



Clearing Permit Decision Report

1. Application details and outcomes

1.1. Permit application details

Permit number:	2283/7
Permit type:	Purpose Permit
Applicant name:	Hamersley Iron Pty Ltd
Application received:	28 March 2023
Application area:	355 hectares
Purpose of clearing:	Mineral exploration, resource definition drilling and associated activities
Method of clearing:	Mechanical Removal
Tenure:	<i>Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972, Temporary Reserve 70/4193</i> <i>Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972, Temporary Reserve 70/4882</i> <i>Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972, Temporary Reserve 70/4883</i> <i>Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972, Temporary Reserve 70/4884</i>
Location (LGA area):	Shire of East Pilbara
Colloquial name:	Greater Broadway Project

1.2. Description of clearing activities

Hamersley Iron Pty Ltd proposes to clear up to 355 hectares of native vegetation within a boundary of approximately 4,930 hectares, for the purpose of mineral exploration, definition drilling and associated activities. The project is located approximately 42 kilometres north-west of nearest Newman, within the Shire of East Pilbara (GIS Database).

Clearing permit CPS 2283/1 was granted by the Department of Industry and Resources (now Department of Mines, Industry Regulation and Safety) on 23 April 2008, authorising the clearing of up to 200 hectares of native vegetation within a boundary of approximately 949 hectares, for the purpose of mineral exploration.

CPS 2283/2 was granted on 12 May 2011 to change the reporting date from 31 March to 31 July each year. The area approved to clear and the permit boundary remained unchanged.

CPS 2283/3 was granted on 16 February 2012, extending the period in which clearing was authorised by five years and the duration of the permit by five years.

CPS 2283/4 was granted on 30 March 2017 to extend the period in which clearing was authorised and the duration of the permit by five years, and change the permit reporting date from 31 July for the previous financial year to 30 June for the previous calendar year.

CPS 2283/5 was granted on 31 December 2017, increasing the amount of clearing authorised to 342 hectares and increasing the clearing permit boundary to approximately 4,849 hectares, incorporating the area previously approved under CPS 4149/3.

CPS 2283/6 was granted on 8 November 2018, increasing the amount of clearing authorised from 342 hectares to 355 hectares, and increase the permit boundary from approximately 4,849 hectares to approximately 4,930 hectares.

On 28 March 2023, the Permit Holder applied to amend CPS 2283/6 to amend Condition 2 to include resource definition drilling and associated activities, to amend Condition 4 to extend the authorised clearing period from 31 December 2022 to 31 December 2027 and to extend the permit expiry date from 31 December 2027 to 31 December 2032. The area approved to clear and the permit boundary remained unchanged.

1.3. Decision on application and key considerations

Decision:	Grant
Decision date:	9 November 2023
Decision area:	355 hectares of native vegetation

1.4. 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) on 28 March 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 A), relevant datasets (Appendix D), supporting information provided by the applicant including the results of a flora and vegetation survey, the clearing principles set out in Schedule 5 of the EP Act (Appendix C), proposed avoidance and minimisation measures (Section 3.1), relevant planning instruments and any other matters considered relevant to the assessment (Section 3.3).

The assessment identified that the proposed clearing may result in:

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

After consideration of the available information, as well as the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined the proposed clearing can be minimised and managed to be unlikely to lead to an unacceptable risk to environmental values. The applicant has suitably demonstrated avoidance and minimisation measures.

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;
- avoid identified caves;
- maintain existing watercourses and drainage lines, and where practicable avoid riparian vegetation;
- secondary approval required when clearing individuals of *Acacia bromilowiana*, *Glycine falcata*, *Isotropis parviflora*, *Oxalis* sp. Pilbara and *Rhagodia* sp. Hamersley;
- undertake slow directional clearing to allow fauna to move into adjacent vegetation ahead of the clearing activity which will minimise impact to individuals;
- avoid known locations of *Pseudomys chapmani* mounds;
- retain vegetative material and topsoil, revegetation and rehabilitation.

The assessment has not changed since the assessment for CPS 2283/6, except in the case of principles (a) and (b). The Delegated Officer determined that the proposed amendments are not likely to lead to an unacceptable risk to environmental values.

1.5. Site map

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

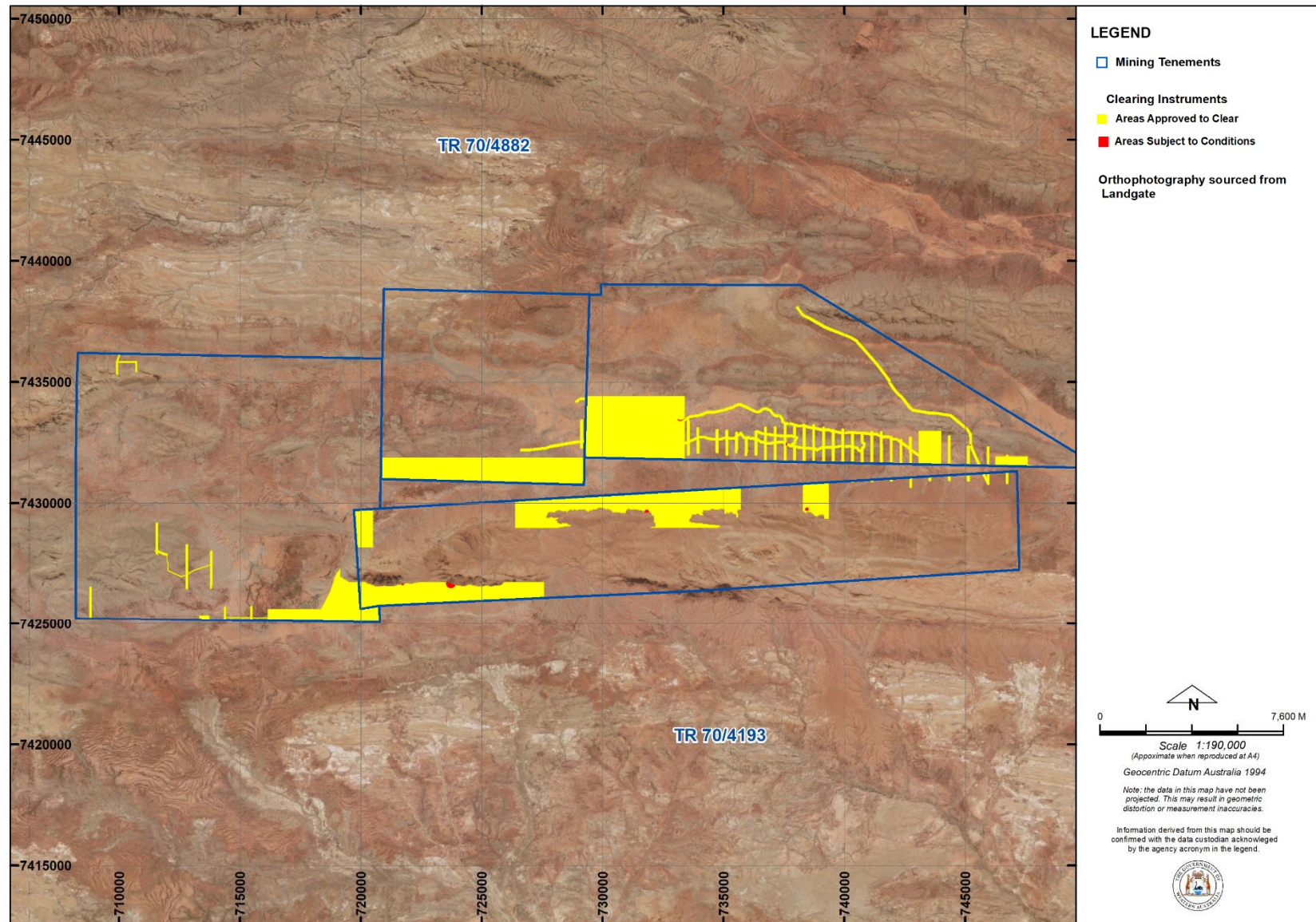


Figure 1. Map of the application area. The yellow area indicates the area within which conditional authorised clearing can occur under the granted clearing permit.

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 (Rhodes Ridge) Agreement Authorisation Act 1972*, Temporary Reserve 70/4193
- *Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972*, Temporary Reserve 70/4882
- *Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972*, Temporary Reserve 70/4883
- *Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972*, Temporary Reserve 70/4884

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

Evidence was submitted by the applicant (Rio Tinto, 2022), demonstrating that avoidance and mitigation measures such as, but not limited to, those listed below will be undertaken:

- No new exploration or associated works will be conducted within the P15 vegetation unit. An additional 50 meter exclusion area will be applied to this vegetation unit in Rio Tinto's Approvals Request Co-ordination System (ARCS) to avoid potential indirect and inadvertent impacts to this vegetation unit.
- A 20 meter exclusion area has been applied to Priority 2 flora records in ARCS to further reduce the risk of potential indirect and inadvertent impacts from new exploration works on these Priority 2 flora taxa.
- All four known Category 3 and 4 caves will be avoided. A minimum 25 meter exclusion area will be applied to the Category 4 caves and 75 meter exclusion area applied to the Category 3 cave to avoid potential indirect and inadvertent impacts from exploration works on Ghost Bat and Pilbara Leaf-nosed Bat.
- The proposed clearing has been planned so as to require the minimal clearing.
- Existing tracks will be utilised where possible.

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

3.2. Assessment of impacts on environmental values

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

A review of current environmental information (Appendix A) reveals that the assessment against the clearing principles has not changed significantly from the Clearing Permit Decision Report CPS 2283/6.

The amendment application has been assessed against the clearing principles, planning instruments and other matters in accordance with section 51O of the *Environmental Protection Act 1986*, and the proposed clearing is at variance to Principle (f), is not likely to be at variance to Principles (c), (d), (g), (h), (i) and (j) and is not at variance to Principle (e). The previous assessment determined the proposed clearing was not likely at variance to Principle (a) and (b), however the current assessment has determined that the proposed clearing may be at variance to these principles.

