (c). The assessment against Principles (a) and (b) have changed from 'may be at variance' to 'at variance' and Principle (c) has changed from 'not likely to be at variance' to 'at variance'. The Delegated Officer determined that the proposed extension of duration will not likely to lead to an unacceptable risk to environmental values.

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;
- impacts to conservation significant flora and fauna;
- potential land degradation in the form of wind erosion; and
- impacts to riparian vegetation.

After consideration of the available information, as well as the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined the proposed clearing is unlikely to lead to 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;
- undertake slow, progressive one-directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity;
- engage fauna specialist to identify habitat for: *Dasyurus hallucatus* (Northern Quoll), *Rhinonictes aurantius* (Pilbara Orange Leaf-nosed Bat) and *Macroderma gigas* (Ghost Bat);
- avoid, minimise and reduce the impacts and extent of clearing;
- flora management condition to avoid disturbance to the conservation significant flora (*Aluta quadrata*);
- avoid riparian vegetation and maintain surface water flow; and
- retain vegetative material and topsoil, revegetation and rehabilitation.

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)
- *Conservation and Land Management Act 1984* (WA) (CALM Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Iron Ore (Hamersley Range) Agreement Act 1968*

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, 2016)
- Technical guidance – *Terrestrial Fauna Surveys for Environmental Impact Assessment* (EPA, 2020)

3. Detailed assessment of application

3.1. Avoidance and mitigation measures

The applicant has indicated implementation of following avoidance and mitigation measures:

- commit to implement best practice according to Rio Tinto Environmental Management System (Rio Tinto, 2011);
- consideration to avoid and minimise clearing and utilising/targeting existing cleared areas wherever possible (Hamersley, 2023);
- excising known records of *Aluta quadrata* and adjacent vegetation with a 50 metre buffer;
- avoiding disturbance to the core habitats of *Dasyurus hallucatus* (northern quoll), *Macroderma gigas* (Ghost Bat), and *Rhinonictes aurantia* (Pilbara Leaf-nosed Bat) (Rio Tinto, 2023a); and

- identifying locations of priority flora within internal works approval system as restricted areas and avoiding impact on these areas (Rio Tinto, 2023b).

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

3.2. Assessment of impacts on environmental values

In assessing the application, the Delegated Officer has had regard for the site characteristics (Appendix B) and the extent to which the impacts of the proposed clearing present a risk to biological, conservation, land and water resource values. A review of current environmental information reveals that the assessment against the clearing principles has not changed significantly from the previous versions of this decision report. The only change in the assessment is against the clearing Principles (a), (b) and (c). The assessment against Principles (a) and (b) have changed from 'may be at variance' to 'at variance' and Principle (c) has changed from 'not likely to be at variance' to 'at variance'. The Delegated Officer determined that the proposed extension of duration will not likely to lead to an unacceptable risk to environmental values.

The applicant has reported that total of 160.55 hectares of native vegetation has been cleared as of 31 December 2022 under the clearing permit 4594/8 (Rio Tinto, 2023b). Hamersley Iron Ore Pty Ltd has applied to amend CPS 4594/8 to extend the period in which clearing is authorised to 30 June 2028 and extend the permit duration to 31 December 2033 (Hamersley, 2023). The permit boundary has been reduced from 7,683 hectares to 6,145 hectares, as the applicant has excised gorge/gully, breakaways and riverine habitats. The proposed amendment is not likely to result in significant environmental impact.

The amendment application has been assessed against the clearing principles, planning instrument and other matters in accordance with s.51O of the *Environmental Protection Act 1986*, and the proposed clearing is at variance to Principles (a), (b), (c) and (f); may be at variance to Principles (g) and (i); not likely to be at variance to Principles (d), (h) and (j) and not at variance to Principle (e).

3.2.1. Biological values (high level of biodiversity) - Clearing Principles (a) & (c) – Vegetation and Flora

Assessment

Recent biological surveys (Biologic 2020a; 2020b; 2021a; 2021b; 2021c) which have been undertaken across the application area have been submitted in support of this clearing permit amendment (Rio Tinto, 2023a). The review of the current environmental values and potential impacts to the area proposed to be cleared indicate some potential impacts to the significant vegetation and conservation significant flora present within the application area.

Significant Vegetation

The vegetation communities identified in the application area do not represent known threatened or priority ecological communities (TEC or PEC) (Biota, 2012a; 2012b). Several mulga communities (units AanAprAteTe, AanAteCAsspTw, AanAteTe and AanAteERfTeTw) identified by Biota (2012b) were considered to be analogous to the "lower slope mulga" community identified as an ecosystem at risk by fire regimes. However, it was determined that these associations do not have elevated significance than other vegetation as susceptibility to long-term degradation from fire is reduced given that the majority of these units are surrounded by large areas of stony habitat with limited grassy understorey and therefore limited potential to carry fire (Biota, 2012b). These vegetation types have therefore not been assigned an elevated conservation significance ranking above the general vegetation. Therefore, none of the mulga communities within the study area are considered to be "low slope mulga" communities (Biologic, 2021c, Biota 2012a; 2012b).

The Mulga creekline community (MUCR) occurring on alluvial plains in the Ashburton is also listed as an ecosystem at risk. MUCR is described as occurring in four of the land systems mapped within the application area (Biologic, 2021c). This vegetation type could potentially correspond to the Mulga tall shrublands / low woodlands recorded from the flowlines through the plains to the north and south of the application area, specifically units AanAwTe, AanAxTa, AanAxTe, AciAanAwTe, AciAanAwTw and AciAanCEspp, however the description provided in Payne et al. (1988) suggests that MUCR would most likely correspond to vegetation unit AciAanCEspp (Biota, 2012b). Given that the unit AciAanCEspp is already substantially degraded through invasion of Buffel Grass and grazing/trampling by cattle, which are the major listed threats to the MUCR community, this unit is not considered to be a good quality example of the MUCR community and has not been assigned an elevated conservation significance (Biologic, 2021b).

The vegetation types from which the Threatened flora *Aluta quadrata* were recorded is considered of elevated conservation significance. These vegetation associations were DpERcrTe, AanAprAteTe, and AprGbERsppTe (Biologic, 2021c). However, disturbance to this species will be managed by avoiding disturbance to the population and will be further discussed in the flora section below.

Multiple minor drainage lines occur throughout the application area (GIS Database). These drainage lines have the potential to support phreatophytic flora, or ground water dependent vegetation. The major watercourses within the application area comprise; six mile creek, seven mile creek and Pirraburdu creek. Biological surveys have identified various permanent and semi-permanent (ephemeral) pools, in particular Ratty Springs in Pirraburdu Creek (Biologic, 2020a; 2020b). *Eucalyptus victrix* was recorded as the dominant overstorey species within vegetation type EvAcMgCEspp, within Six Mile Creek. *Eucalyptus victrix* is a vadophyte, or in certain situations a facultative phreatophyte (when occurring in association in shallow groundwater). In addition to *E. victrix*, several mesophytic flora have been recorded from the drainage line: *Acacia citrinoviridis*; *Melaleuca glomerata*; *A. coriacea* subsp. *pendens*; and *Cyperus vaginatus* (Biologic, 2021c). Comparatively less information is known on the groundwater use strategies of these understorey species; however, they occurred in association with a drainage line with groundwater likely in proximity to the surface. The Ratty Springs and the presence of equivalent vegetation (EcEvAamMgCYPv)

on Seven Mile Creek suggests that another spring may be located in this area (Biota, 2012a). Given that these vegetation types are already somewhat degraded through weed invasion, they have been ascribed only a Moderate (rather than High) conservation significance ranking. However, clearing within these creek systems should be avoided if possible, and otherwise strictly minimised as the vegetation types of the major creek systems would comprise ecosystems at risk (Biota, 2012a). This will be managed by the existing vegetation management condition.

