



Clearing Permit Decision Report

1. Application details and outcomes

1.1. Permit application details

Permit number:	7246/5
Permit type:	Purpose Permit
Applicant name:	Ngungaju Lithium Operations Pty Ltd
Application received:	9 October 2023
Application area:	624.58 hectares
Purpose of clearing:	Mineral Production
Method of clearing:	Mechanical Removal
Tenure:	Mining Leases 45/1230, 45/1231, 45/1260 Miscellaneous Licences 45/400, 45/401, 45/404, 45/416
Location (LGA area/s):	Shire of East Pilbara
Colloquial name:	Pilgangoora Lithium Project

1.2. Description of clearing activities

Ngungaju Lithium Operations Pty Ltd proposes to clear up to 624.58 hectares of native vegetation within a boundary of approximately 974.69 hectares, for the purpose of mineral production. The project is located approximately 89 kilometres east of Marble Bar, within the Shire of East Pilbara.

The application is to support future mining activities and expansion (NLO, 2023).

Clearing permit CPS 7246/1 was granted by the Department of Mines and Petroleum (now the Department of Energy, Mines, Industry Regulation and Safety) on 20 October 2016 and was valid from 12 November 2016 to 12 November 2023. The permit authorised the clearing of up to 374.58 hectares of native vegetation within a boundary of approximately 374.58 hectares, for the purpose of mineral production.

CPS 7246/2 was granted on 1 June 2017, amending the permit to increase the permit boundary from 374.58 hectares to 542.6 hectares.

CPS 7246/3 was granted on 5 December 2019, amending the permit to increase the amount of clearing authorised from 374.58 hectares to 454.58 hectares (80 hectare increase), increase the permit boundary from 542.6 hectares to 974.7 hectares, and change the permit holder name from Altura Exploration Pty Ltd to Altura Lithium Operations Pty Ltd. The permit holder also requested for Mining Lease 45/1260, Miscellaneous Licence 45/401 and Miscellaneous Licence 45/416 to be added to the tenure on on the permit.

CPS 7246/4 was granted on 19 September 2023, amending the permit to extend the permit duration by five years, to 12 November 2028, and update the Permit Holder name from Altura Lithium Operations Pty Ltd to Ngungaju Lithium Operations Pty Ltd. The amount of clearing authorised and the permit boundaries remained unchanged.

On 9 October 2023, the permit holder applied to amend CPS 7246/4 to increase the amount of clearing authorised from 454.58 hectares to 624.58 hectares (170 hectare increase). The permit boundary remains unchanged.

1.3. Decision on application and key considerations

Decision:	Grant
Decision date:	19 December 2023
Decision area:	624.58 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 (now Department of Energy, Mines, Industry Regulation and Safety (DEMIRS)) on 9 October 2023. DEMIRS advertised the application for a public comment for a period of 21 days, and one submission was received.

In making this decision, the Delegated Officer had regard for the site characteristics (Appendix B), relevant datasets (Appendix E), supporting information provided by the applicant including the results of biological surveys, 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;
- the loss of habitat for western pebble-mound mouse;
- potential land degradation; and
- loss of riparian vegetation.

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

The conditions currently imposed on clearing permit CPS 7246/4 are considered adequate to manage the impacts of clearing:

- avoid, minimise to reduce the impacts and extent of clearing;
- take hygiene steps to minimise the risk of the introduction and spread of weeds;
- watercourse management condition to reduce the impacts to riparian vegetation; and
- commence construction no later than three months after undertaking clearing to reduce the risk of erosion.

The assessment has not changed since the assessment for CPS 7246/4. The Delegated Officer determined that the proposed 170 hectare increase to the amount authorised to clear is not likely to lead to an unacceptable risk to environmental values.

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)
- *Mining Act 1978* (WA)

Relevant agreements (treaties) considered during the assessment include:

- Japan-Australia Migratory Bird Agreement
- China-Australia Migratory Bird Agreement
- Republic of Korea-Australia Migratory Bird Agreement

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

As part of the initial application for CPS 7246/1, the applicant provided an outline of their clearing process, including avoidance and mitigation measures as detailed below (Altura, 2016):

- Prior to clearing activities commencing, the clearing footprint boundaries will be pegged.
- All clearing will be supervised by the site supervisor or an authorised delegate, and will take place during day shift only.
- Plant operators will have a functional communication link with the site supervisor or an authorised delegate at all times.
- Clearing activities will take place as follows:
 - All machinery will be inspected and cleaned prior to being permitted on site to avoid potential weed infestations.
 - Clearing will be undertaken 'blade-up' in order to minimise disturbance to the soil and plant rootstock.
 - Areas to be cleared will be delineated on project drawings and pegged in the field. Pegged areas will be inspected and approved by the site supervisor or an authorised delegate before clearing commences to ensure they comply with the approved clearing footprint and site plan specifications.
 - The perimeter of the approved clearing area will be cleared first. Following this, an inspection of the perimeter will be conducted by the site supervisor or an authorised delegate. If the perimeter has been cleared

according to boundary pegging and relevant maps, approval will be given to commence clearing inwards. If perimeter clearing has not been undertaken correctly, all clearing activity will cease immediately and remedial actions will be undertaken before clearing may recommence.

- Clearing of an area will be undertaken in a single direction (i.e. east to west, or north to south). Systematic clearing from one direction should allow the natural movement of fauna away from the working machinery.
- Dust suppression via water spraying will be used to control dust emissions during clearing.
- Trees will be felled in such a manner that they fall within the approved clearing area.
- Vegetation will be salvaged and retained where possible for rehabilitation purposes.
- Vegetation and topsoil will be stockpiled to avoid erosion from works and surface water flow. Topsoil will be removed ahead of mining operations to the maximum depth practicable and stockpiled for replacement as rehabilitation progresses.