3.2.1. Biological values (flora) - Clearing Principle (a)

Assessment

Astron has conducted a two phase detailed flora and vegetation survey of the greater Rhodes Ridge project area and have carried out 23 field visits from 2019 to 2021 (Astron, 2022; Rio Tinto 2017; 2018).

One priority ecological community (PEC) may be represented by vegetation recorded in the survey area (Astron, 2022). Vegetation unit P15 may represent the 'West Angelas Cracking-Clays' Priority 1 PEC and covers 76.1 hectares (0.2%) of the

survey area (Astron, 2022). This potential PEC was recorded within the application area. The remaining recorded vegetation units are considered well represented beyond the survey area and do not support assemblages of species that are unique, located on restricted landforms, or of high conservation significance (Astron, 2022). The proponent has committed to avoid areas within the P15 vegetation unit for all new exploration or associated works, however existing areas may be accessed and maintained as necessary. The continued implementation of the existing permit condition excluding the clearing of this vegetation association, may minimise the potential impacts to this PEC.

The following 14 conservation significant species have been recorded within the application area:

Acacia bromilowiana, Priority 4, is a tree or shrub, growing to 12 metres high, which can be found inhabiting red skeletal stony loam, orange-brown pebbly, gravel loam, laterite, banded ironstone and basalt on rocky hills, breakaways, scree slopes, gorges, creek beds (Western Australian Herbarium, 1998-). *Acacia bromilowiana* is known from 29 records within the WA Herbarium, all within the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA) region (Western Australian Herbarium, 1998-). This species was recorded at five locations within the permit boundary with a total abundance of 110 individuals (Astron, 2022; Rio Tinto, 2017). The greater Rhodes Ridge unpublished dataset has recorded an estimated total abundance of 3,445 individuals of *Acacia bromilowiana* within approximately 200 kilometre of the survey area (Astron, 2022). From a regional perspective an estimated 3.2 percent of the known population occurs within the application area. This species has been recorded from 17 locations within 50 kilometres of the application area, with a total abundance of approximately 200 individuals (Astron, 2022; Rio Tinto, 2017; GIS Database). From a local perspective an estimated 55 percent of the known population occurs within the application area. Impacts to this species may be managed through a flora management condition on the permit.

Aristida jerichoensis var. *subspinulifera*, Priority 3, is a compactly tufted perennial, grass-like or herb, growing 0.3-0.8 metres high and can be found inhabiting hardpan plains (Western Australian Herbarium, 1998-). This species is known from 45 records within the WA Herbarium, from the Central Ranges, Gascoyne, Murchison and Pilbara IBRA regions (Western Australian Herbarium, 1998-). This species was recorded within the application area at two locations with a total abundance of 51 individuals (Astron, 2022). Approximately 3,550 individuals have been recorded within the survey area and therefore the clearing of 51 individuals is unlikely to lead to a significant impact (Astron, 2022).

Dolichocarpa sp. Hamersley Station, Priority 3, is a small herb which can be found inhabiting cracking clay plains, minor drainage lines and slopes (Western Australian Herbarium, 1998-). This species is known from 38 records within the WA Herbarium, from the Pilbara IBRA region (Western Australian Herbarium, 1998-). This species was recorded within the application area at one location with a total abundance of 100 individuals (Astron, 2022). This species was recorded from seven locations totalling 1,351 individuals in the central and west portion of the survey area (Astron, 2022). The clearing of 100 individuals will not lead to a significant impact to the species and is unlikely to affect the conservation status of this species.

Euphorbia australis var. *glabra*, Priority 3, is an annual prostrate herb which can be found inhabiting cracking clay plains, minor drainage lines and slopes (Western Australian Herbarium, 1998-). This species is known from 23 records within the WA Herbarium, from the Pilbara IBRA region (Western Australian Herbarium, 1998-). This species was recorded within the application area at one location with a total abundance of 1 individual (Astron, 2022). This species was recorded from 31 locations totalling 743 individuals in the survey area (Astron, 2022). The clearing of 1 individual will not lead to a significant impact to the species and is unlikely to affect the conservation status of this species.

Euphorbia inappendiculata var. *inappendiculata*, Priority 2, is a prostrate herb which can be found inhabiting cracking clay plains, creek beds, minor drainage lines and slopes (Western Australian Herbarium, 1998-). This species is known from 14 records within the WA Herbarium, from the Gascoyne and Pilbara IBRA regions (Western Australian Herbarium, 1998-). This species was recorded within the application area at one location with a total abundance of 1 individual (Astron, 2022). This species was recorded from six locations totalling 1,034 individuals in the survey area (Astron, 2022). The clearing of 1 individual will not lead to a significant impact to the species and is unlikely to affect the conservation status of this species. Previous assessments have discussed *Euphorbia inappendiculata* var. *queenslandica* (Priority 2) as being recorded within the application area, it is assumed this is due to administration error and the correct species present is *Euphorbia inappendiculata* var. *inappendiculata*, *Euphorbia inappendiculata* var. *queenslandica* is thereby removed from the flora management condition.

Glycine falcata, Priority 3, is mat-forming perennial, herb, which can be found inhabiting black clayey sand along drainage depressions in crabhole plains on river floodplains (Western Australian Herbarium, 1998-). This species is known from 14 records within the WA Herbarium, from the Central Kimberley, Ord Victoria Plain and Pilbara IBRA regions (Western Australian Herbarium, 1998-). This species was recorded within the application area at one location with a total abundance of 22 individuals (Astron, 2022). This species was recorded from 10 locations totalling 58 individuals in the survey area (Astron, 2022). From a local perspective an estimated 17 percent of the known population occurs within the application area. This species was recorded on clay plains and self-mulching cracking clay within vegetation unit P15, as the proponent has committed to no further clearing within this vegetation unit, the 22 individuals within the clearing permit will not be impacted and any impacts can be managed through a flora management condition on the permit.

Indigofera gilesii, Priority 3, is a shrub which can be found inhabiting pebbly loam, amongst boulders and outcrops and hills (Western Australian Herbarium, 1998-). This species is known from 39 records within the WA Herbarium, from the Central Ranges, Gascoyne, Murchison, Pilbara and Tanami IBRA regions (Western Australian Herbarium, 1998-). This species was recorded within the application area at 20 locations with a total abundance of 249 individuals (Astron,

2022). This species was recorded from 676 locations totalling 3,945 individuals in the survey area (Astron, 2022). The clearing of 249 individuals will not lead to a significant impact to the species and is unlikely to affect the conservation status of this species.

Isotropis parviflora, Priority 3, is a shrub which can be found inhabiting valley slopes of ironstone plateau (Western Australian Herbarium, 1998-). This species is known from 33 records within the WA Herbarium, from the Great Sandy Desert, Pilbara and Tanami IBRA regions (Western Australian Herbarium, 1998-). This species was recorded within the application area at 88 locations with a total abundance of 1,128 individuals (Astron, 2022). Impacts to this species may be managed through maintaining the flora management condition on the permit.

Oxalis sp. Pilbara, Priority 2, is a small, creeping herb that can be found inhabiting creek lines, gorges and gullies within brown-red loam (Western Australian Herbarium, 1998-). This species is known from 14 records within the WA Herbarium, from the Little Sandy Desert and Pilbara IBRA regions (Western Australian Herbarium, 1998-). This species was recorded within the application area at one location with a total abundance of 20 individuals (Astron, 2022). This species was recorded from three locations totalling 24 individuals in the survey area (Astron, 2022). Impact to this species may be managed through maintaining the flora management condition on the permit.

Rhagodia sp. Hamersley, Priority 3, is a mid-shrub which can be found inhabiting hardpan plains, low undulating hills, and Mulga plains (Western Australian Herbarium, 1998-). This species is known from 72 records within the WA Herbarium, from the Gascoyne, and Pilbara IBRA regions (Western Australian Herbarium, 1998-). This species was recorded from 36,142 locations totalling 45,660 individuals in the survey area (Astron, 2022). This species was recorded within the application area at 4,893 locations with a total abundance of 8,312 individuals (Astron, 2022). From a local perspective an estimated 18 percent of the known population occurs within the application area. Impacts to this species may be managed through a flora management condition on the permit.

Solanum kentrocaule, Priority 3, is a thin, upright exceeding spiny shrub which can be found inhabiting steep gullies, steep slopes of ironstone hills and creek beds (Western Australian Herbarium, 1998-). This species is known from 21 records within the WA Herbarium, from the Gascoyne, and Pilbara IBRA regions (Western Australian Herbarium, 1998-). This species has been recorded at eight locations within 50 kilometres of the application area with an estimated abundance of 60 individuals (GIS Database). This species was recorded within the application area at three locations with a total abundance of four individuals (Astron, 2022). The clearing of four individuals will not lead to a significant impact to the species and is unlikely to affect the conservation status of this species.

Streptoglossa sp. Cracking clays, Priority 3, is a multi-stemmed herb which can be found inhabiting ironstone, plains and small cracking clay plains (Western Australian Herbarium, 1998-). This species is known from 13 records within the WA Herbarium, from the Gascoyne, and Pilbara IBRA regions (Western Australian Herbarium, 1998-). This species was recorded within the application area at one location with a total abundance of one individual (Astron, 2022). The clearing of one individual will not lead to a significant impact to the species and is unlikely to affect the conservation status of this species.

Themeda sp. Hamersley Station, Priority 3, is a tussocky perennial, grass-like or herb which can be found inhabiting red clay, clay plains and grass plains (Western Australian Herbarium, 1998-). This species is known from 60 records within the WA Herbarium, from the Gascoyne and Pilbara IBRA regions (Western Australian Herbarium, 1998-). This species was recorded from 10 locations totalling 533 individuals in the survey area (Astron, 2022). This species was recorded within the application area at three locations with a total abundance of 250 individuals (Astron, 2022).