Vegetation unit CfAciAanTe (Biota, 2009) is considered as low to moderate significance as it provides riparian habitat for priority flora, riparian flora and fauna (Biota, 2012a; 2012b). This habitat supports a number of conservation significant flora taxa including *Eremophila* sp. Hamersley Range (K. Walker KW 136) (P1), *Hibiscus campanulatus* (P1), *Grevillea saxicola* (P3), *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P3) and *Solanum* sp. (indet) (Biota, 2012a; 2012b). Although this vegetation unit appears to occur across a wide range, the flora species which inhabit gorge habitats can be localised as to have elevated conservation significance at a local scale (Biota, 2009) when occurring in association to the gorges as they provide habitat for the conservation significant fauna species (see section 3.2.2). Considering the significance of the vegetation unit in the local scale, this habitat type (gorges/gullies) has been excised from the application area.

Flora

Review of biological information of the application area has identified one threatened flora species (*Aluta quadrata*) and three priority species occurring within the application area.

Aluta quadrata (Threatened): a shrub about 0.8-2.6 metres high, flowering (white) in June and has a restricted distribution to banded ironstone formations, edge of creek beds, base of cliffs, rocky crevices, and near crest of ridges (Western Australian Herbarium 1998–). This species has been recorded only from three geographically discrete locations; Howie's Hole, the Western range and Pirruradoo Creek with a total range of approximately 75 square kilometres (Astron, 2018a; Biologic, 2020a; 2020b; 2021c; Biota, 2009; GIS Database). The species is more abundant at the Western Range and Howie's Hole, with a number of populations or meta-populations across each range, while the fewer plants located at Pirruradoo Creek are considered to constitute a single population (Western Australian Herbarium 1998–). However, total Western Range population is located within the application area and the applicant has committed to avoid disturbance to the species with 50 metre buffer (Rio Tinto, 2023a). The continued implementation of the flora management condition will mitigate any potential impacts to this species.

Goodenia sp. East Pilbara (Priority 3): an open, erect annual or biennial herb about 0.2 metres high, flowering yellow in August-September (Western Australian Herbarium 1998–). This species is growing in red-brown clay soil, calcrete pebbles on low undulating plain or swampy plains (Western Australian Herbarium 1998–). This species has 91 records, 70 of these records are within 50 kilometres of the application area (GIS Database). However, this species is widespread in the Weeli Wolli, Mulga Downs, Nullagine, north-west of Newman regions of the Pilbara. Therefore, the proposed activities and extending the duration of the permit is unlikely to cause significant impact to the conservation status of this species (Western Australian Herbarium 1998–).

Hibiscus campanulatus (Priority 1): a woody shrub 1.8 -3.0 metre tall (Western Australian Herbarium 1998–). This species is restricted to the Hamersley subregion of the Pilbara bioregion in Western Australia (Western Australian Herbarium 1998–). The plants grow within incised ironstone gullies, protected areas below cliffs, rocky creek lines and below breakaways, often with underlying loamy to skeletal ironstone soils (Western Australian Herbarium 1998–). Flora and vegetation surveys have recorded this species from 341 locations with an abundance of approximately 4,703 individuals within the survey area, 14 of these locations were recorded within the application area with an abundance of approximately 203 individuals (Astron, 2018a; Biota, 2009; 2012b). The applicant has minimised impacts to this species by excising gorge/gully and breakaway habitats from the application area.

Ptilotus trichocephalus (Priority 4): this prostrate annual herb flowers mainly in August-September, though specimens have been collected as early as March-May; it is likely to be overlooked at other times of the year. This species has been recorded once from clayey flats near Paraburdoo and in the Beasley River study area, approximately 50 kilometres to the north-northwest. This species appears to be strongly associated with broad flat plains with a hard-packed (not cracking) clay substrate and a surface littered with pebbles (a typical gibber plain) (Biota, 2012b). Flora and vegetation surveys have recorded this species from 93 locations with an abundance of approximately 730 individuals within the survey area, 90 of these locations were recorded within the application area with an abundance of approximately 726 individuals (Astron, 2013; Biologic, 2021a; Biota 2012a; 2012b). The proponent's regional dataset includes 4,326 individuals of this species from 299 records. The proponent has an internal Approvals Request Coordination System (ARCS), placing an internal restriction zone (25 metre buffer) around these locations. The proposed clearing is unlikely to impact this species on a local scale.

The applicant has committed to avoid the disturbance to the identified priority flora (Rio Tinto, 2023a). However, considering the low impact nature of the proposed activities and the large permit boundary and avoidance and mitigation methods implemented by the applicant, impacts to these species are considered low.

Thirteen other Priority flora species have been identified as potentially occurring considering the presence of suitable habitat features, abundance, and distance to closest record (section B.2). However, considering the extensive surveys transecting the application area likelihood of presence of these species are considered low.

Conclusion

For the reasons set out above, it is considered that the impacts of the proposed clearing on riparian vegetation and conservation significant flora should be avoided or minimised where possible. Impact to the conservation significant areas (gorge/gully,

breakaways and riverine habitats) will be managed by excising these areas from the application area and the existing condition on weed hygiene to avoid and minimise the risk of the introduction and spread of weeds. Additionally, the disturbance to the flora of conservation significance will be minimised by the existing flora management condition.

Conditions

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

- flora management condition to avoid disturbance to the conservation significant flora,
- avoid riparian vegetation and maintain surface water flow; and
- implementation of weed hygiene condition to avoid and minimise the spread of weeds.

3.2.2. *Biological values (high level of biodiversity) - Clearing Principles (a) & (b) – Flora & fauna habitat*

Assessment

The information provided with the clearing permit application and available databases were utilised in this assessment. Review of the current environmental values and potential impacts to the area proposed to be cleared indicated the potential impact to the fauna habitats and fauna of conservation significance.

Fauna habitats

The assessment area is broadly mapped into eight fauna habitats: alluvial plain, breakaway, drainage line, gorge/gully, low hill, rocky hill, stony plain and cleared areas (Astron, 2013; 2019b; Biologic, 2019a; 2019b; 2020a; 2020b; 2021a; 2021b; Biota, 2011). These habitat types are considered common and widespread within the Hamersley and Ashburton subregions, with the exception of breakaways, drainage lines and gorge/gully fauna habitats, which are of conservation significance as they represent habitat which provides important refugia and denning resources such as caves and rock crevices, as well as water pools which is favoured habitat of conservation significant species discussed below (Astron, 2013; 2019a; 2019b; Bat Call WA, 2020; Biologic, 2019a; 2019b; 2020a; 2020b; 2021a; 2021b; Biota, 2011).

Breakaway habitats within the application area are associated with the broken edge of rocky hill habitat and, due to the sloping geological stratification, are more prominent on the north facing slopes. This habitat also provides semi-permanent water resources. The vegetation of the breakaways are typically sparse and contains microhabitats such as crevices, overhangs and shallow caves that provide potential shelter opportunities for conservation significant species, including the Pilbara olive python and northern quoll (Biologic 2021a). The caves have the potential to be used as diurnal roosts and nocturnal feeding roosts for the ghost bat and Pilbara leaf-nosed bat, and provides potential den sites for the northern quoll and Pilbara olive python. The breakaway habitat provides critical habitat values to several conservations listed species and is therefore considered of high importance for fauna (Biota, 2011; Biologic, 2021a).

The drainage line habitat is of moderate value and typically exhibits a moderate diversity of microhabitats, with some tree hollows and woody debris (logs and leaf litter). The ground storey vegetation was dominated by Buffel Grass reducing floral diversity. Drainage lines within the survey area did not support permanent or semi-permanent water bodies and are likely to be seasonally inundated during large rainfall events only. Both ground dwelling and flying fauna are likely to utilise the linear nature of the drainage lines for dispersal between habitats (Biota, 2011; Biologic, 2021a).

Gorge/Gully habitats are one of the most restricted habitats within the application area. They are considered of high value as it contains a complexity of microhabitats and supports conservation significant fauna species. The gorge/gully habitat represent important potential shelter or roosting habitat for Pilbara olive python, ghost bat, Pilbara leaf-nosed bat and northern quoll. The Gorge/Gully habitat in the survey area transitions from shallow, open gullies on the upper slopes of the hill to deeper, incised gorges on the lower slopes. This habitat supports occasional deep caves particularly on the south facing slopes and semi-permanent rock pools on the foot slopes; these habitat features can provide refuge for fauna during harsher, drier seasonal conditions (Biota, 2011; Biologic, 2021a).