3.2. Assessment of impacts on environmental values

A review of current environmental information (Appendix B) reveals that the assessment against the clearing principles has not changed significantly from the Clearing Permit Decision Report CPS 7246/4. Additional consideration was given to the presence of priority flora species within the application area.

3.2.1. Biological values (flora and fauna) - Clearing Principles (a) and (b)

Assessment

FLORA

Three priority flora species have previously been recorded within the application area (Ecologia, 2018; Natural Area, 2014):

- *Euphorbia clementii* (P3)
- *Stackhousia clementii* (P3)
- *Triodia chichesterensis* (P3)

Euphorbia clementii was recorded at 27 locations within the application area, totalling approximately 250 individuals (Ecologia, 2018). The species was recorded almost exclusively on vehicle tracks and windrows during the 2018 survey, indicating that the species reacts favourably to disturbance (Ecologia, 2018; PM, 2023). APM (2022) did not re-identify this species, which suggests that the plants recorded are no longer present within the application area and have somewhat short lifespans.

Natural Area (2014) recorded *Stackhousia clementii* at two locations within the application area. While the abundance of individuals was not counted, the presence of this species was recorded as 'uncommon' (Natural Area, 2014). The two locations this species was recorded has been cleared for mining infrastructure and no longer persist in the area (GIS Database).

Ecologia (2018) recorded a population of *Triodia chichesterensis* with more than 1,000 individuals, represented by its own vegetation type; *Acacia inaequilatera* sparse mid shrubland over *Triodia chichesterensis* (P3) open hummock grassland. There is also one Western Australian Herbarium record of *Triodia chichesterensis* located within the application area (WAH, 1998-).

Triodia chichesterensis is closely related to *Triodia lanigera* and can be difficult to distinguish between the two where they co-occur (PM, 2023). APM (2022) did not record *Triodia chichesterensis* within the application area despite surveying the same area where Ecologia (2018) recorded the *Triodia chichesterensis* population, likely due to the similarities in morphology. APM (2022) did however record *Triodia lanigera* around the same area where the population of *Triodia chichesterensis* was recorded by Ecologia (2018). It is likely that the *Triodia chichesterensis* population has persisted in the area, however the total number of individuals has likely to have declined due to disturbance for access roads and tracks (PM, 2023).

The proposed increase in clearing will likely impact *Euphorbia clementii* and *Triodia chichesterensis* if they are still present within the application area. Both species are restricted to the Pilbara bioregion, however they both are well represented locally outside the application area and their habitat requirements are common and widespread within the region (WAH, 1998-; GIS Database).

FAUNA

A number of fauna surveys of the application area recorded western pebble-mound mouse (*Pseudomys chapmani*, P4) mounds within the application area, in stony plain habitat (APM, 2022; Ecologia, 2018; Natural Area, 2016). APM (2022) recorded two active, one intermediate, and one inactive mound within Mining Lease 45/1260, which remains mostly uncleared. Ecologia (2018) also recorded one inactive mound in Mining Lease 45/1260. It is likely that the proposed increase in clearing will directly impact these mounds, however the stony plain habitat is not restricted to the application or local area. The localised loss of habitat and the impacts to the five mounds caused by the proposed clearing is unlikely to significantly impact on the conservation status of western pebble-mound mouse.

The application area contains basic characteristics of foraging habitat that may provide resources for a number of conservation significant species, particularly: northern quoll (*Dasyurus hallucatus*, EN), Pilbara leaf-nosed bat (*Rhinionictis aurantia*, VU), ghost bat (*Macroderma gigas*, VU) (Natural Area, 2016). Due to the ongoing disturbance caused by grazing, foraging resources are of low quality and may be used by species to transit to more productive surrounding areas found outside the application area (APM, 2022). The part of the application area that remains uncleared is immediately adjacent to the existing mining operations and infrastructure, and the proposed clearing of this area is unlikely to cause a significant reduction in habitat connectivity for fauna species within the area. Given the available fauna habitats within the application area are common within the broader region it is unlikely the application area provides significant habitat for conservation significant fauna.

Conclusion

Based on the above assessment, the proposed clearing will result in a direct loss of priority flora and habitat for western pebble-mound mouse.

For the reasons set out above, it is considered that the impacts of the proposed clearing can be managed to be environmentally acceptable with standard avoid and minimise and weed management conditions.

Conditions

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

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

3.3. Relevant planning instruments and other matters

The clearing permit amendment application was advertised on 27 October 2023 by the Department of Energy, Mines, Industry Regulation and Safety inviting submissions from the public. One submission was received in relation to this application.

There are two native title claims (WCD2018/015, WCD2019/010) over the area under application (DPLH, 2023). These claims have been determined by the Federal Court on behalf of the claimant groups. However, the mining tenure has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore, the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There is one registered Aboriginal Sites of Significance within the application area (DPLH, 2023). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

Other relevant authorisations required for the proposed land use include:

- A Programme of Work approved under the *Mining Act 1978*.
- A Mining Proposal / Mine Closure Plan approved under the *Mining Act 1978*.

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

End

Appendix A. Details of public submissions

Summary of comments	Consideration of comment
A submission was received from the Shire of East Pilbara raising no objections to the proposed clearing.	Noted.