Themeda sp. Hamersley Station has an estimated total abundance of 301,231 individuals within 200 kilometres of the application area (Astron, 2022). Clearing activities may have a significant impact on the local population, however as suitable habitat is available throughout the Pilbara region and the species is abundant within the surrounding environment, the clearing of 250 individuals will not likely lead to a significant impact to the species at a regional level.

Triodia sp. Mt Ella, Priority 3, is a perennial, grass-like or herb which can be found inhabiting light orange-brown, pebbly loam amongst rocks and outcrops and gully slopes (Western Australian Herbarium, 1998-). This species is known from 38 records within the WA Herbarium, from the Gascoyne, Little Sandy Desert and Pilbara IBRA regions (Western Australian Herbarium, 1998-). This species was recorded from 17 locations totalling 1,160 individuals in the survey area (Astron, 2022). This species was recorded within the application area at eight locations with a total abundance of 280 individuals (Astron, 2022). *Triodia* sp. Mt Ella has an estimated total abundance of 149,432 individuals within 200 kilometres of the application area (Astron, 2022). Clearing activities may have a significant impact on the local population, however as suitable habitat is available throughout the Pilbara region and the species is abundant within the surrounding environment, the clearing of 250 individuals will not likely lead to a significant impacts to the species at a regional level.

Conclusion

Based on the above assessment, the proposed clearing will result in the potential removal of priority flora. For the reasons set out above, it is considered that the impacts of the proposed clearing on flora can be managed by a flora management condition.

Conditions

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

- avoid, minimise to reduce the impacts and extent of clearing;
- secondary approval required when clearing individuals of *Acacia bromilowiana*, *Glycine falcata*, *Isotropis parviflora*, *Oxalis* sp. Pilbara and *Rhagodia* sp. Hamersley;

- avoid areas where vegetation unit P15 is recorded;
- avoid clearing riparian vegetation; and
- take hygiene steps to minimise the risk of the introduction and spread of weeds.

3.2.2. Biological values (fauna) - Clearing Principle (b)

Assessment

Astron has been conducting a two phase Detailed flora, vegetation and fauna survey of the greater Rhodes Ridge project area and have carried out 19 field visits from 2019 to 2021 (Astron, 2022). The following summarises the fauna assessments conducted by Astron:

- Twenty-five habitat assessments were conducted within representative fauna habitat types present within the greater survey area.
- Seventeen trapping sites were sampled within the greater survey area.
- Thirty-one hours of systematic avifauna (bird) censuses were conducted at the trapping grids within the greater survey area (Astron, 2022).
- Motion sensitive cameras were set at 61 locations for three to 98 nights.
- Acoustic recording devices were set at 15 locations for one to 11 nights to record the presence of bats.
- Autonomous Recording Units (ARUs) were set at 13 sites for six to 44 nights.
- Active searches were undertaken in microhabitats suitable for ground-dwelling reptiles and mammals (Astron, 2022).

The following eight broad habitat types were identified within the application area:

- Low Hills and Slopes: Low stony hills and slopes with dissected valleys and drainage on stony soils.
- Clay Plain: Low in the landscape with clay base soils.
- Mulga Woodland: Stands of mulga groves on clay based stony plains.
- Stony Plain: Broad flat low lying plains to undulating plain on soft loamy soils.
- Rocky Hill: Stony hills on high ranges with dissected valleys.
- Minor Drainage: Open drainage areas on stony soils.
- Gullies: Deep often rock gorges, sometimes with ephemeral or semi-permanent pools.
- Cleared/Disturbed: Cleared areas from mining and pastoralism activities (Astron, 2022).

The fauna surveys have identified 183 fauna species, comprising four amphibians, 70 reptiles, 80 birds and 29 mammals within the survey area (Astron, 2022). Two conservation significant fauna species were recorded within the survey area; ghost bat (*Macroderma gigas*) (Vulnerable) and western pebble mouse (*Pseudomys chapmani*) (Priority 4).

Macroderma gigas (ghost bat), Vulnerable, is the largest microchiropteran bat in Australia (DCCEEW, 2023). This species was once distributed over much of Australia except Victoria and Tasmania, currently this species range is discontinuous, with geographically disjunct colonies occurring in the Pilbara, Kimberley, northern Northern Territory, coastal and near coastal eastern Queensland, and western Queensland (DCCEEW, 2023). *Macroderma gigas* currently occupies habitats ranging from arid Pilbara to tropical savanna woodlands and rainforests, where during the daytime they roost in caves, rock crevices and old mines (DCCEEW, 2023). This species was recorded via acoustic recordings within 0.3 kilometres of the application area, scats were identified within 3.5 kilometres of the application area and one individual was sighted within a diurnal roosting cave located approximately 0.7 kilometres from the application area (Astron, 2022). Records occurred within Gorge/Gully habitat, with acoustic recordings indicating a general, low-density presence within the survey area (Astron, 2022). Six Ghost Bat roost caves were recorded within the survey area, comprising of one Category 3 roost cave with occasional occupancy, and five Category 4 nocturnal roost caves with opportunistic usage, none of these caves are considered individually significant to the long-term persistence of the species (Astron, 2022). Two Category 4 caves, one Category 3 cave and one Category 2 cave was recorded within the permit area (Astron, 2022). An additional 46 ghost bat caves have been recorded within the greater Rhodes Ridge area (Astron, 2022). The taller trees located within the minor drainage habitat provides suitable foraging/hunting perches for this species, and the rocky hill habitat contains microhabitats such as boulder piles, cracks and crevices that support a wide range of prey for this species (Astron, 2022). None of the fauna habitats within the survey area are restricted at the local or sub-regional scale and are common, widespread in the broader Pilbara region and are well connected to similar, surrounding habitats (Astron, 2022). Impacts to these caves can be managed through a permit condition, excluding the caves with an appropriate buffer from the application.

Pseudomys chapmani (western Pebble-mound mouse), Priority 4, is endemic to the Pilbara region of Western Australia (DCCEEW, 2023). The species is patchily distributed on gentle colluvial slopes of rocky, hummock grasslands with little or no soil and a sparse shrub layer (DCCEEW, 2023). Thirty-three pebble-mounds (26 active, seven inactive) were recorded within the low hills and slopes, rocky hill, and stony plain habitats of the survey area (Astron, 2022). These habitats are widespread and common within the vicinity of the survey area and the wider Pilbara region. The previous permit condition requires the protection and avoidance of existing pebble mounds, this condition will be maintained in the amended permit.

Eleven conservation significant fauna species were considered to have a high likelihood of occurring within the application area (as listed in Table A.1) (Astron, 2022). Extending the duration of the clearing permit and resource definition drilling activities will not likely lead to significant impacts to these species and is unlikely to affect the conservation status of these species.

Conclusion

Based on the above assessment, the proposed clearing will result in loss of potential habitat for a number of conservation significant fauna species. For the reasons set out above, it is considered that the impacts of the proposed clearing on fauna habitats can be managed by implementing fauna management conditions.

Conditions

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

- avoid, minimise and reduce the impacts and extent of clearing;
- undertake slow directional clearing to allow fauna to move into adjacent vegetation ahead of the clearing activity which will minimise impact to individuals;
- clearing not permitted within identified *Pseudomys chapmani* mounds; and
- clearing not permitted within 50 metres of the identified caves.

3.3. Relevant planning instruments and other matters

The clearing permit amendment application was advertised on 18 April 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 three native title claims over the area under application (Niyiyaparli People (WAD6280/1998), Niyiyaparli #3 (WAD196/2013) and Ngarlawangga People (WAD78/2005)) (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 several registered Aboriginal Sites of Significance within the application area (DPLH, 2023). It is the proponent's responsibility to comply with the *Aboriginal Cultural Heritage Act 2021* 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. Site characteristics