As part of this amendment the proponent has excised riverine, gorge/gully and breakaway habitat types from the application area.

Fauna of conservation significance:

Multiple fauna surveys (Astron, 2013; 2018b; 2019a; 2019b; Batt Call WA, 2020; Biologic, 2019a; 2019b; 2020a; 2020b; 2021a; 2021b; 2021c; Biota 2011) transecting the application area have identified and confirmed the presence of three conservation significant fauna species in the application area (Astron, 2018b; 2018c; 2019a; Biologic 202b; 2021a; Biota, 2011)

Pseudomys chapmani (western pebble-mound mouse) (Priority 4): occurs almost exclusively on low undulating stony hills and the gentler slopes of rocky ranges where the ground is covered with a stony mantle and vegetated by hard spinifex, often with a sparse over storey of eucalypts and scattered shrubs (DCCEEW, 2023). The species is likely to occur throughout the application area in the low hill, rocky hill and stony plain habitats where suitable burrowing substrate and mound materials (pebbles and small rocks) are present. Considering only an inactive mound has been recorded in the application area, this species is likely to occur in low density (Biota, 2012b).

Dasyurus hallucatus (Northern quoll) (Endangered): are known to occur within a range of habitats, including ironstone and sandstone ridges, scree slopes, granite boulders and outcrops, drainage lines, riverine habitats dissected rocky escarpments, open forest of lowland savannah and woodland (DCCEEW, 2023). Rocky habitats tend to support higher densities, as they offer protection from predators and are generally more productive in terms of availability of resources. Northern quoll was recorded via scat and camera trap records within the breakaway and gorge/gully habitat

types where suitable denning/shelter and/or foraging habitat is present, in addition the drainage line and rocky hill habitat for foraging and/or dispersal (Biota, 2011). Impacts to this species may be managed by the excision of the riverine, gorge/gully and breakaway habitats from the application area, and by maintaining the fauna condition on the permit given new habitats arise.

Rhinonictis aurantia (Pilbara) (Pilbara leaf-nosed bat) (Vulnerable): roost in undisturbed caves, deep fissures or abandoned mine shafts (DCCEEW, 2023). Gorge/gully and breakaways represent significant habitat for the Pilbara leaf-nosed bat as caves are often formed within these habitat types which can be utilised for roosting and foraging (DCCEEW, 2023). Drainage lines provides suitable foraging habitat for Pilbara leaf-nosed bats in the Study Area. Impacts to this species may be managed by the excision of riverine, gorge/gully and breakaway habitats from the application area, and by maintaining the fauna condition on the permit given new habitats arise.

The following conservation significant fauna species have been recorded within the survey area and could potentially occur within the application area:

Actitis hypoleucos (common sandpiper) (Migratory): is known for its wide range and utilising a wide range of coastal wetlands and some inland wetlands (DCCEEW, 2023). This species may utilise the drainage line habitat areas for foraging, as riverine habitats have been excised from the application area and suitable habitat is widespread and available outside the application area, extending the permit duration will not have a significant impact to this species.

Falco hypoleucos (Grey falcon) (Vulnerable): commonly nests in timbered areas, particularly tall trees along watercourses, and forages in open or more sparsely vegetated habitats (DCCEEW, 2023). Grey falcon was recorded within or near major drainage habitats in the survey area. It is possible the species is nesting within this habitat, particularly where riparian vegetation comprises large tall trees providing suitable nesting opportunities and vantage points for the species, particularly around the Ratty Springs locality (Biota, 2011). Suitable habitat is available widespread within the surrounding environment and impacts to this species may be managed through a flora management condition avoiding riparian vegetation.

Leiopotherapon aheneus (Fortescue grunter) (Priority 4): is endemic to the region and listed as a Priority 4 (P4) species on the DBCA Threatened and Priority Fauna Species List (DBCA, 2020) and Endangered on the IUCN Redlist of Threatened Species (IUCN, 2020). This species is known only from the Ashburton, Fortescue, and Robe rivers in the Pilbara. Its IUCN listing was recently revised and upgraded from Near Threatened (IUCN, 2020). The Fortescue grunter have been recorded throughout Pirrarburdu Creek. Impacts to this species is considered low as the applicant has excised riverine habitats from the application area.

Liasis olivaceus barroni (Pilbara olive python) (Vulnerable): is often associated with drainage systems, including areas with localised drainage and watercourses (DCCEEW, 2023). Microhabitat preferences of the Pilbara olive python are under rock piles, on top of rocks or under spinifex (DCCEEW, 2023). Individuals spend the cooler winter months within caves and rock crevices away from water sources (DCCEEW, 2023). This species is likely to be found within the gorge/gully, breakaway and drainage line habitats particularly at the sites that contain permanent or semi-permanent water. Occurrence is likely to be associated with waterbodies, particularly highly persistent waterbodies such as spring-fed systems occurring in major drainage habitats, and rock pools in gorge/gully habitat. Impacts to this species is considered low as the applicant has excised riverine habitats from the application area.

Macroderma gigas (Ghost bat) (Vulnerable): will roost either individually or in colonies (Astron, 2019a) and move periodically from roost to roost in as dictated by weather changes or local prey availability (Northover et al., 2023). Ghost bats forage in productive habitat including drainage lines and along riparian corridors, on alluvial plains supporting mulga woodlands and tussock grassland, sparse woodlands along ridge lines, as well as cave entrances where other bats are hunted (Northover et al., 2023). Foraging areas tend to be located less than 5 kilometres from diurnal roost sites (Northover et al., 2023). Ghost bats are known to be sensitive to disturbances within, or in close proximity to, roost caves and are known to abandon caves where construction or mining activities occur nearby (Bat Call WA, 2020). The operational noise, dust, light, vibration etc. are likely to be the primary impacts on these species. However, the species is known to quickly recolonise the roost caves provided that their internal structures remain secure and continue to offer viable internal habitats. The field survey by the Astron (2019a) has identified population of ghost bats within the application area to range between 5 - 11 individuals (Astron, 2019a). Total of 18 ghost bat caves has been identified within the application area (Astron, 2019a), of which eight of those caves are consider as critical habitat as defined as:

- four category 2 caves including one confirmed maternal roost cave (cave 6), and three potential maternal roosts/confirmed roosts (cave 11, 15, and 18); and
- four potential maternal roosts/confirmed diurnal roosts (category 3- apartment blocks) (cave 1, 4, 14, and 16).

Nine isolated caves (cave 2, 3, 7, 8,9,10,12,13 and 17) identified as potential diurnal roosts (category 3) caves, and one nocturnal (category 4) roost cave (cave 5) were categorised as not critical habitat (Northover et al., 2023). The amendment has excised these caves (with the appropriate buffer) from the application area.

The permit condition requiring a fauna specialist to identify suitable habitat for *Dasyurus hallucatus* (Northern Quoll), *Rhinonictis aurantius* (Pilbara Orange Leaf-nosed Bat) and *Macroderma gigas* (Ghost Bat) will remain on this permit given new locations of these species arise in the future.

Conclusion

Impacts to breakaways, drainage lines, and gorge/gully habitat types should be avoided where possible including the ephemeral rivers and springs within the application area to locally conserve conservation significant species. Additionally, Vegetation unit CfAciAanTe has been mapped from gullies in the application area (see Section 4.1.3) and is assigned a Moderate conservation CPS 4594/9

significance ranking. Disturbance to the core habitats used by the conservation significant fauna species have been managed via excising these areas from the application area.

Conditions

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

- direction of clearing: slow directional clearing to allow fauna to move into adjacent vegetation ahead of the clearing activity;
- engage fauna specialist to identify habitat for: *Dasyurus hallucatus* (Northern Quoll), *Rhinionictoris aurantius* (Pilbara Orange Leaf-nosed Bat) and *Macroderma gigas* (Ghost Bat); and
- avoid, minimise and reduce the impacts and extent of clearing.

3.3. Relevant planning instruments and other matters

The clearing permit amendment application was advertised on 30 June 2023 by the Department of Mines, Industry Regulation and Safety inviting submissions from the public. No submissions were received in relation to this application.