Appendix B. Site characteristics

B.1. Site characteristics

Characteristic	Details														
Local context	<p>The area proposed to be cleared is part of an expansive tract of native vegetation in the extensive land use zone of Western Australia (GIS Database). It is surrounded by large areas of uncleared land and mining operations (GIS Database).</p> <p>Approximately 99% of the local area (50 kilometre radius from the centre of the area proposed to be cleared) remains uncleared (GIS Database).</p>														
Ecological linkage	The application area is not considered a significant ecological linkage. The vegetation immediately surrounding the application area and the majority of the region remains uncleared (GIS Database).														
Conservation areas	The application area is not located within any conservation areas (GIS Database). The nearest legislated conservation area is Mungaroon Range Nature Reserve, located approximately 63 kilometres southwest 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> <p>82: Hummock grasslands, low tree steppe - snappy gum over <i>Triodia wiseana</i>; 93: Hummock grasslands, shrub steppe - kanji over soft spinifex; and 619: Medium woodland - river gum (<i>Eucalyptus camaldulensis</i>) (GIS Database).</p> <p>A flora and vegetation survey was conducted over part of the application area by Natural Area Holdings Pty Ltd (Natural Area) during March 2016. The following vegetation types were recorded within the application area (Natural Area, 2016):</p> <table border="1"> <thead> <tr> <th>CODE</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>TwHG</td> <td>Spinifex grassland dominated by <i>Triodia wiseana</i>, with small patches of <i>Triodia epactia</i> towards the base of hillslopes. <i>Acacia inaequilatera</i> and <i>Acacia acradenia</i> are found throughout this vegetation type in low densities</td> </tr> <tr> <td>TeTwHG</td> <td>Hummock grassland dominated by <i>Triodia epactia</i> and <i>Triodia wiseana</i> with scattered patches of <i>Triodia pungens</i> in seasonally wet areas. Scattered <i>Acacia inaequilatera</i> occur throughout this vegetation type; annuals such as <i>Goodenia muelleriana</i>, <i>Ptilotus axillaris</i> and <i>Ptilotus clementii</i> are found here after seasonal rainfall</td> </tr> <tr> <td>EcOW</td> <td>Open woodland of <i>Eucalyptus camaldulensis</i> with a reduced understorey of <i>Marsilea exarata</i>, <i>Pluchea tetranthera</i>, and non-native Buffel Grass (<i>Cenchrus ciliaris</i>). This vegetation type is located along major drainage lines and is characterised by clayey loam soils with a thick layer of leaf litter produced from the <i>Eucalyptus camaldulensis</i></td> </tr> <tr> <td>APIOS</td> <td>Low open scrubland of <i>Acacia acradenia</i>, <i>Acacia inaequilatera</i> and <i>Petalostylis labicheoides</i> over a dense spinifex grassland of <i>Triodia pungens</i>, with <i>Triodia wiseana</i> and sparse <i>Corymbia hamersleyana</i> trees found along the edges of the drainage line. This vegetation type was found along minor drainage lines with clayey loam soils</td> </tr> <tr> <td>ATOS</td> <td>Tall open <i>Acacia</i> shrubland dominated by <i>Acacia acradenia</i> and <i>Acacia inaequilatera</i> over a <i>Triodia wiseana</i> hummock grassland, with isolated patches of <i>Triodia longiceps</i> on hill slopes. Shrubs scattered throughout this vegetation type include <i>Scaevola pulchella</i>, <i>Corchorus parviflorus</i>, <i>Euphorbia tannensis</i> subsp. <i>eremophila</i>, <i>Grevillea wickhamii</i> and the occasional <i>Hakea chordophylla</i></td> </tr> </tbody> </table> <p>A flora and vegetation survey was conducted over part of the application area by Ecologia Environment (Ecologia) during May 2018. The following vegetation types were recorded within the application area (Ecologia, 2018):</p> <table border="1"> <thead> <tr> <th>CODE</th> <th>DESCRIPTION</th> </tr> </thead> </table>	CODE	DESCRIPTION	TwHG	Spinifex grassland dominated by <i>Triodia wiseana</i> , with small patches of <i>Triodia epactia</i> towards the base of hillslopes. <i>Acacia inaequilatera</i> and <i>Acacia acradenia</i> are found throughout this vegetation type in low densities	TeTwHG	Hummock grassland dominated by <i>Triodia epactia</i> and <i>Triodia wiseana</i> with scattered patches of <i>Triodia pungens</i> in seasonally wet areas. Scattered <i>Acacia inaequilatera</i> occur throughout this vegetation type; annuals such as <i>Goodenia muelleriana</i> , <i>Ptilotus axillaris</i> and <i>Ptilotus clementii</i> are found here after seasonal rainfall	EcOW	Open woodland of <i>Eucalyptus camaldulensis</i> with a reduced understorey of <i>Marsilea exarata</i> , <i>Pluchea tetranthera</i> , and non-native Buffel Grass (<i>Cenchrus ciliaris</i>). This vegetation type is located along major drainage lines and is characterised by clayey loam soils with a thick layer of leaf litter produced from the <i>Eucalyptus camaldulensis</i>	APIOS	Low open scrubland of <i>Acacia acradenia</i> , <i>Acacia inaequilatera</i> and <i>Petalostylis labicheoides</i> over a dense spinifex grassland of <i>Triodia pungens</i> , with <i>Triodia wiseana</i> and sparse <i>Corymbia hamersleyana</i> trees found along the edges of the drainage line. This vegetation type was found along minor drainage lines with clayey loam soils	ATOS	Tall open <i>Acacia</i> shrubland dominated by <i>Acacia acradenia</i> and <i>Acacia inaequilatera</i> over a <i>Triodia wiseana</i> hummock grassland, with isolated patches of <i>Triodia longiceps</i> on hill slopes. Shrubs scattered throughout this vegetation type include <i>Scaevola pulchella</i> , <i>Corchorus parviflorus</i> , <i>Euphorbia tannensis</i> subsp. <i>eremophila</i> , <i>Grevillea wickhamii</i> and the occasional <i>Hakea chordophylla</i>	CODE	DESCRIPTION