A.1. Site characteristics

Characteristic	Details
Local context	The area proposed to be cleared is located approximately 42 kilometres north-west of Newman, within the Shire of East Pilbara (GIS Database). The area proposed to be cleared is part of part of an expansive tract of native vegetation in the extensive land use zone of Western Australia (GIS Database). The proposed area is located on unallocated crown land, with temporary allocation to Hamersley Resources Limited (Astron, 2022). The surrounding area includes pastoral stations (Astron, 2022).
Ecological linkage	According to available databases, the application area does not contain any known or mapped ecological linkages (GIS Database).
Conservation areas	The application area is not located within a conservation area (GIS Database). The nearest conservation area, Karijini National Park (R 30082), is located approximately 48 kilometres west of the application area (GIS Database).
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"> • 18: Low woodland; mulga (<i>Acacia aneura</i>); • 29: Sparse low woodland; mulga, discontinuous in scattered groups; • 82: Hummock grasslands, low tree steppe; snappygum over <i>Triodia wiseana</i>; and • 175: Short bunch grassland - savanna/grass plain (Pilbara) (GIS Database). <p>A multiple phase detailed and targeted flora and vegetation survey has been conducted over the application area by Astron from May 2019 to October 2021 (Astron, 2022; Rio Tinto, 2017; 2018). The following 28 vegetation associations were recorded within the application area (Astron, 2022; Rio Tinto, 2017; 2018):</p> <p>Hills and Slopes</p> <ul style="list-style-type: none"> • H1: Low open woodland of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>, <i>Corymbia deserticola</i> and <i>Eucalyptus</i>; <i>gamophylla</i> over open shrubland of <i>Acacia atkinsiana</i> over open hummock grassland of <i>Triodia vanleeuwenii</i>; • H2: Low open woodland of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> over mixed shrubs over very open hummock grassland of <i>Triodia pungens</i> over mixed grasses and herbs; • H3: Low open woodland of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and <i>Corymbia hamersleyana</i> over mixed; shrubs over very open hummock grassland of <i>Triodia pungens</i> and <i>T. vanleeuwenii</i> over mixed annual species; • H4: Low open woodland of <i>Corymbia hamersleyana</i> over scattered shrubs of <i>Acacia atkinsiana</i> over low open shrubland of <i>Corchorus lasiocarpus</i> over very open hummock grassland of <i>Triodia pungens</i>; • H5: <i>Acacia pruinocarpa</i>, <i>Acacia aptaneura</i> and <i>Acacia aneura</i> tall shrubland over <i>Triodia epactia</i> open hummock grassland; • H6: <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> low open woodland over <i>Acacia inaequilatera</i> tall sparse shrubland; and • H7: <i>Acacia pruinocarpa</i>, <i>Acacia aptaneura</i> and <i>Acacia catenulata</i> subsp. <i>occidentalis</i> mid open shrubland over <i>Eremophila forrestii</i> low sparse shrubland over <i>Triodia epactia</i> open hummock grassland. <p>Plains</p> <ul style="list-style-type: none"> • P1: Low woodland of <i>Acacia catenulata</i> subsp. <i>occidentalis</i>, <i>A. aptaneura</i> and <i>A. atkinsiana</i> over open shrubland of <i>Eremophila forrestii</i> over very open hummock grassland of <i>Triodia pungens</i> over annual species; • P2: Tall open shrubland of <i>Acacia aptaneura</i> over scattered low shrubs of <i>Eremophila lanceolata</i> and <i>Solanum lasiophyllum</i> over very open tussock grassland of <i>Aristida contorta</i> over mixed annual species; • P3: Scattered tall shrubs of <i>Acacia aptaneura</i> over low open shrubland of <i>Solanum morrisonii</i> over very open tussock grassland of <i>Eriachne flaccida</i> over very open sedgeland of <i>Fimbristylis dichotoma</i> over mixed annual species; • P4: Tall open shrubland of <i>Acacia ayersiana</i> hybrid and <i>A. aptaneura</i> over low open shrubland of <i>Eremophila lanceolata</i> over very open tussock grassland of <i>Aristida contorta</i> over mixed annual herbs; • P5: Low open woodland of <i>Acacia aptaneura</i> over very open tussock grassland of <i>Aristida latifolia</i> and <i>Digitaria brownie</i>; • P6: <i>Acacia aptaneura</i> low open woodland over <i>Acacia catenulata</i> subsp. <i>occidentalis</i> and <i>Acacia pruinocarpa</i> tall open shrubland over <i>Eremophila forrestii</i> subsp. <i>forrestii</i> scattered shrubs over <i>Triodia melvillei</i> scattered hummock grassland and scattered tussock grasses; • P10: Scattered <i>Acacia aptaneura</i> and <i>Grevillea berryana</i> low trees over <i>Hakea chordophylla</i>, <i>Acacia catenulata</i> subsp. <i>occidentalis</i> and <i>Acacia pruinocarpa</i> scattered tall shrubs over <i>Aristida latifolia</i> and <i>Themeda triandra</i> open tussock grassland with

Characteristic	Details
	<p><i>Triodia melvillei</i> and <i>Triodia epactia</i> open hummock grassland;</p> <ul style="list-style-type: none"> • P11: <i>Eucalyptus gamophylla</i> and <i>Corymbia deserticola</i> low open woodland over <i>Hakea chordophylla</i> and <i>Acacia ancistrocarpa</i> open shrubland over <i>Triodia basedowii</i> hummock grassland; • P12: <i>Acacia aptaneura</i> low open woodland over <i>Aristida contorta</i>, <i>Aristida latifolia</i> and <i>Fimbristylis depauperata</i> open tussock grassland and <i>Triodia melvillei</i> scattered hummock grassland; • P13: <i>Acacia ayersiana</i>, <i>Acacia aptaneura</i> and <i>Acacia catenulata</i> subsp. <i>occidentalis</i> tall open shrubland over <i>Eremophila forrestii</i> and <i>Eremophila latrobei</i> low open shrubland over <i>Triodia melvillei</i> and <i>Triodia epactia</i> hummock grassland plains; • P14: <i>Acacia catenulata</i> subsp. <i>occidentalis</i> tall open shrubland over <i>Enchylaena tomentosa</i> scattered low shrubland over <i>Aristida contorta</i> tussock grassland on light clay plains; • P15: <i>Aristida latifolia</i>, <i>Chrysopogon fallax</i> and <i>Ischaemum albvillosum</i> closed tussock grassland; • P16: <i>Acacia aptaneura</i> (± <i>Acacia aneura</i>) low woodland over <i>Themeda triandra</i> tussock grassland; • P17: Scattered <i>Acacia aptaneura</i> (± <i>Eucalyptus xerothermica</i>) low trees over <i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431), <i>Aristida contorta</i> and <i>Chrysopogon fallax</i> tussock grassland; • P18: <i>Acacia aptaneura</i> (<i>Acacia aneura</i>) low woodland/<i>Acacia aptaneura</i> low open woodland over <i>Eremophila lanceolata</i>, <i>Ptilotus schwartzii</i> and <i>Solanum</i>; and • P19: <i>Corymbia hamersleyana</i> low open woodland/<i>Acacia aptaneura</i> low open woodland over <i>Acacia ayersiana</i>, <i>Acacia aptaneura</i> and <i>Grevillea berryana</i> mid open shrubland. <p>Drainage Lines</p> <ul style="list-style-type: none"> • D1: Low open woodland of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and <i>Corymbia hamersleyana</i> over tall open shrubland of <i>Acacia monticola</i>, <i>Petalostylis labicheoides</i> and <i>Gossypium robinsonii</i> over scattered shrubs of <i>Acacia maitlandii</i> over open hummock grassland of <i>Triodia pungens</i>; • D2: Low open woodland of <i>Corymbia hamersleyana</i> over tall open shrubland of <i>Petalostylis labicheoides</i>, <i>Gossypium robinsonii</i> and <i>Acacia monticola</i> over low open shrubland of <i>Tephrosia</i> sp. Fortescue (A.A. Mitchell 606) over very open tussock grassland of <i>Themeda triandra</i>, <i>Cymbopogon ambiguus</i> and <i>Eulalia aurea</i> over mixed annuals; • D3: <i>Corymbia hamersleyana</i> low open woodland over <i>Acacia maitlandii</i>, <i>Acacia monticola</i> and/or <i>Gossypium robinsonii</i> mid open shrubland; • D4: <i>Eucalyptus camaldulensis</i> subsp. <i>refulgens</i> and <i>E. victrix</i> low open woodland to woodland over <i>Petalostylis labicheoides</i>, <i>Acacia citrinoviridis</i> and <i>Gossypium robinsonii</i> scattered tall shrubs to tall shrubland over <i>G. sturtianum</i> var. <i>sturtianum</i> (and <i>Androcalva luteiflora</i>) scattered shrubs to open shrubland over (<i>Triodia longiceps</i> and/or <i>T. pungens</i> scattered hummock grasses to very open hummock grassland over) <i>Themeda triandra</i>, <i>Eulalia aurea</i> and <i>Eriachne tenuiculmis</i> open tussock grassland with <i>Eragrostis tenellula</i> scattered annual grasses to very open annual grassland; and • D5: <i>Eucalyptus xerothermica</i> (and <i>Corymbia hamersleyana</i>) low open woodland over <i>Petalostylis labicheoides</i>, <i>Eremophila longiflora</i> and <i>Androcalva luteiflora</i> tall open shrubland to tall shrubland over <i>Senna artemisioides</i> subsp. <i>x. artemisioides</i>, <i>Gossypium sturtianum</i> var. <i>sturtianum</i> and <i>Santalum lanceolatum</i> scattered shrubs to open shrubland over <i>Triodia pungens</i>, <i>T. longiceps</i> and/or <i>T. wiseana</i> scattered hummock grasses to open hummock grassland over <i>Themeda triandra</i>, <i>Eulalia aurea</i> and <i>Chrysopogon fallax</i> tussock grassland (over <i>Eragrostis cumingii</i>, <i>Digitaria ctenantha</i> and/or <i>Perotis rara</i> scattered annual grasses to open annual grassland with <i>Arivela viscosa</i> and <i>*Bidens bipinnata</i> scattered herbs to very open herbland).
Vegetation condition	<p>The vegetation survey (Astron 2022; Rio Tinto, 2017; 2018) indicate the vegetation within the proposed clearing area is in 'Completed Degraded' to 'Excellent' (Trudgen, 1991) condition, described as</p> <ul style="list-style-type: none"> • Excellent: Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement; to • Completely Degraded: Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs. <p>The full Trudgen (1991) condition rating scale is provided in Appendix C.</p>
Climate and landform	<p>The climate of the region (Pilbara) is arid tropical with two distinct seasons and experiences an average annual rain fall of 302.3 millilitres (BoM, 2023).</p>