There are two native title claims (Yinhawangka Part A & B) over the area under application (DPLH, 2023). These claims have been determined by the Federal Court on behalf of the claimant groups. 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 37 registered Aboriginal Sites of Significance within the application area (DPLH, 2023). 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 |
|--|--|
| IBSA reference numbers to the requested surveys were provided by the proponent. | Survey information was used in the assessment. |
| New spatial data (shapefile) provided excluding Threatened flora, Ghost bat caves, Pilbara Leaf-nosed bat caves, significant fauna habitats and significant vegetation | New shapefile used for the assessment |

Appendix B. Site characteristics

B.1. Site characteristics

| Characteristic | Details |
|------------------------|--|
| Local context | The area proposed to be cleared is located approximately eight kilometres west of Paraburdoo within the Shire of Ashburton (GIS Database). It is part of an extensive land use zone of Western Australia and is located on unallocated crown land and Ashburton down, Mininer, and Rocklea Pastoral stations (GIS database). Over 99% of the native vegetation within a 50 kilometre radius of the application area remains uncleared (GIS Database). |
| Ecological linkage | Known or mapped ecological linkages has not been identified in the application area (GIS database). |
| Conservation areas | The application area is not located within a conservation area (GIS Database). The nearest main conservation area is the A-class Karijini National Park (R30082), located approximately 40 kilometres east from the application area (Biologic, 2021). |
| Vegetation description | <p>The vegetation of the application area is broadly mapped as the following Beard vegetation associations:</p> <ul style="list-style-type: none"> • 82: Hummock grasslands, low tree steppe; snappy gum over <i>Triodia wiseana</i>; • 163: Shrublands; eremophila and cassia dwarf scrub; • 181: Shrublands; mulga & snakewood scrub; and • 567: Hummock grasslands, shrub steppe; mulga & kanji over soft spinifex & <i>Triodia basedowii</i>. <p>A flora and vegetation survey of the application area has identified the following 25 vegetation types (Biologic, 2021; Biota, 2012a; 2012b):</p> <p>Hills and Ridges</p> <p>AanAprAteTe: <i>Acacia aneura</i>, <i>Acacia pruinocarpa</i> tall open shrubland to low woodland over <i>Acacia tetragonophylla</i> scattered shrubs over <i>Triodia epactia</i> hummock grassland on crests and slopes;</p> <p>AprGbERsppTe: <i>Acacia pruinocarpa</i>, <i>Grevillea berryana</i> tall open shrubland over <i>Eremophila fraseri</i> subsp. <i>fraseri</i>, <i>Eremophila canaliculata</i>, <i>Eremophila cuneifolia</i> scattered low shrubs over <i>Triodia epactia</i> hummock grassland on crests and slope;</p> <p>AteAsyERcTe: <i>Acacia tetragonophylla</i>, <i>Acacia synchronicia</i> scattered tall shrubs over <i>Eremophila cuneifolia</i> scattered shrubs over <i>Triodia epactia</i> hummock grassland on footslopes and scattered low ridges;</p> <p>AteERfTw: <i>Acacia tetragonophylla</i> scattered tall shrubs over <i>Eremophila fraseri</i> subsp. <i>fraseri</i> scattered shrubs over <i>Triodia wiseana</i> hummock grassland on low calcrete hills;</p> <p>AanAteCAsspTw: <i>Acacia aneura</i> low open woodland over <i>Acacia tetragonophylla</i> tall open shrubland over <i>Cassia</i> spp. scattered shrubs over <i>Triodia wiseana</i> open hummock to hummock grassland;</p> <p>AanAteERfTeTw: <i>Acacia aneura</i>, <i>Acacia tetragonophylla</i> tall open shrubland over <i>Eremophila fraseri</i> subsp. <i>fraseri</i> scattered shrubs over <i>Triodia epactia</i>, <i>Triodia wiseana</i> open hummock grassland on low ridges and hills;</p> <p>AanCAoERsppARc: <i>Acacia aneura</i> tall open scrub over <i>Cassia oligophylla</i>, <i>Eremophila</i> spp. open heath over <i>Aristida contorta</i> open bunch grassland;</p> <p>DpERcrTe: <i>Dodonaea pachyneura</i>, <i>Eremophila cryptothrix</i> tall shrubland over <i>Triodia epactia</i> hummock grassland;</p> |

| Characteristic | Details |
|----------------------|---|
| | <p>Stony Plains</p> <p>AanAteTe: <i>Acacia aneura</i>, <i>Acacia tetragonophylla</i> tall shrubland over <i>Triodia epactia</i> open hummock grassland low undulating hills and stony plains;</p> <p>AanAteCAspp: <i>Acacia aneura</i>, <i>Acacia tetragonophylla</i> tall open shrubland over <i>Cassia</i> spp. scattered low shrubs;</p> <p>AanAxAteERcTa: <i>Acacia aneura</i>, <i>Acacia xiphophylla</i> tall open shrubland over <i>Acacia tetragonophylla</i>, <i>Eremophila cuneifolia</i> shrubland over <i>Triodia angusta</i> hummock grassland;</p> <p>AxAteERcCAspp: <i>Acacia xiphophylla</i> tall open shrubland over <i>Acacia tetragonophylla</i> open shrubland over <i>Eremophila cuneifolia</i>, <i>Cassia</i> spp. scattered low shrubs;</p> <p>AanAxAteERcCAspp: <i>Acacia aneura</i>, <i>Acacia xiphophylla</i> tall open shrubland over <i>Acacia tetragonophylla</i> open shrubland over <i>Eremophila cuneifolia</i>, <i>Cassia</i> spp. scattered low shrubs;</p> <p>Drainage Lines</p> <p>EvAcMgCEspp: <i>Eucalyptus victrix</i> woodland to scattered trees over <i>Acacia coriacea</i> subsp. <i>pendens</i>, <i>Melaleuca glomerata</i> tall shrubland over *<i>Cenchrus</i> spp. open tussock grassland;</p> <p>AanAxTe: <i>Acacia aneura</i>, <i>Acacia xiphophylla</i> tall open scrub over mixed open shrubland over <i>Triodia epactia</i> open hummock grassland;</p> <p>AanAwTe: <i>Acacia aneura</i> low open woodland to low woodland over <i>A. wanyu</i> tall open shrubland over <i>Triodia epactia</i> very open hummock grassland;</p> <p>AciAanCEspp: <i>Acacia citrinoviridis</i>, <i>A. aneura</i> tall shrubland to low open forest over *<i>Cenchrus</i> species open tussock grassland to tussock grassland;</p> <p>AciCEsppTe: <i>Acacia citrinoviridis</i> low woodland over *<i>Cenchrus</i> spp. open tussock to closed tussock grassland with <i>Triodia epactia</i> scattered to very open hummock grassland in floodbanks and floodplains associated with major unnamed creek;</p> <p>AanAxTa: <i>Acacia aneura</i>, <i>Acacia xiphophylla</i> tall open scrub over <i>Triodia angusta</i> open hummock grassland in moderate creeks;</p> <p>EcEvAamMgCYPv: <i>Eucalyptus camaldulensis</i>, <i>Eucalyptus victrix</i> open forest over <i>Acacia ampliceps</i>, <i>Melaleuca glomerata</i> tall shrubland over <i>Cyperus vaginatus</i> open sedgeland to sedgeland;</p> <p>AciAanAwTe: <i>Acacia citrinoviridis</i>, <i>Acacia aneura</i> low open woodland to low woodland over <i>Acacia wanyu</i> tall open shrubland over <i>Triodia epactia</i> very open hummock grassland;</p> <p>AciAanAwTw: <i>Acacia citrinoviridis</i>, <i>Acacia aneura</i> low open woodland to low woodland over <i>Acacia wanyu</i> tall open shrubland over <i>Triodia wiseana</i> very open hummock grassland in moderate creeks;</p> <p>CfAciAanTe: <i>Corymbia ferriticola</i> scattered low trees to low open woodland over <i>Acacia citrinoviridis</i>, <i>Acacia aneura</i> tall shrubland over <i>Triodia epactia</i> open hummock grassland in converging rocky gullies and creeks; and</p> <p>AanAxTe: <i>Acacia aneura</i>, <i>Acacia xiphophylla</i> tall open scrub over <i>Triodia epactia</i> open hummock grassland in minor flowlines.</p> <p>Alluvial Plain</p> <p>AsyAteCc; <i>Acacia synchronicia</i> and <i>Acacia tetragonophylla</i> tall open shrubland over <i>Senna</i> spp. low scattered shrubs;</p> |
| Vegetation condition | <p>The aerial imagery and a vegetation surveys conducted by Biologic Environmental Services (Biologic, 2021) and Biota Environmental Services (Biota, 2012a; 2012b) indicate the majority of vegetation within the proposed clearing area is in excellent to completely degraded (Trudgen, 1991) condition. Complete degraded condition only applies to the areas with existing disturbance to the native vegetation due to Paraburdoo mine, a network of exploration activities, cattle grazing, and trampling throughout the application area. Some vegetation units (i.e. AciAanCEspp, EvAcMgCEspp, AciCEsppTe, and AsyAteCc) have been identified in poor condition due to the presence of weed</p> |