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	<p>S1 <i>Acacia inaequilatera</i> and <i>Acacia ancistrocarpa</i> mid open shrubland over <i>Triodia longiceps</i> (\pm<i>Triodia lanigera</i>, <i>Triodia brizoides</i>, <i>Triodia epactia</i>) open hummock grassland</p> <p>S2 <i>Neptunia dimorphantha</i> and <i>Sida fibulifera</i> low open shrubland over <i>Eriachne benthamii</i> and <i>Cynodon convergens</i> open grassland</p> <p>S3 <i>Acacia acradenia</i>, <i>Acacia ancistrocarpa</i>, <i>Acacia tumida</i> var. <i>pilbarensis</i>, and <i>Petalostylis labicheoides</i> mid open shrubland over <i>Triodia epactia</i> (\pm<i>Triodia wiseana</i>) hummock grassland</p> <p>S4 <i>Acacia inaequilatera</i> sparse mid shrubland over <i>Triodia chichesterensis</i> (P3) open hummock grassland</p> <p>W1 <i>Eucalyptus victrix</i> and <i>Corymbia hamersleyana</i> low open woodland over <i>Acacia colei</i> mid sparse shrubland over <i>Triodia epactia</i> sparse hummock grassland</p> <p>W2 <i>Corymbia hamersleyana</i> low open woodland over <i>Acacia acradenia</i> and <i>Acacia ancistrocarpa</i> mid sparse shrubland over <i>Triodia epactia</i> (\pm<i>Triodia wiseana</i>, <i>Triodia longiceps</i>) open hummock grassland</p> <p>A flora and vegetation survey was conducted over part of the application area by Animal Plant Mineral Pty Ltd (APM) during October 2022. The following vegetation types were recorded within the application area (APM, 2022):</p> <table border="1"> <thead> <tr> <th>CODE</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>12a</td> <td>Undulating plains of isolated low <i>Corymbia hamersleyana</i> over mid to tall, isolated shrubs of <i>Acacia tumida</i>, <i>Acacia adsurgens</i> and <i>Acacia inaequilatera</i> with hummock grassland of <i>Triodia angusta</i>, <i>Triodia wiseana</i> and <i>Triodia lanigera</i></td> </tr> <tr> <td>13a</td> <td>Low open woodland of <i>Eucalyptus camaldulensis</i>, <i>Corymbia hamersleyana</i> and <i>Eucalyptus victrix</i>; sparse mid to tall shrubland of <i>Acacia tumida</i>, <i>Acacia stellaticeps</i> and <i>Acacia bivenosa</i> over <i>Triodia epactia</i>, *<i>Cenchrus ciliaris</i> and *<i>Cenchrus setiger</i> tussock/hummock grassland in creeks</td> </tr> <tr> <td>14a</td> <td><i>Corymbia hamersleyana</i> low open woodland over sparse forbland/low shrubland of <i>Streptoglossa odora</i>, <i>Goodenia lamprosperma</i> and <i>Solanum diversiflorum</i> in drainage depressions</td> </tr> </tbody> </table>	CODE	DESCRIPTION	12a	Undulating plains of isolated low <i>Corymbia hamersleyana</i> over mid to tall, isolated shrubs of <i>Acacia tumida</i> , <i>Acacia adsurgens</i> and <i>Acacia inaequilatera</i> with hummock grassland of <i>Triodia angusta</i> , <i>Triodia wiseana</i> and <i>Triodia lanigera</i>	13a	Low open woodland of <i>Eucalyptus camaldulensis</i> , <i>Corymbia hamersleyana</i> and <i>Eucalyptus victrix</i> ; sparse mid to tall shrubland of <i>Acacia tumida</i> , <i>Acacia stellaticeps</i> and <i>Acacia bivenosa</i> over <i>Triodia epactia</i> , * <i>Cenchrus ciliaris</i> and * <i>Cenchrus setiger</i> tussock/hummock grassland in creeks	14a	<i>Corymbia hamersleyana</i> low open woodland over sparse forbland/low shrubland of <i>Streptoglossa odora</i> , <i>Goodenia lamprosperma</i> and <i>Solanum diversiflorum</i> in drainage depressions
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Vegetation condition	<p>Vegetation surveys of the application area determined the vegetation was in excellent, very good, good, poor, and completely degraded condition (APM, 2022; Ecologia, 2018; Natural Area, 2016; Trudgen, 1991).</p> <p>The full Trudgen (1991) condition rating scale is provided in Appendix D.</p>								
Climate and landform	<p>The climate of the Chichester subregion is described as semi-desert-tropical, with the nearest weather station recording an average rainfall of approximately 382.1 millimetres per year (BoM, 2023; CALM, 2002).</p> <p>The application area is mapped at an elevation of 150-250 metres AHD (GIS Database). The soil-landscape systems mapped within the application area describe the landforms as (DPIRD, 2023; Van Vreeswyk et al., 2004; GIS Database):</p> <ul style="list-style-type: none"> • Satirist system: depositional surfaces; level to very gently inclined stony plains, plains with gilgai microrelief, low stony rises and drainage flats; sparse tributary drainage patterns with minor channels; • Talga system: hill tracts and ridges on basalt, greenstones, schist, other metamorphics and chert with rocky rounded crests and ridge tops extending for many kilometres; very steep upper slopes, more gently inclined lower footslopes, restricted lower stony plains and interfluves; moderately spaced tributary and strike aligned drainage floors and channels; • Macroy system: gently undulating stony plains and interfluves with quartz surface mantles, sandy surfaced plains, minor calcrete plains, closely spaced tributary drainage lines in upper parts of system becoming much wider downslope; minor granite hills, tor fields and quartz ridges; and • River system: flood plains and river terraces subject to fairly regular overbank flooding from major channels and watercourses, sandy banks and poorly defined levees and cobble plains. Banks, levees and slightly higher upper terraces receive less regular flooding than lower terraces and flood plains. 								
Soil description	<p>The soils within the application area are primarily mapped as (DPIRD, 2023; Van Vreeswyk et al., 2004; GIS Database):</p>								