Characteristic	Details
Soil description	<p>The soils of the application area are broadly mapped as the following soil types:</p> <ul style="list-style-type: none"> • 285Bb: Boolgeeda system. Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands; • 285Ne: Newman system. Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands; • 285R: Rocklea system. Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex and occasionally soft spinifex grasslands with scattered shrubs; • 285Sp: Spearhole system. Gently undulating gravelly hardpan plains and dissected slopes supporting groved mulga shrublands and hard spinifex; and • 285Wn: Wannamunna system. Hardpan plains and internal drainage tracts supporting mulga shrublands and woodlands and occasionally eucalypt woodlands (DPIRD, 2023).
Land degradation risk	<p>The Boolgeeda land system is described as stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands (Van Vreeswyk et al, 2004). The vegetation within the system is not prone to degradation and the system is not susceptible to erosion (Van Vreeswyk et al, 2004).</p> <p>The majority of the proposed clearing occurs on the Newman land system. This system is described as rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands (Van Vreeswyk et al, 2004).</p> <p>The Rocklea system is described as basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands, this system has a very low erosion hazard (Van Vreeswyk et al, 2004).</p> <p>A very small fraction of the application area occurs within the Spearhole land system and is comprised mainly of mulga groves which are not susceptible to erosion (Van Vreeswyk et al, 2004).</p> <p>The Wannamunna land system is described as hardpan plains and internal drainage tracts supporting mulga shrublands and woodlands (and occasional eucalypt woodlands) (Van Vreeswyk et al, 2004). Generally, the system has a low susceptibility to erosion (Van Vreeswyk et al, 2004).</p>
Waterbodies	The desktop assessment and aerial imagery indicated that a few minor non-perennial drainage lines occur within the application area (GIS Database). There are no permanent watercourses located within the application area (GIS Database).
Hydrogeography	The application area is not mapped within a proclaimed groundwater area (GIS Database). The proposed area is located within the Pilbara Groundwater Area (GIS Database).
Flora	No Threatened flora were recorded within the application area during the flora, vegetation and fauna habitat surveys (Astron, 2022; Rio Tinto, 2017; 2018).
Ecological communities	The application area is partially mapped within Priority Ecological Community (PEC) 'Coolibah – Lignum Flats: sub type 1', Priority 3 (Astron, 2022; GIS Database). The application area is not mapped within a Threatened Ecological Community (TEC) (GIS Database).
Fauna	<p>Astron has conducted a multiple phase detailed fauna survey across the application area (Astron, 2022). The following summarises the fauna assessments conducted by Astron:</p> <ul style="list-style-type: none"> • Twenty-five habitat assessments were conducted within representative fauna habitat types present within the greater survey area. • Seventeen trapping sites were sampled within the greater survey area. • Thirty-one hours of systematic avifauna (bird) censuses were conducted at the trapping grids within the greater survey area (Astron, 2022). • Motion sensitive cameras were set at 61 locations for three to 98 nights. • Acoustic recording devices were set at 15 locations for one to 11 nights to record the presence of bats. • Autonomous Recording Units (ARUs) were set at 13 sites for six to 44 nights. • Active searches were undertaken in microhabitats suitable for ground-dwelling reptiles and mammals (Astron, 2022).

A.2. Vegetation extent

	Pre-European area (ha)	Current extent (ha)	Extent Remaining %	Current extent in all DBCA managed land (ha)	Current proportion (%) of pre-European extent in all DBCA Managed Lands

IBRA Bioregion - Pilbara	17,808,657.04	17,731,764.88	99.57	1,801,714.98	10.12
Beard vegetation associations - State					
Veg Assoc No. 18	19,892,306.46	19,843,148.07	99.75	1,317,179.00	6.62
Veg Assoc No. 29	7,903,991.45	7,898,973.24	99.94	496,367.56	6.28
Veg Assoc No. 82	2,565,901.28	2,553,206.19	99.51	295,377.96	11.51
Veg Assoc No. 175	526,957.95	524,640.18	99.56	40,277.79	7.64
Beard vegetation associations - Bioregion					
Veg Assoc No. 18	676,556.72	671,843.35	99.30	170,297.48	25.17
Veg Assoc No. 29	1,133,219.76	1,131,712.01	99.87	106,259.86	9.38
Veg Assoc No. 82	2,563,583.23	2,550,888.14	99.50	295,377.96	11.52
Veg Assoc No. 175	507,860.16	507,466.80	99.92	40,277.79	7.93

Government of Western Australia (2019)

A.3. Flora analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix D.1), and biological survey information, impacts to the following conservation significant flora required further consideration.

Species	Conservation Status	Habit and flowering information	Habitat	Distance of closest record from survey area (km)	Post-survey likelihood of occurrence
<i>Indigofera gilesii</i>	P3	Shrub, to 1.5 m high. Leaflets green with white margin. Flowers purple-pink, June to October.	Rocky slopes, gullies, high in landscape, skeletal soils overlaying ironstone formations, red brown loam.	0	Recorded within application area
<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	P2	Spreading procumbent herb, to 0.1 m high. Flowers May and August (Halford, D.A. and Harris W.K, 2012)	Cracking clay (gilgai) flats and depressions. Heavy clay soils on open plains or gently slopes (Halford, D.A. and Harris W.K, 2012)	0	Recorded within application area
<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	Spreading herb to 0.1 m high. Flowers blue, March.	Cracking clay, basalt. Gently undulating plains with large surface rocks, flat crabholed plains.	0	Recorded within application area
<i>Euphorbia australis</i> var. <i>glabra</i>	P3	Prostrate spreading herb or groundcover, stems much-branched sometimes ascending, green or reddish.	Sump, low in landscape, Saline flats on alluvial cracking clay loamy soil, gritty with ironstone fragments.	0	Recorded within application area
<i>Glycine falcata</i>	P3	Mat-forming herb, to 0.2 m high. Flowers blue/purple, May to July.	Drainage depressions in crabhole plains on river floodplains. Black clayey sand.	0	Recorded within application area
<i>Streptoglossa</i> sp. Cracking clays (S. van Leeuwen et al. PBS 7353)	P3	Multi-stemmed erect herb. Flowers pink to dark pink, June.	Cracking clays. Colluvial and alluvial gravels in fan or floodplain.	0	Recorded within application area
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3	Tussocky grass, 0.9 m to 1.8 m high. Flowers August.	Drainage lines, clay flats, crabhole flats and dark, self-mulching clays. Red clay. Clay pan, grass plain.	0	Recorded within application area
<i>Isotropis parviflora</i>	P2	Shrub, 0.1 m high. Flowers white/pink, March.	Valley slope of ironstone plateau. Hillslopes. Associated with mallee on slopes or hard spinifex on ironstone.	0	Recorded within application area
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	P3	Shrub, 2.5 m high, leaves small lanceolate, not aromatic. Flowers yellow, from May. Fruit small red drupelets.	Mulga plains. Alluvial plains. Red brown clay to loamy clay. Occasionally on slopes.	0	Recorded within application area
<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	P2	Small, trailing or tufted, three leaved herb. Leaves with purplish underside. Flowers yellow, May to September.	In gullies and on gully walls. Shaded areas around rock outcrops and gullies.	0	Recorded within application area
<i>Aristida lazaridis</i>	P2	Densely tufted grass, 0.4 m to 1.5 m high. Leaf-blade surface scaberulous. Flowers in April.	Sand, loam, clayey soils. Plains, ironstone hills.	0	Recorded within application area

Species	Conservation Status	Habit and flowering information	Habitat	Distance of closest record from survey area (km)	Post-survey likelihood of occurrence
<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)	P3	Hummock grass to 0.5 m high. Foliage copiously resinous, leaf sheath surface glabrous. Flowers February.	Light orange-brown, pebbly loam. Amongst rocks and outcrops, gully slopes. Ephemeral creek banks, flow lines, skeletal soil over massive ironstone.	0	Recorded within application area
<i>Acacia bromilowiana</i>	P4	Tree or shrub, to 6.5 m high and occasionally to 12 m high. Phyllodes more or less glaucous and slightly pruinose. Flowers yellow/pink, July to August.	Red skeletal stony loam, orange-brown pebbly, gravel loam, laterite, banded ironstone, basalt. High in landscape, rocky hills, breakaways, ridge tops, steep scree slopes, gorges, creek beds.	0	Recorded within application area
<i>Solanum kentrocaule</i>	P3	Erect spindly shrub 0.5 m to 1.5 m high. Flowers mauve/purple, May to September.	Hammersley ranges between 700 m to 1,250 m altitude. Hillsides and mountaintops, or occasionally creek beds, in skeletal red-brown soil over ironstone or on basalt scree.	0	Recorded within application area
<i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109)	P1	Tussock-forming grass-like or herb with woolly base, to 0.3 m high. Flowers September.	Red-brown skeletal soils, ironstone. Steep slopes, summits. Found within <i>Eucalyptus</i> mallee shrubs and <i>Acacia</i> spp. Over hummock grasses.	<15	Recorded within survey area
<i>Hibiscus</i> sp. Gurinbiddy Range (M.E. Trudgen MET 15708)	P2	Spindly upright shrub to 3 m high. Flowers May to July.	Near summit of hill, high in landscape, skeletal red-brown stony soil over massive ironstone of the Brockman Iron Formation. Sheltered or rocky drainage lines below cliffs.	<15	Recorded within survey area
<i>Ipomoea racemigera</i>	P2	Pilose creeping herb or climber. Ovate leaves, glabrous upper surface. Flowers white, March to August.	Flats with brown silty loam soil, major drainage. Creek lines. Sandy soils along watercourses.	<15	Recorded within survey area
<i>Swainsona thompsoniana</i>	P3	Prostrate herb to 0.1 m. Flowers mauve-cream-yellow, August to September.	Open flood plains on heavy clay soils, crabhole plains and gilgai.	<15	Recorded within survey area
<i>Goodenia nuda</i>	P4	Erect to ascending herb, to 0.5 m high. Flowers yellow, April to August.	Alluvial soils over ironstone, floodplains, valleys, watercourses, floodplains and in orange-brown alluvial sand over ironstone. Clay soils and drainage lines.	<15	Recorded within survey area
<i>Lepidium catapycnon</i>	P4	Open, woody herb or shrub, 0.2 m to 0.3 m high, stems zigzag. Flowers white, October.	Skeletal soils in open woodland. Hillsides. More frequent on south facing slopes.	<15	Recorded within survey area
<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)	P1	Erect-branched herb or subshrub to 1 m high. Flowers cream, July.	Major drainage/floodplain in valley between ranges. Flat plain, clays, cracking clay, gilgai, low in landscape, red sandy clay loam with some stone. Dark reddish brown sandy loam.	<15	Recorded within survey area
<i>Xerochrysum boreale</i>	P3	Erect shrub, 1.5 m high. Flowers yellow, September.	Mulga on stony surfaced red-brown, clay- loam.	<15	Recorded within survey area