| Characteristic | Details |
|----------------------|--|
| | <p>species, which was evident across the larger creek systems and their associated floodplains (Biologic, 2021).</p> <p>The full Trudgen (1991) condition rating scale is provided in Appendix D.</p> |
| Climate and landform | <p>The climate of the Pilbara is semi desert tropical with annual rain fall of 300 millilitres (BoM, 2023). The land system comprised of repeating patterns of topography, soils and vegetation (Biota, 2012b)</p> |
| Soil description | <p>The application area is mapped into two soil landscape zones (Tille, 2006):</p> <ul style="list-style-type: none"> • Hamersley Plateaux Zone with hills and dissected plateaux (with some stony plains and hardpan wash plains) on sedimentary and volcanic rocks of the Hamersley Basin with Stony soils, Red shallow loams and some Red/brown non-cracking clays and Red loamy earths; and • Ashburton Valley Zone with hills and ranges (with some floodplains and stony plains) on sandstone, shale and conglomerate of the Ashburton Basin with Stony soils, Red loamy earths and Red shallow loams. <p>Soil types in the application area are broadly mapped into four soil types (GIS Database);</p> <ul style="list-style-type: none"> • Fa13: Ranges of banded jaspilite and chert along with shales, dolomites, and iron ore formations; some areas of ferruginous duricrust as well as occasional narrow winding valley plains and steeply dissected pediments. This unit is largely associated with the Hamersley and Ophthalmia Ranges. The soils are frequently stony and shallow and there are extensive areas without soil cover: chief soils are shallow stony earthy loams; • Fa15: Ranges of basalt along with shale, chert, jaspilite, and dolomite; some narrow winding valley plains. The soils are frequently shallow and there are extensive areas without soil cover: chief soils are shallow stony loams; • Oc50: Dissected Pedi plain with occasional small steep stony hills. Shales and greywackes along with some volcanic and dolomites form the country rock: hard alkaline red soils are dominant; and • Oc69: Valley plains with occasional low flat-topped residuals that are often capped by iron ore formations but sometimes by calcrete (kunkar): hard alkaline red soils are dominant. |
| Land systems | <p>The application area is broadly mapped into nine land systems (DPRID, 2023).</p> <ol style="list-style-type: none"> 1. Newman system: Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands. Erosional surfaces; plateaux and mountains - extensive high plateaux, mountains and strike ridges with vertical escarpments and steep scree slopes and more gently inclined lower slopes; moderately spaced dendritic and rectangular tributary drainage patterns of narrow valleys and gorges with narrow drainage floors and channels. 2. Table system: Low calcrete plateaux, mesas and lower plains supporting mulga and cassia. Erosional surfaces formed by dissection of the old Tertiary surface; low dissected plateaux with tops up to several kilometres in extent and with numerous small drainage foci; isolated mesas, buttes and low hills with vertical breakaway faces and short lower slopes, restricted lower calcareous plains; moderately to widely spaced tributary and non-tributary drainage floors and channels. 3. Dollar system: Stony plains supporting mulga and snakewood shrublands with some chenopod low shrubs. Depositional surfaces; level stony plains of unconsolidated colluvium, minor alluvial zones, outcrop plains and low dolomitic rises; sparse, through going sub parallel drainage with single and braided channels. 4. Paraburdoo system: Basalt derived stony gilgai plains and stony plains supporting snakewood and mulga shrublands with spinifex, chenopods and tussock grasses. Mostly depositional surfaces; isolated low basalt hills, stony upper interfluvial plains with small groves, stony plains with gilgai microrelief; moderately spaced patterns of sub-parallel tributary drainage extending downslope into broad zones with braided drainage and major trunk channels. 5. Boolgeeda system: Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands. Predominantly depositional surfaces; very gently inclined stony slopes and plains below hill systems becoming almost level further downslope; closely spaced, dendritic and sub-parallel drainage lines. 6. River system: Narrow, seasonally active flood plains and river terraces subject to fairly regular overbank flooding from major channels and watercourses, sandy banks and poorly defined levees and cobble plains. Supports moderately close, tall shrublands or woodlands |

| Characteristic | Details |
|-----------------------|--|
| | <p>of acacias and fringing communities of eucalypts sometimes with tussock grasses.</p> <ol style="list-style-type: none"> 7. Marandoo system: Basalt hills and restricted stony plains supporting grassy mulga shrublands. Erosional surfaces; hills and ridges with steep stony upper slopes, more gently inclined lower slopes and stony interfluves, widely spaced tributary drainage floors and channels. 8. Rocklea system: Erosional surfaces; hills, ridges and plateaux remnants on basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex and occasionally soft spinifex grasslands with scattered shrubs. Moderately spaced tributary drainage patterns of small channels in shallow valleys in upper parts becoming broader floors and channels downslope. 9. Ethel system: Cobble plains with sparse mulga and other acacia shrublands Stony plains with acacia shrublands. Soils are reddish brown loams and clays, generally with dense pebble and cobble strew. These soils are inherently stable due to the stony nature, although some pasture degradation is evident on drainage floors (Astron, 2013a). |
| Land degradation risk | <p>From the above nine land systems:</p> <ul style="list-style-type: none"> • Newman, Table and Rocklea land systems are more susceptible to the erosion (Van Vreeswyk et al., 2004). River land system is highly to very highly susceptible to erosion if vegetative cover is removed. The drainage zones of the Ethel and Paraburdoo land systems are moderately susceptible to the erosion (Payne et al., 1988; Van Vreeswyk et al., 2004). • Majority of application area has low risk of acidification and salinization with <3% of map unit with high risk (DPRID, 2023). However, Ethel and Dollar land systems (10% of map units with high risk) and river land system (60% of map unit with high risk) have high susceptibility of acidification and subsurface compaction (DPRID, 2023). <p>Biota (2012b) identified some erosion along tracks that access the steep slopes, however this has not extended substantially from the disturbance areas.</p> <p>The main areas in which existing land degradation is evident comprise the moderate-sized creek lines supporting <i>Acacia citrinoviridis</i> (units AciCEsppTe and AciAscCEspp) and <i>Acacia aneura</i> (Mulga) tall shrublands over *<i>Cenchrus</i> spp. tussock grasslands (unit AciAanCEspp); these areas are both heavily infested with weeds, and heavily grazed and trampled by cattle (Biota,2012a).</p> |
| Waterbodies | <p>Three major drainage features have been identified within the application area; six mile creek, seven mile creek and Pirraburdu creek. Several unnamed ephemeral creeks intersect the study area from north to south. This creek forms a tributary of Six Mile Creek, located approximately 10 kilometres south west of the study area (Biota 2012a; 2012b). Vegetation on these creek lines represents the riparian vegetation (Biota, 201a).</p> <p>No permanent surface water bodies or wetlands were identified within application area. However multiple water bodies including lakes, rivers (i.e.: Ashburton river) and creeks (i.e.: turee creek, tableland creek) were identified within 50 kilometres boundary from the application area (GIS Database).</p> <p>All of these watercourses form part of the Ashburton River catchment zone. The Ashburton River, at its nearest point, lies approximately 38 kilometres to the south of the study area (Rio Tinto, 2018).</p> <p>Riverine areas have been excised from the application area following this review.</p> |
| Hydrogeography | <p>The application area is located in Ashburton river catchment area (GIS Database) and local aquifers are rocks of low permeability, fractured and weathered rocks (GIS Database).Paraburdoo Water Reserve drinking water resource management area (CAWS Act) is approximately seven kilometres to the east from application area (GIS Database). The application area is located within the Pilbara Ground and surface water Area (R/WI Act) (GIS Database).</p> <p>The ground water in the application area is mapped as marginal saline (TDS 500-100mg/L) (GIS Database).</p> <p>Local aquifer of the area application area is broadly mapped as rocks of low permeability, fractured and weathered rocks of Shale and Sedimentary rocks.</p> |