Characteristic	Details										
	<table border="1"> <thead> <tr> <th>LAND SYSTEM</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>SATIRIST (504.3 ha)</td> <td>red/brown non-cracking clay, hard cracking clay, red shallow loam, red loamy earth, and calcareous shallow loam</td> </tr> <tr> <td>TALGA (261.5 ha)</td> <td>stony soil, calcareous shallow loam, red shallow loam, and red deep sandy duplex</td> </tr> <tr> <td>MACROY (183.2 ha)</td> <td>red shallow loam, red deep sandy duplex, red loamy earth, red sandy earth, stony soil, and calcareous shallow loam</td> </tr> <tr> <td>RIVER (25.6 ha)</td> <td>red deep sand, red loamy earth, and red sandy earth</td> </tr> </tbody> </table>	LAND SYSTEM	DESCRIPTION	SATIRIST (504.3 ha)	red/brown non-cracking clay, hard cracking clay, red shallow loam, red loamy earth, and calcareous shallow loam	TALGA (261.5 ha)	stony soil, calcareous shallow loam, red shallow loam, and red deep sandy duplex	MACROY (183.2 ha)	red shallow loam, red deep sandy duplex, red loamy earth, red sandy earth, stony soil, and calcareous shallow loam	RIVER (25.6 ha)	red deep sand, red loamy earth, and red sandy earth
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RIVER (25.6 ha)	red deep sand, red loamy earth, and red sandy earth										
Land degradation risk	The above land systems are generally not susceptible to erosion, however the River land system is highly susceptible to erosion if vegetative cover is removed (Van Vreeswyk et al., 2004; GIS Database). The significant number of drainage lines that intersect the application area may also be prone to erosion if vegetation cover is removed (GIS Database).										
Waterbodies	Multiple major and minor non-perennial drainage lines intersect the application area, including Chinnamon Creek, Gillam Creek, and Turner River (GIS Database). A very small portion of the application area also intersects a small perennial lake (approximately 0.03 hectares).										
Hydrogeography	The application area is located within the Pilbara Surface Water Area and the Pilbara Groundwater Area, which are proclaimed under the <i>Rights in Water and Irrigation Act 1914</i> (GIS Database). No Public Drinking Water Source Areas (PDWSA) are located within the application area (GIS Database). The mapped groundwater salinity is 500-1000 total dissolved solids milligrams per litre, which is described as marginal water quality (GIS Database).										
Flora	There are records of one threatened flora species and 22 priority flora species within a 50 kilometre radius of the application area (GIS Database).										
Ecological communities	There are no known threatened or priority ecological communities mapped within the application area (GIS Database). The nearest known ecological community is the Gregory Land System priority ecological community (P3), located approximately 15.6 kilometres west of the application area (GIS Database).										
Fauna	There are records of 30 conservation significant fauna species within a 50 kilometre radius of the application area (GIS Database). 15 of these species are list as migratory birds under the BC Act and/or EPBC Act (GIS Database).										

B.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	17,731,764	~99	1,801,714	10.12
Beard vegetation associations - State					
82	2,565,901	2,553,206	~99	295,377	11.51
93	3,044,309	3,040,640	~99	59,536	1.96
619	119,373	118,205	~99	236	0.20
Beard vegetation associations - Bioregion					

82	2,563,583	2,550,888	~99	295,377	11.52
93	3,042,114	3,038,471	~99	59,536	1.96
619	118,920	118,116	~99	236	0.20

Government of Western Australia (2019)