Species	Conservation Status	Habit and flowering information	Habitat	Distance of closest record from survey area (km)	Post-survey likelihood of occurrence
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	P3	A compactly tufted grass-like or herb with lemma groove muricate. 0.3 m to 0.8 m high. Leaf blade wire-like.	Hardpan plains, Crackling clay, Floodplain with red brown clay loam.	<15	Recorded within survey area
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	P3	Open, erect herb, rosetted with spatulata leaves to 0.2 m high. Flowers yellow, March to September.	Red-brown clay soil, calcrete pebbles. Low undulating plain, swampy plains, stony plains, hill slopes.	<15	Recorded within survey area
<i>Acacia subtiliformis</i>	P3	Spindly, slender, erect shrub, to 3.5 m high, new growth slightly viscid, resinous, aromatic. Peduncles red. Flowers yellow, June to August.	Low undulating country on calcareous rises adjacent to drainage lines. On rocky calcrete plateaux.	<15	Recorded within survey area
<i>Teucrium pilbaranum</i>	P2	Upright shrub, 0.2 m high. Flowers white, May or September.	Clay. Crab hole plain in a river floodplain, margin of calcrete table.	<15	Recorded within survey area
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	P3	Herb or shrub, 0.1 m to 0.3 m high. Angular stems and small flowers covered by conspicuous bract. Flowers blue-purple-violet, April to May.	Ironstone soils. Near creeks or watercourses, along shaded rocky ridges, often in dry gullies and gorges. Rocky hills.	<15	Recorded within survey area
<i>Pityrodia augustensis</i> (EPBC: VU)	T	Bushy shrub to 1 m high. Flowers purple-red, August to September.	Amongst rocks on slopes, or in drainage lines. Sandstone substrate or yellow brown sandy loam over granite.	>200	Unlikely
<i>Calotis squamigera</i>	P1	Procumbent herb, to 0.25 m high. Prostrate radiating branches, leaves light to mid green. Flowers yellow, July.	Pebbly/stony red brown loam, poorly defined flowline on plain.	44.8	Unlikely
<i>Eremophila</i> sp. West Angelas (S. van Leeuwen 4068)	P1	Erect-branched spindly whip shrub with narrow leaves to 3 m high. Flowers purple, September to October.	Very steep rocky hillslopes and ridges of brown silty loam. Breakaways, skeletal red gritty soil over massive banded iron. Mulga bands in clay soils between rocky ridges.	2.8	Unlikely
<i>Goodenia pedicellata</i>	P1	Single stemmed herb with dense cottony and strigose hairs, to 0.25 m high. Flowers yellow, June.	Open exposed sites with scattered sparse shrubs on rocky slopes and crests of low hills.	8.3	Unlikely
<i>Hibiscus</i> sp. Mt Brockman (E. Thoma ET 1354)	P1	Shrub, to 3 m high. Flowers purple/mauve, February to August.	Hill summit, gorge, sheltered or rocky drainage lines below associated cliff-lines or rocky ridges. Red brown sand, skeletal soils.	32.4	Unlikely
<i>Lindernia</i> sp. Pilbara (M.N. Lyons & L. Lewis FV 1069)	P1	No Information Available.	Clay pans, lower slope of dune, riparian slope at water's edge, berm on eastern edge of wetland.	42.5	Unlikely
<i>Myriocephalus scalpellus</i>	P1	Prostrate to semi-erect herb, 0.03 m to 0.08 m high. Flowers yellow- white, July to September.	Depression on flood plain. Clay soils. Sandy clays and loams around clay pan.	42.3	Unlikely

Species	Conservation Status	Habit and flowering information	Habitat	Distance of closest record from survey area (km)	Post-survey likelihood of occurrence
<i>Rorippa</i> sp. Fortescue Valley (M.N. Lyons & R.A. Coppen FV 0760)	P1	No Information Available	Riparian slope at water's edge.	42.5	Unlikely
<i>Synostemon hamersleyensis</i>	P1	Small divaricate subshrub to 1 m high. Glabrous, perennial woody rootstock. Flowers August to November.	Steep scree slope below banded iron formation cliff line with brown sandy loam soil, skeletal ironstone. Breakaway formations and rocky outcrops of incised gully systems. Occurs most commonly at 500 m to 700 m altitude.	44.4	Unlikely
<i>Triodia</i> sp. Karijini (S. van Leeuwen 4111)	P1	Wispy hummock grass 0.6 m to 1 m tall. Non-resinous to weakly resinous, soft-type foliage. Flowers September.	Summits or Mid to upper steep slopes, ridgelines, skeletal soils. On or near outcropping ironstone.	28.9	Unlikely
<i>Cladium procerum</i>	P2	Densely tufted grass-like or herb (sedge) to 2 m high. Nodding inflorescences. Flowers brown, July, October, November.	Perennial streams and pond edges. Along streams in deep gorges of Hamersley Range.	20.5	Unlikely
<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i>	P2	Spreading, much-branched, procumbent herb to 0.3m long. Leaves opposite, petiolate, obovate, very small sinuate-denticulate and glabrous. Flowers and fruits have been collected throughout the year (Halford, D.A. and Harris W.K, 2012).	Dark reddish brown clay or loam. Cracking clay (gilgai) flats and depressions. Quartzite.	4.0	Unlikely
<i>Rhodanthe frenchii</i>	P2	Upright herb to 0.35 m high. Flowers yellow, August to October.	Stony hills, rocky riverbanks and outcrops.	37.2	Unlikely
<i>Tetrateca fordiana</i>	P2	Dwarf shrub, with large obvious hairs on stem, to 0.4 m high. Flowers pink, June to July, September.	Cliff faces, crests, ridges and outcrops in upper rocky ironstone ridgelines, skeletal soil. Shale pocket amongst ironstone, high in landscape.	40.5	Unlikely
<i>Acacia dawweana</i>	P3	Spreading shrub, 0.3 m to 1.5 (-2) m high. Flowers yellow, July to September.	Stony red loamy soils. Low rocky rises, along drainage lines. Rocky skeletal loam on lower scree slopes. Outwash fans of rocky banded ironstone ranges and ridges.	45.7	Unlikely
<i>Acacia effusa</i>	P3	Low, dense, spreading, somewhat viscid shrub, 0.3 m to 1.2 m high, bark 'minniritchi'. Flowers yellow, May to August.	Stony/rocky red loam. Scree slopes of low ranges, diffuse drainage lines. Alluvial plain at base of large banded ironstone mountains and ranges.	34.5	Unlikely
<i>Amaranthus centralis</i>	P3	Herb, decumbent or erect to 0.6 m high. Stems angular, sometimes reddish. Flowers January to December.	Red sand in ephemeral watercourses and loams on edge of permanent pools. Sand plain, river bank, mulga woodland. Granite outcrop. Silty sand amongst granite boulders.	36.1	Unlikely
<i>Crotalaria smithiana</i>	P3	Erect, soft wooded shrub or herb to 0.4 m high. Flowers yellow, June.	Alluvium on floodplains.	47.4	Unlikely

Species	Conservation Status	Habit and flowering information	Habitat	Distance of closest record from survey area (km)	Post-survey likelihood of occurrence
<i>Dampiera metallorum</i>	P3	Rounded, multi-stemmed herb or shrub, to 0.5 m high. Dense, appressed dendritic hairs but becoming glabrescent with age. Flowers blue, April, June or October.	Skeletal red-brown gravelly soil over banded ironstone. Steep slopes, summits of hills.	2.5	Unlikely
<i>Eremophila magnifica</i> subsp. <i>velutina</i>	P3	Aromatic shrub 0.5 m to 1.5 m high. Velutinous. Flowers blue-purple, June to September.	Skeletal soils on the slopes and summits of ironstone hills.	16.8	Unlikely
<i>Eremophila rigida</i>	P3	Erect, bushy shrub, 0.3 m to 4 m high with rigid to leathery ovate leaves. Flowers cream, June to September.	Red sand alluvium. Hardpan plains, stony clay depressions.	31.2	Unlikely
<i>Eremophila</i> sp. Hamersley Range (K. Walker KW 136)	P3	Erect shrub 1 to 3.5 m high. Flowers white-cream-yellow-pink-purple, June to October.	High in the landscape, cliff tops, gorge tops, steep rocky slopes, skeletal red- brown soils.	7.5	Unlikely
<i>Euphorbia clementii</i>	P3	Hard, decumbent, pale stemmed herb to 0.6 m high.	Gravelly hillsides, stony grounds. Clay plains, rocky ironstone slopes, drainage lines on red brown sand.	36.4	Unlikely
<i>Euphorbia stevenii</i>	P3	Glabrous, upright somewhat succulent herb/herbaceous subshrub, to 0.5 m high. Likely to flower throughout the year in response to rainfall.	Clay or clay loam, sandy soils, cracking clay with scattered pebbles, floodplains.	44.1	Unlikely
<i>Fimbristylis sieberiana</i>	P3	Shortly rhizomatous, tufted, grass- like or herb (sedge), 0.25 m to 0.6 m high. Flowers brown, May to June.	Mud, skeletal soil pockets. Pool edges, sandstone cliffs.	18.2	Unlikely
<i>Goodenia lyrata</i>	P3	Prostrate herb with lyrate leaves. Flowers yellow, August.	Red sandy loam. Near claypan. Poorly drained flats.	15.1	Unlikely
<i>Goodenia purpurascens</i> [^]	P3	Erect herb, 0.1 m to 0.3 m high. Flowers blue-purple/white/yellow, January to December.	Clay, mud. Swamps and seasonally wet depressions.	3.5	Unlikely
<i>Grevillea saxicola</i>	P3	Erect shrub to 2.5 m high. Flowers February, April, November.	Low rocky hill, red-brown sandy loam with ironstone pebble cover. Upper steep scree/breakaway slopes and crests associated with banded iron formation outcropping. Mulga woodlands.	3.1	Unlikely
<i>Gymnanthera cunninghamii</i>	P3	Erect woody shrub, 1 m to 2 m high. Leaves somewhat leathery, lanceolate to elliptic. Flowers cream- yellow-green, January to December.	Red/brown/white sandy soils in and adjacent to drainage lines. Riverine brown loam-clay, ironstone scree slopes adjacent to drainage lines, floodplains with sandy soils, foot of low limestone ridge adjacent to mudflats, beach sand.	4.5	Unlikely