| Characteristic | Details |
|------------------------|--|
| Flora | The applicant has excised areas where <i>Aluta quadrata</i> (Threatened) individuals were recorded, therefore amending the application area. Following the review of the new application area: thirteen conservation significant flora species have been recorded during the flora and vegetation surveys, three of these conservation significant flora species have been recorded within the application area and an additional thirteen flora species may potentially occur (GIS Database). |
| Ecological communities | No identified Threatened or Priority Ecological Community located within 50 kilometres from the application area (GIS Database). |
| Fauna | <p>The application area is broadly mapped into eight fauna habitat types; Alluvial plain, Breakaway, Drainage lines, Gorge/gully, Low hill, Rocky hill, Stony plain and cleared areas (Biota, 2011).</p> <p>Fauna surveys (Astron, 2021b; Biologic, 2021a; Biota, 2011) and a desktop assessment has identified three conservation significant fauna species to be present in the application area.</p> <p>Nine Short Range Endemic (SRE) species have been identified in the application area (Biologic, 2021b), however none of them are currently listed as conservation significant (EPA, 2009);</p> <ul style="list-style-type: none"> • Stygofauna (<i>Australoencyclops karaytugi</i>, <i>Diacyclops cocking</i>, <i>Pristina longiseta</i>, <i>Thermocyclops aberrans</i>; • Troglifauna (<i>Lophoturus madecassus</i>); and • Terrestrial intervertebra fauna (<i>Lychas 'pilbara' 1</i>, <i>Oratemnus</i> sp. indet., <i>Pupoides</i> sp. indet., <i>Stenopylis coarctata</i>) (Biologic, 2019a; 2019b; 2020a). |

B.2. Flora analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix E.1), and biological survey information (Astron, 2013; 2018a; 2018b; 2019a; 2019b; Bat Call WA, 2020; Biologic, 2019a; 2019b; 2020a; 2020b; 2021a; 2021b; 2021c; Biota, 2011), impacts to the following conservation significant flora required further consideration.

| Species Name | Conservation code | Distance to the closet record (km) | Number of records locally | Number of records in state | Suitable Soil | Suitable vegetation | Likelihood of occurrence |
|--|-------------------|------------------------------------|---------------------------|----------------------------|---------------|---------------------|--------------------------|
| <i>Aluta quadrata</i> | T | <5 | 2434 | 18 | Y | Y | Likely |
| <i>Dampiera anonyma</i> | P 3 | <50 | 5 | 32 | Y | Y | Unlikely |
| <i>Eremophila coacta</i> | P 3 | <15 | 21 | 14 | Y | Y | Unlikely |
| <i>Eremophila magnifica</i> subsp. <i>magnifica</i> | P 4 | <10 | 4 | 46 | Y | Y | Possibly |
| <i>Eremophila magnifica</i> subsp. <i>velutina</i> | P 3 | <50 | 1 | 22 | Y | Y | Unlikely |
| <i>Eremophila naaykensis</i> A.L Curtis & K. R. Thiele (previously named <i>Eremophila</i> sp. Hamersley Range (K. Walker KW 136)) | P 3 | <10 | 233 | 22 | Y | Y | Possibly |
| <i>Eremophila rigens</i> | P 3 | <50 | 3 | 5 | Y | N | Unlikely |
| <i>Eremophila</i> sp. Mt Channar Range (C. Keating & M.E. Trudgen CK 408) | P 1 | <50 | 2 | 3 | Y | N | Unlikely |
| <i>Eremophila youngii</i> subsp. <i>lepidota</i> | P 4 | <30 | 1 | 49 | Y | Y | Unlikely |
| <i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727) | P 3 | 0 | 91 | 53 | Y | Y | Likely |
| <i>Grevillea saxicola</i> | P 3 | <10 | 53 | 38 | Y | Y | Likely |
| <i>Helichrysum oligochaetum</i> | P 1 | <40 | 3 | 13 | Y | Y | Unlikely |

| | | | | | | | |
|--|-----|------|-----|----|---|---|----------|
| <i>Hibiscus campanulatus</i> | P 1 | 0 | 383 | 38 | Y | Y | Likely |
| <i>Hibiscus</i> sp. Gurinbiddy Range (M.E. Trudgen MET 15708) | P 2 | <40 | 9 | 27 | Y | Y | Likely |
| <i>Hibiscus</i> sp. Mt Brockman (E. Thoma ET 1354) | P 1 | <50 | 1 | 16 | Y | N | Unlikely |
| <i>Isotropis forrestii</i> | P 1 | <20 | 3 | 6 | Y | N | Unlikely |
| <i>Nicotiana umbratica</i> | P 3 | <1 | 2 | 18 | Y | Y | Likely |
| <i>Olearia mucronata</i> | P 3 | <30 | 1 | 14 | N | Y | Unlikely |
| <i>Pilbara trudgenii</i> | P 3 | <10 | 3 | 12 | Y | N | Possibly |
| <i>Ptilotus mollis</i> | P 4 | <30 | 6 | 43 | Y | Y | Unlikely |
| <i>Ptilotus subspinescens</i> | P 3 | <50 | 3 | 18 | Y | N | Unlikely |
| <i>Ptilotus trichocephalus</i> | P 4 | 0.00 | 108 | 20 | Y | Y | Likely |
| <i>Rhodanthe frenchii</i> | P 2 | <50 | 1 | 13 | Y | Y | Unlikely |
| <i>Rostellularia adscendens</i> var. <i>latifolia</i> | P 3 | <50 | 2 | 43 | Y | Y | Possibly |
| <i>Scaevola</i> sp. Hamersley Range basalts (S. van Leeuwen 3675) | P 2 | <30 | 6 | 12 | Y | Y | Possibly |
| <i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642) | P 4 | <5 | 28 | 58 | Y | Y | Likely |
| <i>Sida</i> sp. Hamersley Range (K. Newbey 10692) | P 3 | <30 | 5 | 18 | Y | Y | Possibly |
| <i>Solanum kentrocaule</i> | P 3 | <50 | 2 | 21 | Y | Y | Unlikely |
| <i>Streptoglossa</i> sp. Cracking clays (S. van Leeuwen et al. PBS 7353) | P 3 | <20 | 1 | 13 | Y | Y | Possibly |
| <i>Swainsona thompsoniana</i> | P 3 | <20 | 1 | 28 | Y | Y | Possibly |
| <i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431) | P 3 | <20 | 1 | 60 | Y | Y | Possibly |