Appendix C. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
<p><u>Principle (a):</u> “Native vegetation should not be cleared if it comprises a high level of biodiversity.”</p> <p><u>Assessment:</u> The application area contains two priority flora species, however the impact from the proposed clearing is unlikely to significantly impact the conservation status of these species.</p>	<p>Not likely to be at variance</p> <p>as per CPS 7246/4</p>	<p>Yes</p> <p>Refer to Section 3.2.1, above.</p>
<p><u>Principle (b):</u> “Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna.”</p> <p><u>Assessment:</u> The area proposed to be cleared does not contain locally or regionally significant habitat necessary for the maintenance of conservation significant fauna species.</p>	<p>Not likely to be at variance</p> <p>as per CPS 7246/4</p>	<p>Yes</p> <p>Refer to Section 3.2.1, above.</p>
<p><u>Principle (c):</u> “Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.”</p> <p><u>Assessment:</u> There are no previous records of threatened flora located within the application area (GIS Database). Surveys of the application area did not record any threatened flora species (APM, 2022; Ecologia, 2018; Natural Area, 2016).</p> <p>The closest record of threatened flora species is <i>Quoya zonalis</i> located approximately 14 kilometres southeast of the application area (GIS Database). The application area is unlikely to contain suitable habitat for <i>Quoya zonalis</i> or any other threatened flora species (Shepherd & Hislop, 2020; GIS Database).</p>	<p>Not likely to be at variance</p> <p>as per CPS 7246/4</p>	<p>No</p>
<p><u>Principle (d):</u> “Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.”</p> <p><u>Assessment:</u> There are no known state or federally listed threatened ecological communities (TECs) located within or in close proximity to the application area (GIS Database). The nearest known threatened ecological community is the <i>Themeda</i> grasslands (<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)) on cracking clays (Hamersley Station, Pilbara) threatened ecological community (CR), located approximately 158.3 kilometres southwest of the application area (GIS Database).</p> <p>Flora and vegetation surveys of the application area and surrounds did not record vegetation that could be representative of a TEC (APM, 2022; Ecologia, 2018; Natural Area, 2016).</p>	<p>Not likely to be at variance</p> <p>as per CPS 7246/4</p>	<p>No</p>
Environmental value: significant remnant vegetation and conservation areas		
<p><u>Principle (e):</u> “Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.”</p> <p><u>Assessment:</u> The application area occurs within the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion, in which approximately 99% of the pre-European vegetation remains (Government of Western Australia, 2019; GIS Database).</p> <p>The vegetation within the application area has been mapped as Beard vegetation associations 82: Hummock grasslands, low tree steppe; snappy gum over <i>Triodia wiseana</i>; 93: Hummock grasslands, shrub steppe; kanji over soft spinifex; and 619: Medium woodland; river gum (<i>Eucalyptus camaldulensis</i>) (GIS Database).</p>	<p>Not at variance</p> <p>as per CPS 7246/4</p>	<p>No</p>

Assessment against the clearing principles	Variance level	Is further consideration required?																
<p>Approximately 99% of the pre-European extent of these vegetation associations remain uncleared at both the state and bioregional level (Government of Western Australia, 2019).</p> <p>Given the amount of vegetation remaining in the local area and bioregion, the vegetation proposed to be cleared is not considered to represent a remnant within an extensively cleared area.</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: Given the distance to the nearest conservation area is approximately 63 kilometres southwest of the application area, the proposed clearing is not likely to have an impact on the environmental values of this conservation area (GIS Database).</p>	<p>Not likely to be at variance as per CPS 7246/4</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: Multiple major and minor non-perennial drainage lines intersect the application area, including Chinnamon Creek, Gillam Creek, and Turner River (GIS Database).</p> <p>Vegetation surveys conducted over the application area have recorded a number of different vegetation types growing in association with these watercourses (APM, 2022; Ecologia, 2018; Natural Area, 2016):</p> <table border="1" data-bbox="129 969 1046 1727"> <thead> <tr> <th colspan="2" data-bbox="129 969 1046 1010">Natural Area (2016)</th> </tr> </thead> <tbody> <tr> <td data-bbox="129 1010 225 1160">EcOW</td> <td data-bbox="225 1010 1046 1160">Open woodland of <i>Eucalyptus camaldulensis</i> with a reduced understorey of <i>Marsilea exarata</i>, <i>Pluchea tetranthera</i>, and non-native Buffel Grass (<i>Cenchrus ciliaris</i>). This vegetation type is located along major drainage lines and is characterised by clayey loam soils with a thick layer of leaf litter produced from the <i>Eucalyptus camaldulensis</i></td> </tr> <tr> <td data-bbox="129 1160 225 1310">APIOs</td> <td data-bbox="225 1160 1046 1310">Low open scrubland of <i>Acacia acradenia</i>, <i>Acacia inaequilatera</i> and <i>Petalostylis labicheoides</i> over a dense spinifex grassland of <i>Triodia pungens</i>, with <i>Triodia wiseana</i> and sparse <i>Corymbia hamersleyana</i> trees found along the edges of the drainage line. This vegetation type was found along minor drainage lines with clayey loam soils</td> </tr> <tr> <th colspan="2" data-bbox="129 1310 1046 1350">Ecologia (2018)</th> </tr> <tr> <td data-bbox="129 1350 225 1447">W1</td> <td data-bbox="225 1350 1046 1447"><i>Eucalyptus victrix</i> and <i>Corymbia hamersleyana</i> low open woodland over <i>Acacia coleii</i> mid sparse shrubland over <i>Triodia epactia</i> sparse hummock grassland</td> </tr> <tr> <th colspan="2" data-bbox="129 1447 1046 1487">APM, 2022</th> </tr> <tr> <td data-bbox="129 1487 225 1637">13a</td> <td data-bbox="225 1487 1046 1637">Low open woodland of <i>Eucalyptus camaldulensis</i>, <i>Corymbia hamersleyana</i> and <i>Eucalyptus victrix</i>; sparse mid to tall shrubland of <i>Acacia tumida</i>, <i>Acacia stellaticeps</i> and <i>Acacia bivenosa</i> over <i>Triodia epactia</i>, *<i>Cenchrus ciliaris</i> and *<i>Cenchrus setiger</i> tussock/hummock grassland in creeks</td> </tr> <tr> <td data-bbox="129 1637 225 1727">14a</td> <td data-bbox="225 1637 1046 1727"><i>Corymbia hamersleyana</i> low open woodland over sparse forbland/low shrubland of <i>Streptoglossa odora</i>, <i>Goodenia lamprosperma</i> and <i>Solanum diversiflorum</i> in drainage depressions</td> </tr> </tbody> </table> <p>Potential impacts to vegetation growing in association with these drainage lines may be minimised by the continued implementation of a vegetation management condition.</p>	Natural Area (2016)		EcOW	Open woodland of <i>Eucalyptus camaldulensis</i> with a reduced understorey of <i>Marsilea exarata</i> , <i>Pluchea tetranthera</i> , and non-native Buffel Grass (<i>Cenchrus ciliaris</i>). This vegetation type is located along major drainage lines and is characterised by clayey loam soils with a thick layer of leaf litter produced from the <i>Eucalyptus camaldulensis</i>	APIOs	Low open scrubland of <i>Acacia acradenia</i> , <i>Acacia inaequilatera</i> and <i>Petalostylis labicheoides</i> over a dense spinifex grassland of <i>Triodia pungens</i> , with <i>Triodia wiseana</i> and sparse <i>Corymbia hamersleyana</i> trees found along the edges of the drainage line. This vegetation type was found along minor drainage lines with clayey loam soils	Ecologia (2018)		W1	<i>Eucalyptus victrix</i> and <i>Corymbia hamersleyana</i> low open woodland over <i>Acacia coleii</i> mid sparse shrubland over <i>Triodia epactia</i> sparse hummock grassland	APM, 2022		13a	Low open woodland of <i>Eucalyptus camaldulensis</i> , <i>Corymbia hamersleyana</i> and <i>Eucalyptus victrix</i> ; sparse mid to tall shrubland of <i>Acacia tumida</i> , <i>Acacia stellaticeps</i> and <i>Acacia bivenosa</i> over <i>Triodia epactia</i> , * <i>Cenchrus ciliaris</i> and * <i>Cenchrus setiger</i> tussock/hummock grassland in creeks	14a	<i>Corymbia hamersleyana</i> low open woodland over sparse forbland/low shrubland of <i>Streptoglossa odora</i> , <i>Goodenia lamprosperma</i> and <i>Solanum diversiflorum</i> in drainage depressions	<p>At variance as per CPS 7246/4</p>	<p>No</p>
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<p>Principle (g): <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</i></p> <p>Assessment: The River land system is highly susceptible to erosion if vegetative cover is removed (DPIRD, 2023; Van Vreeswyk et al., 2004; GIS Database). The significant number of drainage lines that intersect the application area may also be prone to erosion if vegetation cover is removed (GIS Database).</p>	<p>May be at variance as per CPS 7246/4</p>	<p>No</p>																