Species	Conservation Status	Habit and flowering information	Habitat	Distance of closest record from survey area (km)	Post-survey likelihood of occurrence
<i>Olearia mucronata</i>	P3	Densely branched, unpleasantly aromatic shrub, 0.6 m to 1 m high. Flowers white and yellow, August to December or January.	Schistose hills, along drainage channels. Mesic areas amongst ironstone boulders and creek lines. Margins of dry creek lines.	37.2	Unlikely
<i>Phyllanthus hebecarpus</i>	P3	Woody shrub, to 0.5 m high. Covered in small hairs that give plant a grey appearance.	Moist sites on plateaus or ridges. Granite outcrops.	10.5	Unlikely
<i>Pilbara trudgenii</i>	P3	Gnarled, aromatic shrub, to 1 m high. Flowers white, September.	Skeletal, red stony soil over ironstone. Hill summits, steep slopes, screes, cliff faces.	28.6	Unlikely
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	P3	Spreading shrub to 0.5 m high. Flowers yellow, August.	Skeletal red soils pockets. Steep scree slopes and rock piles, small chines and gullies.	15.5	Unlikely
<i>Sida</i> sp. Hamersley Range (K. Newbey 10692)	P3	Semi-prostrate to upright shrub to 2 m high. Flowers yellow, September to October.	Gorges, base of cliffs, rocky outcrops and breakaways. Occasionally in flat areas between hills in shrubby grasslands.	26.3	Unlikely
<i>Stylidium weeliwoffi</i>	P3	Herb, 0.1 m to 0.25 m high. Flowers pink-red, August to September.	Gritty sand soil, sandy clay. Edge of watercourses, gorges.	9.7	Unlikely
<i>Tecticornia medusa</i>	P3	Erect shrub to 0.7 m high. Vegetative articles obovoid to cylindrical, not compressed. Flowers July to November.	Flat floodplain. Red clayey sand.	49.8	Unlikely
<i>Triodia basitricha</i>	P3	Hummock grass to 0.8 m high, soft, non-resinous to moderately resinous, lower leaf sheaths hairy. Flowers May.	Gravelly low hill and small gully at base of steep slope. Crest of sandstone/basalt hill. Along drainage line at base of steep slope; skeletal red gritty alluvial soil amongst cobble, large boulders, and rocky screes. Undulating rocky uplands.	37.8	Unlikely
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	P4	Shrub, 0.5 m to 1.5 m high. Aromatic, glabrous. Flowers blue/purple, June to September.	Skeletal soils over ironstone. Rocky screes. Slopes and summits.	2.7	Unlikely
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	Dense, erect spreading shrub, to 4 m high. Flowers purple-red-pink, January to September.	Occurs on stony red sandy loam, flats, plains, drainage lines, floodplains and sometimes semi-saline, clay flats. Margins of clay depressions.	4.5	Unlikely
<i>Ptilotus mollis</i>	P4	Compact shrub, to 0.5 m high, soft grey foliage. Stems teres, densely hairy, with nodose hairs. Flowers white/pink, May or September.	Stony hills, steep rocky sites and screes, in drainage lines. Usually in full sun on massive ironstone formations.	2.9	Unlikely
<i>Rhynchosia bungarensis</i>	P4	Compact, prostrate shrub, to 0.5 m high. Fl. yellow. Pebbly, shingly coarse sand amongst boulders. Flowers yellow, May, June and November.	Banks of flow line in the mouth of a gully in a valley wall.	34.0	Unlikely

A.1. Fauna analysis table

Scientific name (common name)	Conservation codes			Preferred habitat	Likelihood of occurrence	
	EPBC Act	BC Act	DFCA		Pre-survey	Post survey
Reptiles						
<i>Underwoodisaurus seorsus</i> (Pilbara Barking Gecko)			P2	Confined in the Pilbara to the Hamersley Ranges from Tom Price to Newman. Occurs in rocky areas with spinifex and low tree cover.	High	High
<i>Lerista macropisthopus remota</i>			P2	This subspecies is in the central interior in woodlands and semi- arid shrublands where animals shelter under leaf litter. This species is generally found in the central interior particularly the Ashburton region.	High	High
<i>Anilius ganeii</i>			P1	Little information is available on this species but it is believed to be associated with moist gorges and gullies.	High	High
<i>Liasis olivaceus barroni</i> (Pilbara Olive Python)	VU	VU		Generally rocky habitats in close association to permanent and semi-permanent water sources.	High – previously recorded within survey area	High
Birds						
<i>Macronectes giganteus</i> (Southern Giant Petrel)	EN, MI	MI		Predominantly pelagic species that is independent of terrestrial habitats.	Low	Low
<i>Plegadis falcinellus</i> (Glossy Ibis)	MI	MI		Wetland habitats such as freshwater marshes at the edges of lakes, rivers and wet swamp areas. This species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons.	Low	Low
<i>Elanus scriptus</i> (Letter-winged Kite)			P4	The Letter-winged Kite is a bird of open country and grasslands in arid and semi-arid Australia, where there are tree-lined streams or water courses.	High	High
<i>Pandion cristatus</i> (Osprey, Eastern Osprey)	MI	MI		Occurs in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. Also coastal areas, and occasionally travel inland along major rivers.	Low	Low
<i>Charadrius veredus</i> (Oriental Plover)	MI	MI		Breeding habitat includes arid grasslands, salt pans; non-breeding habitat includes grasslands, salt-fields, and coastal regions.	High	High
<i>Rostratula australis</i> (Australian Painted Snipe)	EN	EN		Inhabits shallow terrestrial freshwater wetlands, lakes, swamps and claypans. Also found in waterlogged grassland and saltmarsh. Typical sites include areas with emergent tussocks of grass, sedges or samphire; often scattered with clumps of lignum <i>Muehlenbeckia</i> , or canegrass or sometimes with tea-tree (<i>Melaleuca</i>).	Low	Low
<i>Actitis hypoleucos</i> (Common Sandpiper)	MI	MI		Non-breeding migrant to a wide variety of habitats, such as riverbanks, estuaries, freshwater seeps on coastal shores, tidal creeks, mangrove swamps and saltmarshes.	Low	Low
<i>Calidris acuminata</i> (Sharp-tailed Sandpiper)	MI	MI		Muddy edges of shallow fresh/brackish wetlands with emergent sedges, saltmarsh, grass and low vegetation.	Low	Low

Scientific name (common name)	Conservation codes			Preferred habitat	Likelihood of occurrence	
	EPBC Act	BC Act	DBCA		Pre-survey	Post survey
<i>Calidris ferruginea</i> (Curlew Sandpiper)	CR/MI	CR/MI		This species mainly occurs on intertidal mudflats in sheltered coastal areas and also around non-tidal swamps, lakes and lagoons near the coast. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.	Low	Low
<i>Calidris melanotos</i> (Pectoral Sandpiper)	MI	MI		Mainly swamps, lagoons, river pools, irrigation channels and sewerage ponds. Also in samphire flats around estuaries and salt lakes.	Low	Low
<i>Calidris ruficollis</i> (Red-necked Stint)	MI			The edge of sheltered waters including estuaries, beaches, near- coastal salt lakes, swamps, lakes, sewerage ponds and bore overflows.	Low	Low
<i>Calidris subminuta</i> (Long-toed Stint)	MI			Generally found in coastal environments such as coastal margins, lagoons, beaches and tidal flats.	Low	Low
<i>Tringa nebularia</i> (Common Greenshank)	MI	MI		A variety of freshwater, marine and artificial wetlands, including swamps, open muddy or rocky shores of lakes and large rivers, sewage farms, saltworks, muddy coastal flats, mangroves and estuaries.	Low	Low
<i>Tringa stagnatilis</i> (Marsh Sandpiper)	MI	MI		Found at the margins of inland freshwater and brackish wetlands such as rice paddy-fields, swamps, salt-pans, salt-marshes, sewage works and marshy lake-edges, and although it is rare on open coastlines it can occasionally be found on estuaries, lagoons and intertidal mudflats.	Low	Low
<i>Tringa tetanus</i> (Common Redshank)	MI	MI		Found at sheltered coastal wetlands such as bays, river estuaries, lagoons, inlets and saltmarsh (with bare open flats and banks of mud or sand). They are also found around saltlakes, freshwater lagoons, artificial wetlands and saltworks and sewage farms.	Low	Low
<i>Gelochelidon nilotica</i> (Gull-billed Tern)	MI	MI		Shallow sheltered seas close to land, estuaries, tidal creeks, near- coastal salt lakes, samphire flats, swamps, lagoons, river pools, claypans, dams and over grain crops.	Low	Low
<i>Hydroprogne caspia</i> (Caspian Tern)	MI	MI		Mainly sheltered seas, estuaries and tidal creeks.	Low	Low
<i>Apus pacificus</i> (Fork-tailed Swift)	MI	MI		Largely aerial species independent of the terrestrial environment.	Moderate	High
<i>Falco hypoleucos</i> (Grey Falcon)		VU		Open habitats: semi-deserts, grassy inland plains, timbered watercourses, pastoral lands.	High	High
<i>Falco peregrinus</i> (Peregrine Falcon)		OS		Cosmopolitan, will hunt in any habitat, soaring at height or from a perch; often near cliffs. Nests on rocky ledges in tall, vertical cliff faces and tall trees associated with drainage lines.	High	High
<i>Pezoporus occidentalis</i> (Night Parrot)	EN	CR		Most habitat records are from <i>Triodia</i> grasslands and/or chenopod shrublands in the arid and semi-arid zones. <i>Astrebla</i> spp. (Mitchell grass), shrubby samphire and chenopod associations, scattered trees and shrubs, <i>Acacia aneura</i> (Mulga) woodland, treeless areas and bare gibber as associated with sightings of the species.	Low	Low