T: threatened, P: priority

B.3. Fauna analysis table

| Scientific Name | Common Name | Conservation code | Number of records within 50km | Distance to the closet record (km) |
|-------------------------------|------------------------|-------------------|-------------------------------|------------------------------------|
| BIRD | | | | |
| <i>Actitis hypoleucos</i> | common sandpiper | MI | 10 | <5 |
| <i>Calidris acuminata</i> | Sharp-tailed sandpiper | MI | 5 | <10 |
| <i>Calidris ruficollis</i> | Red-necked stint | MI | 1 | <30 |
| <i>Calidris subminuta</i> | Long-toed Stint | MI | 2 | <10 |
| <i>Charadrius veredus</i> | Oriental Plover | MI | 1 | <50 |
| <i>Falco hypoleucos</i> | Grey falcon | VU | 3 | <5 |
| <i>Falco peregrinus</i> | peregrine falcon | OS | 3 | <30 |
| <i>Pezoporus occidentalis</i> | night parrot | CR | 1 | <50 |
| <i>Plegadis falcinellus</i> | Glossy ibis | MI | 3 | <30 |
| <i>Tringa glareola</i> | Wood sandpiper | MI | 5 | <10 |

| MAMMAL | | | | |
|---------------------------------------|-----------------------------|----|----|-----|
| <i>Dasyurus hallucatus</i> | Northern quoll | EN | 21 | 0 |
| <i>Leggadina lakedownensis</i> | northern short-tailed mouse | P4 | 4 | <50 |
| <i>Macroderma gigas</i> | Ghost bat | VU | 8 | <5 |
| <i>Pseudomys chapmani</i> | western pebble-mound mouse | P4 | 45 | 0 |
| <i>Rhinonictis aurantia (Pilbara)</i> | Pilbara leaf-nosed bat | VU | 65 | 0 |
| <i>Sminthopsis longicaudata</i> | Long-tailed dunnart | P4 | 6 | <30 |
| REPTILE | | | | |
| <i>Liasis olivaceus barroni</i> | Pilbara olive python | VU | 5 | <5 |
| Aquatic | | | | |
| <i>Leiopotherapon aheneus</i> | Fortescue grunter | P4 | 22 | <5 |

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority, MI: Migratory, OS: Other specially Protected

Appendix C. Assessment against the clearing principles

| Assessment against the clearing principles | Variance level | Is further consideration required? |
|--|---|---|
| Environmental value: biological values | | |
| <p>Principle (a): "Native vegetation should not be cleared if it comprises a high level of biodiversity."</p> <p><u>Assessment:</u></p> <p>One threatened flora (<i>Aluta quadrata</i>) species and seven priority flora species has been recorded in the survey area. Additionally:</p> <ul style="list-style-type: none"> three vegetation types identified in the application area considered as of elevated significance (i.e.: CfAciAanTe, EvAcMgCEspp, and EcEvAamMgCYPv); three significant fauna habitats have been identified within the application area; and fauna species of conservation significance have been recorded in the application area. <p>However, the applicant has excised the above environmental values from the application area.</p> | At variance (changed from CPS 4594/8) | Yes <i>Refer to Section 3.2.1 & 3.2.2 above.</i> |
| <p>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."</p> <p><u>Assessment:</u></p> <p>Proposed area to be cleared contains critical, breeding, roosting, and foraging, habitat for conservation significant fauna species. The applicant has excised the above environmental values from the application area.</p> | At variance (changed from CPS 4594/8) | Yes <i>Refer to Section 3.2.2, above.</i> |
| <p>Principle (c): "Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."</p> <p><u>Assessment:</u></p> <p>A population of <i>Aluta quadrata</i> (Threatened) species has been identified in the application area. However, the applicant has excised the known records of the <i>A. quadrata</i> from the application area.</p> | At variance (changed from CPS 4594/8) | Yes <i>Refer to Section 3.2.1 above.</i> |
| <p>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."</p> <p><u>Assessment:</u></p> <p>The area proposed to be cleared does not contain species that can indicate a threatened ecological community (TEC) (GIS Database). The nearest identified TEC; Themeda grasslands (<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431) on cracking clays (Hamersley Station, Pilbara) is approximately 90 kilometres to the north of the application area (GIS Database). Therefore it is unlikely the proposed clearing will impact the environmental values of this TEC.</p> | Not likely to be at variance (as per CPS 4594/8) | No |
| Environmental value: significant remnant vegetation and conservation areas | | |

| Assessment against the clearing principles | Variance level | Is further consideration required? |
|---|--|---|
| <p><u>Principle (e):</u> <i>“Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.”</i></p> <p><u>Assessment:</u></p> <p>The application area falls within the Pilbara Bioregion of the Interim Biogeographic Regionalisation for Australia (IBRA) (GIS Database). Approximately more than 99% of the pre-European vegetation still exists in the IBRA Pilbara Bioregion (Government of Western Australia, 2019). The application area is broadly mapped as Beard vegetation associations 181, 82, 163, 567, with approximately more than 97% of the pre-European extent of this vegetation association remains uncleared at both the state and bioregional level (Government of Western Australia, 2019).</p> | <p>Not at variance</p> <p>(as per CPS 4594/8)</p> | <p>No</p> |
| <p><u>Principle (h):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.”</i></p> <p><u>Assessment:</u></p> <p>Proposed clearing is not located within a conservation reserve (GIS Database). The nearest conservation area Karijini National Park (R30082), which is located approximately 40 kilometres east of the application area (GIS Database). At this distance it is unlikely that the proposed clearing will impact the environmental values of any conservation areas.</p> | <p>Not likely to be at variance</p> <p>(as per CPS 4594/8)</p> | <p>No</p> |
| Environmental value: land and water resources | | |
| <p><u>Principle (f):</u> <i>“Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.”</i></p> <p><u>Assessment:</u></p> <p>No permanent wetlands or water courses located within the application area. However multiple ephemeral watercourses (GIS Database) and vegetation communities growing in association with drainage lines were identified. The potential impacts to the riparian vegetation will be managed by the implementation of a vegetation management condition.</p> | <p>At variance</p> <p>(as per CPS 4594/8)</p> | <p>Yes</p> <p><i>Refer to Section 3.2.1 above</i></p> |
| <p><u>Principle (g):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</i></p> <p><u>Assessment:</u></p> <p>Table, Rocklea, River Ethel and Paraburdoo land systems are susceptible to the erosion (Payne et al., 1988; Van Vreeswyk et al., 2004). Surveys have indicated existing minor erosions of the tracks accessing the steep slopes in the application area (Biota, 2012b). There is low risk of acidification and salinization except, Ethel, Dollar and river land system where there is high susceptibility of acidification and subsurface compaction.</p> <p>Noting the nature of the low impact activities allowed, the proposed clearing is not expected to result significant land degradation on the application area. However, potential impacts will be managed by implementation of a staged clearing condition.</p> | <p>May be at variance</p> <p>(as per CPS 4594/8)</p> | <p>No</p> |
| <p><u>Principle (i):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.”</i></p> <p><u>Assessment:</u></p> <p>Paraburdoo Public Drinking Water Source Area (PDWSA) is approximately seven kilometres to the east from application area (GIS Database) and the application area is located within the Pilbara Ground water Area (GIS Database)</p> <p>Provided that clearing is avoided in the major drainage systems of six mile creek, seven mile creek and pirraburdu creek, no deterioration in the quality of surface or underground water should arise from minor clearing activities.</p> <p>The rocky sloping topography of upper catchments tend to produce considerable runoff. However, the ephemeral watercourses tend to have high levels of sedimentation and turbidity after rainfall events (Van Vreeswyk et al., 2004). The proposed clearing is unlikely to increase the sediment load of the surface water significantly compared to surrounding uncleared areas.</p> <p>However, the potential impacts will be managed by the implementation of a vegetation management condition in form of surface water flow maintenance.</p> | <p>May be at variance</p> <p>(as per CPS 4594/8)</p> | <p>No</p> |

| Assessment against the clearing principles | Variance level | Is further consideration required? |
|--|--|------------------------------------|
| <p><u>Principle (j):</u> "Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding."</p> <p><u>Assessment:</u></p> <p>The cyclonic or thunderstorm nature of rainfall in the Pilbara associated with the rocky sloping topography of the upper catchments often produces considerable run-off and widespread flooding in the major river systems. The topography of the Pilbara, being mostly hard surfaced with numerous tributary creeks and rivers, means that major river systems will run from rain falling somewhere within the catchment. Local to widespread flooding is common in the lower reaches of most river systems, narrow floodplains, major channels and ephemeral drainage lines within the application area during intense rainfall.</p> <p>The six mile creek, seven mile creek and pirraburdu creek systems are the main surface features that would flood seasonally during high rainfall events. The plains to the north and the south of the application area generally slope gently away from the ridge, and are dissected by numerous minor flow lines, hence these are unlikely to flood except in very low-lying areas (Biota, 2012a)</p> <p>Clearing of vegetation for the proposed low impact activities unlikely to exacerbate the frequency or intensity of flooding through the area.</p> | <p>Not likely to be at variance</p> <p>(as per CPS 4594/8)</p> | <p>No</p> |