Assessment against the clearing principles	Variance level	Is further consideration required?
Potential erosion may be minimised by the continued implementation of a staged clearing condition.		
<p><u>Principle (i):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.”</i></p> <p><u>Assessment:</u></p> <p>Turner River is a major non-perennial watercourse that intersects the application are, in addition to other minor non-perennial watercourses (GIS Database). A very small portion of the application area also intersects a small perennial lake (approximately 0.03 hectares).</p> <p>The intersection between Turner River and application area lies approximately 48 kilometres south of the Turner alluvial aquifer which has the potential to become a supply source for desalination or a moderate supply of fresh water dependent on limiting factors such as increasing salinity and drawdown (Braithwaite et al., 2011). Despite the Turner River alluvial aquifer being a proclaimed Public Drinking Water Source Area due to pre-existing Public Works Department bore field which is now closed, The Department of Water has not developed a drinking water source protection plan for this source (Braithwaite et al., 2011).</p> <p>The intersection between the small perennial lake and application area may cause deterioration in the quality of surface water if surrounding riparian vegetation is cleared. This potential deterioration can be adequately minimised through the vegetation management condition currently placed on the permit requiring the permit holder to avoid clearing riparian vegetation where practicable.</p> <p>Given there are no PDWSAs within the application area, the proposed clearing is unlikely to impact the quality of ground water.</p>	May be at variance <i>as per CPS 7246/4</i>	No
<p><u>Principle (j):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.”</i></p> <p><u>Assessment:</u> Multiple major and minor non-perennial drainage lines intersect the application area (GIS Database). These drainage lines typically flow following significant rainfall events within the Pilbara bioregion (DPIRD, 2023; Van Vreeswyk et al., 2004; GIS Database). Given this is typical of the Pilbara region, the proposed clearing is unlikely to cause or exacerbate the incidence or intensity of flooding.</p>	Not likely to be at variance <i>as per CPS 7246/4</i>	No

Appendix D. Vegetation condition rating scale

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

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

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

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

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

Appendix E. Sources of information

E.1. GIS databases

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

- Contours (DPIRD-073)
- Clearing Regulations – Schedule One Areas (DWER-057)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Directory of Important Wetlands in Australia – Western Australia (DBCA-045)
- Environmentally Sensitive Areas (DWER-046)
- Groundwater Salinity Statewide (DWER-026)
- Hydrographic Catchments – Catchments (DWER-028)
- Hydrography – Inland Waters – Waterlines
- Hydrography, Linear (DWER-031)
- Hydrological Zones of Western Australia (DPIRD-069)
- IBRA Vegetation Statistics
- Pre-European Vegetation Statistics
- Interim Ramsar Sites (DBCA-010)
- Remnant Vegetation, All Areas
- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil Landscape Mapping – Best Available (DPIRD-027)
- Soil Landscape Mapping – Rangelands (DPIRD-064)
- WA Now Aerial Imagery