Scientific name (common name)	Conservation codes			Preferred habitat	Likelihood of occurrence	
	EPBC Act	BC Act	DBCA		Pre-survey	Post survey
<i>Polytelis alexandrae</i> (Princess Parrot)	VU		P4	Inhabits sand dunes and sand flats in the arid zone. Occurs in savanna woodlands and shrublands that usually consist of scattered stands of <i>Eucalyptus</i> spp, Casuarina/Allocasuarina trees, an understorey of shrubs and a ground cover dominated by <i>Triodia</i> spp.	Low	Low
<i>Hirundo rustica</i> (Barn Swallow)	MI	MI		Coastal open country generally, especially near surface water and man-made structures such as bridges and power wires.	Low	Low
<i>Motacilla flava</i> (Yellow Wagtail)	MI	MI		Mainly banks and rocks in fast-running freshwater habitats such as rivers, creeks, streams and around waterfalls.	Low	Low
<i>Motacilla cinerea</i> (Grey Wagtail)	MI	MI		Damp short-grass flats, rice stubbles and edge of swamps, sewage ponds, bore overflows, grazed or mowed grass and irrigated areas.	Low	Low
Mammals						
<i>Dasyercus blythi</i> (Brush-tailed Mulgara, Ampurta)			P4	Common in a range of habitats – tussock / hummock grasslands and sparse shrubs and low open woodlands on ridge tops, cliffs, scree slopes, hills and valley floors.	Low	Low
<i>Dasyurus hallucatus</i> (Northern Quoll)	EN	EN		Northern Quoll habitat generally encompasses some form of rocky area for denning purposes with surrounding vegetated habitats used for foraging and dispersal.	High	High
<i>Sminthopsis longicaudata</i> (Long-tailed Dunnart)			P4	Found in rocky scree and plateau areas, generally with little vegetation or in areas of spinifex hummock grassland, shrubs and open woodland.	Low	Low
<i>Macrotis lagotis</i> (Greater Bilby, Dalgyte)	VU	VU		Sand or sandy-loam in hummock grassland (<i>Triodia</i> species) and or <i>Acacia</i> shrublands.	High – previously recorded within survey area	Low
<i>Petrogale lateralis lateralis</i> (Black-footed Rock-wallaby)	EN	EN		Occurs in cliffs, rock-piles, talus or escarpment refuge and other steep substrates with grassland feeding habitat nearby. Also occurs on limestone outcrops, coastal cliffs and granite outcrops.	Low	Low
<i>Pseudomys chapmani</i> (Western Pebble-mound Mouse)			P4	Gentle rocky slopes, hills and spurs with small pebble surface cover and sparse vegetation.	High – previously recorded within survey area	Recorded
<i>Leggadina lakedownensis</i> (Short-tailed Mouse)			P4	Open tussock and hummock grassland, Acacia shrubland and savanna woodland on alluvial clay / sandy soils. Cracking clays.	Moderate	Low
<i>Rhinonictis aurantia</i> (Pilbara form) (Pilbara Leaf-nosed Bat)	VU	VU		Roosts in deep warm, humid caves or rock cracks, especially in proximity to water pools. Forages while flying low along watercourses and gorges and over <i>Triodia</i> grassland.	High - previously recorded within survey area	High

Scientific name (common name)	Conservation codes			Preferred habitat	Likelihood of occurrence	
	EPBC Act	BC Act	DBCA		Pre-survey	Post survey
<i>Macroderma gigas</i> (Ghost Bat)	VU	VU		A wide range from rainforest, monsoon and vine scrub in the tropics to open woodlands and arid areas.	High – previously recorded within survey area	Recorded

Appendix B. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
<p>Principle (a): <i>“Native vegetation should not be cleared if it comprises a high level of biodiversity.”</i></p> <p>Assessment:</p> <p>The area proposed to be cleared contains significant flora, fauna and habitats (Astron, 2022; GIS Database). The northern part of the application area contains vegetation unit P15, which has an affinity to the ‘West Angelas Cracking-Clays’ Priority 1 Priority Ecological Community (PEC) (Astron, 2022).</p>	<p>At variance</p> <p>Changed from CPS 2283/6</p>	<p>Yes</p> <p>Refer to Section 3.2.1, above.</p>
<p>Principle (b): <i>“Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna.”</i></p> <p>Assessment:</p> <p>The area proposed to be cleared contains foraging and roosting habitat for several conservation significant fauna.</p>	<p>At variance</p> <p>Changed from CPS 2283/6</p>	<p>Yes</p> <p>Refer to Section 3.2.2, above.</p>
<p>Principle (c): <i>“Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.”</i></p> <p>Assessment:</p> <p>There are no known records of Threatened flora within the application area (GIS Database). Flora surveys of the application area did not record any species of Threatened flora (Astron, 2022).</p>	<p>Not likely to be at variance</p> <p>As per CPS 2283/6</p>	<p>No</p>
<p>Principle (d): <i>“Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.”</i></p> <p>Assessment:</p> <p>There are no known Threatened Ecological Communities (TECs) located within the application area and the flora and vegetation survey did not identify any TECs (Astron, 2022; GIS Database).</p>	<p>Not likely to be at variance</p> <p>As per CPS 2283/6</p>	<p>No</p>
Environmental value: significant remnant vegetation and conservation areas		
<p>Principle (e): <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>Assessment:</p> <p>The application area falls within the Pilbara Bioregion of the Interim Biogeographic Regionalisation for Australia (IBRA) (GIS Database). Approximately 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 association 18, 29, 82 and 175 (GIS Database). Approximately 99% of the pre-European extent of these vegetation associations remains uncleared at both the state and bioregional level (Government of Western Australia, 2019). Therefore, the application area does not represent a significant remnant of native vegetation in an area that has been extensively cleared and is not at variance to this principle.</p>	<p>Not at variance</p> <p>As per CPS 2283/6</p>	<p>No</p>
<p>Principle (h): <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>Assessment:</p> <p>Given the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on the environmental values of nearby conservation areas (GIS Database).</p>	<p>Not likely to be at variance</p> <p>As per CPS 2283/6</p>	<p>No</p>
Environmental value: land and water resources		
<p>Principle (f): <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>Assessment:</p> <p>No permanent water courses or wetlands are recorded within the application area,</p>	<p>At variance</p> <p>As per CPS 2283/6</p>	<p>No</p>

Assessment against the clearing principles	Variance level	Is further consideration required?
however, several minor non-perennial watercourses intersect the application area (GIS Database). Potential impacts can be managed by the continuous implementation of a watercourse management condition on the permit to ensure existing surface water flow.		
<p><u>Principle (g):</u> “Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</p> <p><u>Assessment:</u></p> <p>The application area is mapped within the Boolgeeda, Newman, Rocklea, Spearhole and Wannamunna land systems (DPIRD, 2023). Analysis of aerial photography reveals the application area is comprised of stony lower slope and upper plain; and stony lower plain land units within these systems (Rio Tinto, 2022). These are not susceptible to erosion due to the presence of stony mantles.</p>	Not likely to be at variance As per CPS 2283/6	No
<p><u>Principle (i):</u> “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.”</p> <p><u>Assessment:</u></p> <p>Given no water courses / wetlands / Public Drinking Water Sources Areas are recorded within the application area, the proposed clearing is unlikely to impact surface or ground water quality.</p>	Not likely to be at variance As per CPS 2283/6	No
<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>There are no permanent water courses or waterbodies within the application area (GIS Database). Seasonal drainage lines are common in the region and temporary localised flooding may occur briefly following heavy rainfall events. However, the proposed clearing is unlikely to increase the incidence or intensity of natural flooding events.</p>	Not likely to be at variance As per CPS 2283/6	No

Appendix C. 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 D. Sources of information

D.1. GIS databases

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

- 10 Metre Contours (DPIRD-073)
- Aboriginal Heritage Places (DPLH-001)
- Clearing Regulations – Schedule One Areas (DWER-057)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Environmentally Sensitive Areas (DWER-046)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- Hydrographic Catchments – Catchments (DWER-028)
- Hydrography – Inland Waters – Waterlines
- Hydrography, Linear (DWER-031)
- Hydrological Zones of Western Australia (DPIRD-069)
- IBRA Vegetation Statistics
- Native Title (ILUA) (LGATE-067)
- Pre-European Vegetation Statistics
- Interim Ramsar Sites (DBCA-010)
- Regional Parks (DBCA-026)
- Remnant Vegetation, All Areas
- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil Landscape Land Quality – Flood Risk (DPIRD-007)
- Soil Landscape Land Quality – Phosphorus Export Risk (DPIRD-010)
- Soil Landscape Land Quality – Subsurface Acidification Risk (DPIRD-011)
- Soil Landscape Land Quality – Water Erosion Risk (DPIRD-013)
- Soil Landscape Land Quality – Water Repellence Risk (DPIRD-014)
- Soil Landscape Land Quality – Waterlogging Risk (DPIRD-015)
- Soil Landscape Land Quality – Wind Erosion Risk (DPIRD-016)
- Soil Landscape Mapping – Best Available (DPIRD-027)
- Soil Landscape Mapping – Rangelands (DPIRD-064)
- WA Now Aerial Imagery

Restricted GIS Databases used:

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

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4. Glossary

Acronyms:

BC Act	<i>Biodiversity Conservation Act 2016</i> , Western Australia
BoM	Bureau of Meteorology, Australian Government
DAA	Department of Aboriginal Affairs, Western Australia (now DPLH)
DAFWA	Department of Agriculture and Food, Western Australia (now DPIRD)
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)
DMIRS	Department of Mines, Industry Regulation and Safety, Western Australia
DMP	Department of Mines and Petroleum, Western Australia (now DMIRS)
DoEE	Department of the Environment and Energy (now 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
TEC	Threatened Ecological Community

Definitions:

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

T **Threatened species:**

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

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

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

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

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

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

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

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

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

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

Extinct Species:

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

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

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

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

Specially protected species:

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

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

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

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

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

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

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

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

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

P Priority species:

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

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

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

P1 Priority One - Poorly-known species
Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

P2 Priority Two - Poorly-known species
Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

P3 Priority Three - Poorly-known species
Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

P4 Priority Four - Rare, Near Threatened and other species in need of monitoring
(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Principles for clearing native vegetation:

- (a) Native vegetation should not be cleared if it comprises a high level of biological diversity.
- (b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna.

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