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. Sources of information

E.1. GIS databases

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

- Aboriginal Heritage Places (DPLH-001)
- Clearing Regulations – Schedule One Areas (DWER-057)
- 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
- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil Landscape Land Quality – Subsurface Acidification Risk (DPIRD-011)
- 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

E.2. References

- Astron (2013) Western Ranges Level 1 Vegetation, Flora and Fauna Survey. Report prepared for Rio Tinto Iron Ore Ltd, August 2013.
- Astron (2018a) Greater Paraburdoo Detailed Flora and Vegetation Survey. Prepared for Rio Tinto, April 2018.
- Astron (2018b) Western Range EPA Level 1 and Targeted Conservation Significant Fauna Assessment. Report prepared for Rio Tinto Iron Ore, June-July 2018.
- Astron (2018c) Greater Paraburdoo Level 2 Fauna Survey. Report prepared for Rio Tinto, April 2018.
- Astron (2019a) Greater Paraburdoo Ghost Bat, *Marcroderma gigas* - Contextual Study. Report prepared for Rio Tinto Iron Ore, June 2019.
- Astron (2019b) Greater Paraburdoo Level 2 Fauna Survey. Report prepared for Rio Tinto Iron Ore, April 2019.
- Bat Call WA (2020) Rio Tint, Ratty Spring and Paraburdoo Pools Pilbara leaf-nosed Bat monitoring program, 2015 to January 2020. Report prepared for Rio Tinto, March 2020.
- Biologic (2019a) Greater Paraburdoo Subterranean Fauna Survey. Report prepared for Rio Tinto Iron Ore Pty Ltd, May 2019.
- Biologic (2019b) Greater Paraburdoo Targeted Stygofauna Survey Memo. Report prepared for Rio Tinto Iron Ore, September 2019.
- Biologic (2020a) Greater Paraburdoo Iron Ore Hub: Aquatic Ecosystem Survey Report 2019-2020. Report prepared for Rio Tinto Iron Ore, October 2020.
- Biologic (2020b) Greater Paraburdoo Iron Ore Hub: Aquatic Fauna Survey Intermin Report: Dry Season 2019. Report prepared for Rio Tinto Iron Ore, March 2020.
- Biologic (2021a) Western Range Project Detailed Terrestrial Vertebrate Fauna Survey 2021. Report prepared for Rio Tinto, June 2021.
- Biologic (2021b) Western Range Project Short-Range Endemic Invertebrate Fauna Survey. Report prepared for Rio Tinto Iron Ore, June 2021.
- Biologic (2021c) Western Range Single Detailed Flora and Vegetation Survey. Prepared for Rio Tinto Iron Ore, June 2021.
- Biota (2009) Western Range Phase 1: Vegetation and Flora Summary Report. Prepared for Rio Tinto, December 2009
- Biota (2011) Western Range Two-Phase Fauna Survey. Report prepared for Rio Tinto Iron Ore Pty Ltd, March 2011.
- Biota (2012a) Western Range Additional Area: Vegetation and Flora Report. Report prepared for Rio Tinto, March 2012.
- Biota (2012b) Western Range Phase 2: Vegetation and Flora Report. Report prepared for Rio Tinto, February 2012.
- Bureau of Meteorology (BoM) (2023) Bureau of Meteorology Website – Climate Data Online, Paraburdoo Aero (007185). Bureau of Meteorology. <http://www.bom.gov.au/climate/data/> (Accessed 7 July 2023).
- Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023) Species Profile and Threats Database (SPRAT). Available from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl> (Accessed 8 September 2023).
- Department of Environment Regulation (DER) (2014) *A guide to the assessment of applications to clear native vegetation*. Perth. Available from: https://www.der.wa.gov.au/images/documents/your-environment/native-vegetation/Guidelines/Guide2_assessment_native_veg.pdf
- Department of Planning, Lands and Heritage (DPLH) (2023) Aboriginal Heritage Inquiry System. Department of Planning, Lands and Heritage. <https://espatial.dplh.wa.gov.au/AHIS/index.html?viewer=AHIS> (Accessed 8 September 2023).
- Department of Primary Industries and Regional Development (DPIRD) (2023) NRInfo Digital Mapping. Department of Primary Industries and Regional Development. Government of Western Australia. URL: <https://dpiird.maps.arcgis.com/apps/webappviewer/index.html?id=662e8cbf2def492381fc915aaf3c6a0f> (Accessed 10 August 2023).
- Department of Water and Environmental Regulation (DWER) (2021) Procedure: Native vegetation clearing permits. Joondalup. Available from: https://dwer.wa.gov.au/sites/default/files/Procedure_Native_vegetation_clearing_permits_v1.pdf
- Environmental Protection Authority (EPA) (2009) Guidance for the Assessment of Environmental factors (in accordance with the *Environmental Protection Act 1986*): sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia, No. 20, Western Australia.

- Environmental Protection Authority (EPA) (2016) Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment. Available from:
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) (2016) Technical Guidance – Terrestrial Fauna Surveys. Available from:
https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Tech%20guidance-%20Terrestrial%20Fauna%20Surveys-Dec-2016.pdf
- Environmental Protection Authority (EPA) (2020) Technical Guidance – Terrestrial Fauna Surveys. Available from:
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) 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 Iron Pty Ltd (Hamersley) (2023) Hamersley Iron Pty Ltd - Application to amend a clearing permit, CPS 4594/9, received 22 June 2023.
- IUCN, International Union for the Conservation of Nature and Natural Resources (2020) The IUCN Redlist of Threatened Species. Available from www.iucnredlist.org
- Northover, A., Palmer, R., Burbidge, A.H., Pearson, D., Dziminski, M., Ottewell, K., Prada, D., Umbrello, L., and Gibson, L., (2023) Summary of knowledge for six faunal species that are Matters of National Environmental Significance in the Pilbara, Western Australia. Department of Biodiversity, Conservation and Attractions, Perth.
- Rio Tinto (2011) Statement Addressing the 10 Clearing Principles, Western Range Exploration Drilling and Geotechnical Investigations, August 2011.
- Rio Tinto (2018) Application for amendment to purpose permit CPS 4594/4 - Western Range Mineral Exploration and Geotechnical Investigation Activities – Tenement ML/246SA, 1 August 2018.
- Rio Tinto (2023a) Pro Forma: Advice for Native Vegetation Clearing Permit amendment pathway, Application to extend 'no clearing after' and expiry date (Administrative amendments), received 06 June 2023.
- Rio Tinto (2023b) Annual Clearing Report for Native Vegetation Clearing Permit CPS 4594/8, received 6 July 2023.
- 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.
- Tille, P. (2006) Soil-landscapes of Western Australia's Rangelands and Arid Interior – Resource Management Technical Report 313. Department of Agriculture and Food, 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 1 November 2023).

4. Glossary

Acronyms:

| | |
|-----------------|---|
| BC Act | <i>Biodiversity Conservation Act 2016</i> , Western Australia |
| BoM | Bureau of Meteorology, Australian Government |
| DAA | Department of Aboriginal Affairs, Western Australia (now DPLH) |
| DAFWA | Department of Agriculture and Food, Western Australia (now DPIRD) |
| DCCEEW | Department of Climate Change, Energy, the Environment and Water, Australian Government |
| DBCA | Department of Biodiversity, Conservation and Attractions, Western Australia |
| DER | Department of Environment Regulation, Western Australia (now DWER) |
| DEMIRS | Department of Energy, Mines, Industry Regulation and Safety, Western Australia |
| DMIRS | Department of Mines, Industry Regulation and Safety, Western Australia |
| 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 | <i>Environmental Protection Act 1986</i> , Western Australia |
| EPA | Environmental Protection Authority, Western Australia |
| EPBC Act | <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Federal Act) |
| GIS | Geographical Information System |
| ha | Hectare (10,000 square metres) |
| IBRA | Interim Biogeographic Regionalisation for Australia |
| IUCN | International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union |
| PEC | Priority Ecological Community, Western Australia |
| RIWI Act | <i>Rights in Water and Irrigation Act 1914</i> , Western Australia |

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.