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)

E.2. References

- Altura Exploration Pty Ltd (Altura) (2016) Clearing permit supporting documentation, CPS 7246/1, received 25 August 2016.
- APM (2022) TSF Options 2 and 5 Pilgangoora Project Biological Survey. Prepared by Animal Plant Mineral Pty Ltd, for Pilbara Minerals Limited, November 2022.
- Braimbridge, M., Abbott, D., Lynn, F., Antao, M., Loomes, R., Said, E., Koombi H., and O'Boy, C. (2011) Lower Turner groundwater allocation limit report, Method used to set an allocation limit and licensing rules for the lower Turner alluvial aquifer. Report no. 50. Department of Water, Perth, Western Australia.
- Bureau of Meteorology (BoM) (2023) Bureau of Meteorology Website – Climate Data Online, Marble Bar. Bureau of Meteorology. <http://www.bom.gov.au/climate/data/> (Accessed 3 November 2023).
- CALM (2002) A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002. Department of Conservation and Land Management, Western Australia.
- Department of Environment Regulation (DER) (2014) *A guide to the assessment of applications to clear native vegetation*. Perth. Available from: https://www.der.wa.gov.au/images/documents/your-environment/native-vegetation/Guidelines/Guide2_assessment_native_veg.pdf
- Department of Planning, Lands and Heritage (DPLH) (2023) Aboriginal Heritage Inquiry System. Department of Planning, Lands and Heritage. <https://espatial.dplh.wa.gov.au/AHIS/index.html?viewer=AHIS> (Accessed 2 November 2023).
- Department of Primary Industries and Regional Development (DPIRD) (2023) NRInfo Digital Mapping. Department of Primary Industries and Regional Development. Government of Western Australia. URL: <https://dpiird.maps.arcgis.com/apps/webappviewer/index.html?id=662e8cbf2def492381fc915aaf3c6a0f> (Accessed 3 November 2023).
- Department of Water and Environmental Regulation (DWER) (2021) Procedure: Native vegetation clearing permits. Joondalup. Available from: https://dwer.wa.gov.au/sites/default/files/Procedure_Native_vegetation_clearing_permits_v1.pdf
- Ecologia (2018) Pilgangoora Lithium Project – Mining Lease M45/1260 Level 1 Fauna and Reconnaissance Flora and Vegetation Assessment. Prepared by Ecologia Environment, for Altura Mining Limited, July 2018.
- Environmental Protection Authority (EPA) (2016) Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment. Available from:

http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA%20Technical%20Guidance%20-%20Flora%20and%20Vegetation%20survey_Dec13.pdf

Environmental Protection Authority (EPA) (2016) Technical Guidance – Terrestrial Fauna Surveys. Available from: https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Tech%20guidance-%20Terrestrial%20Fauna%20Surveys-Dec-2016.pdf

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

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

Natural Area (2014) Flora and Fauna Survey Report – Pilgangoora. Prepared by Natural Area Consulting, for Altura Mining Ltd, February 2014.

Natural Area (2016) Flora, Vegetation and Fauna Survey Report Pilgangoora Lithium Project V1. Prepared by Natural Area Consulting, for Altura Mining Ltd, June 2016.

Ngungaju Lithium Operations Pty Ltd (NLO) (2023) Clearing permit application form, CPS 7246/5, received 9 October 2023.

Pilbara Minerals (PM) (2023) Additional information provided by the applicant for CPS 7246/5, received 27 November 2023.

Shepherd, K.A., & Hislop, M. (2020) Between a rock and a hard place: *Quoya zonalis* (Lamiaceae: Chloantheae), a threatened Foxglove from Western Australia's Pilbara bioregion. *Nuytsia*, 31(Volume 31, 7 Sep 2020), 217–221.

Trudgen, M.E. (1991) Vegetation condition scale in National Trust (WA) 1993 Urban Bushland Policy. National Trust of Australia (WA), Wildflower Society of WA (Inc.), and the Tree Society (Inc.), Perth.

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

Western Australian Herbarium (WAH) (1998-) FloraBase - the Western Australian Flora. Department of Biodiversity, Conservation and Attractions, Western Australia. <https://florabase.dpaw.wa.gov.au/> (Accessed 8 November 2023).

4. Glossary

Acronyms:

BC Act	<i>Biodiversity Conservation Act 2016</i> , Western Australia
BoM	Bureau of Meteorology, Australian Government
DAA	Department of Aboriginal Affairs, Western Australia (now DPLH)
DAFWA	Department of Agriculture and Food, Western Australia (now DPIRD)
DCCEEW	Department of Climate Change, Energy, the Environment and Water, Australian Government
DBCA	Department of Biodiversity, Conservation and Attractions, Western Australia
DER	Department of Environment Regulation, Western Australia (now DWER)
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety, Western Australia (DEMIRS)
DMIRS	Department of Mines, Industry Regulation and Safety, Western Australia (now DEMIRS)
DMP	Department of Mines and Petroleum, Western Australia (now DEMIRS)
DoEE	Department of the Environment and Energy (now DCCEEW)
DoW	Department of Water, Western Australia (now DWER)
DPaW	Department of Parks and Wildlife, Western Australia (now DBCA)
DPIRD	Department of Primary Industries and Regional Development, Western Australia
DPLH	Department of Planning, Lands and Heritage, Western Australia
DRF	Declared Rare Flora (now known as Threatened Flora)
DWER	Department of Water and Environmental Regulation, Western Australia
EP Act	<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.