



# Clearing Permit Decision Report

## 1. Application details and outcomes

### 1.1. Permit application details

Permit number:	9477/1
Permit type:	Purpose Permit
Applicant name:	VRX Silica Limited
Application received:	1 November 2021
Application area:	0.25 hectares
Purpose of clearing:	Groundwater Investigation
Method of clearing:	Raised Blade
Tenure:	Exploration Licence 70/5027
Location (LGA area/s):	Shire of Irwin
Colloquial name:	Arrowsmith North Alternative Bore Project

### 1.2. Description of clearing activities

VRX Silica Limited proposes to clear up to 0.25 hectares of native vegetation within a boundary of approximately 0.258 hectares, for the purpose of groundwater investigations. The project is located approximately 33.5 kilometres south-southeast of Port Denison, within the Shire of Irwin.

VRX Silica Limited is looking to develop a high grade silica sand mine in the Geraldton Sandplains bioregion (Preston, 2021). The Arrowsmith North Silica Sand Project was referred to the Environmental Protection Authority (EPA) for assessment under Section 38 of the *Environmental Protection Act 1986*. The EPA made a decision to assess the Arrowsmith North Silica Sand Project on 18 May 2021 (EPA, 2021). The proposed clearing will be to undertake investigation work to inform the EPA's assessment of the Arrowsmith North Silica Sand Project (Preston, 2021).

The application will allow VRX Silica Limited to develop an alternative groundwater abstraction bore as a contingency plan if the original bore is unviable (Preston, 2021).

### 1.3. Decision on application and key considerations

Decision:	Grant
Decision date:	7 June 2022
Decision area:	0.25 hectares of native vegetation

### 1.4. Reasons for decision

This clearing permit application was made in accordance with section 51E of the *Environmental Protection Act 1986* (EP Act) and was received by the Department of Mines, Industry Regulation and Safety (DMIRS) on 1 November 2021. DMIRS advertised the application for a public comment for a period of 21 days, and no submissions were received.

In making this decision, the Delegated Officer had regard for the site characteristics (Appendix A), relevant datasets (Appendix E), supporting information provided by the applicant including the results of a flora and vegetation survey (Appendix D), the clearing principles set out in Schedule 5 of the EP Act (Appendix B), 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 and dieback into adjacent vegetation, which could impact on the quality of the adjacent vegetation and its habitat values;
- impacts to conservation significant flora; and
- the loss of native vegetation that is suitable foraging habitat for Carnaby's black cockatoo (*Calyptorhynchus latirostris*).

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 and dieback; and
- undertake slow, progressive one-directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity.

## 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 includes:

- *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)

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (DER, December 2013)
- *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)

## 3. Detailed assessment of application

### 3.1. Avoidance and mitigation measures

Access to the bore will be via Brand Highway or pre-existing tracks only (Preston, 2021). Disturbance will be limited to what is required for an access track from Brand Highway, and the installation and investigations of the alternative bore (Preston, 2021). Clearing will be conducted with a tractor mounted mulcher set 300 millimetres above the ground surface (Preston, 2021). Minimal disturbance to topsoil is to be expected (Preston, 2021). All cleared areas will be rehabilitated by respraying topsoil and infill planting if the Arrowsmith North Silica Sand Project does not proceed into operation or the bore is not suitable (Preston, 2021).

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

The assessment against the clearing principles identified that the impacts of the proposed clearing present a risk to biological values (fauna, flora and vegetation). The consideration of these impacts, and the extent to which they can be managed through conditions applied in line with sections 51H and 51I of the EP Act, is set out below.

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

##### Assessment

A reconnaissance flora and vegetation survey was conducted by Mattiske Consulting (Mattiske) during May 2020. The survey covered approximately 448 hectares, extending well beyond the application area (Mattiske, 2021). There was one vegetation type mapped within the application area and the vegetation condition was considered 'excellent' (Mattiske, 2021).

A total of 126 flora species from 74 genera and 32 families were recorded within survey quadrats within the larger flora survey area (Mattiske, 2021). A desktop assessment identified four priority flora species with a high likelihood of occurrence within the application area based on factors including known soil type, topography and distribution: *Hemiandra* sp. Eneabba (P3), *Banksia elegans* (P4), *Schoenus griffinianus* (P4), and *Stawellia dimorphantha* (P4) (Mattiske, 2021; Preston, 2021).

No threatened flora species were recorded during the flora survey (Mattiske, 2021). Three priority flora species were recorded during the flora survey: *Hopkinsia anoectocolea* (P3), *Banksia elegans* and *Stawellia dimorphantha* (P4) (Mattiske, 2021). *Banksia elegans* (P4) was recorded from 34 locations totalling 333 individuals, *Hopkinsia anoectocolea* (P3) was recorded from one location totalling 3 plants, and a single plant of *Stawellia dimorphantha* (P4) was recorded (Mattiske, 2021).

None of these species were recorded within the application area, however *Banksia elegans* was recorded adjacent to the permit boundary (Mattiske, 2021). The vegetation located within the application area has the potential to support *Banksia elegans*, however the proposed clearing is unlikely to impact any individual plants (Preston, 2021).

Four introduced flora species were recorded within the larger flora survey area (Mattiske, 2021; Preston, 2021). Weeds and dieback have the potential to out-compete native flora and reduce the biodiversity of an area.

## Conclusion

Based on the above assessment, the proposed clearing will result in the loss of suitable habitat for *Banksia elegans*. There is also a potential to introduce and spread weeds and dieback within the application area.

## Conditions

Potential impacts to biodiversity as a result of the introduction of weeds and die may be minimised by the implementation of a weed and dieback management condition. No flora management conditions required as the loss of suitable *Banksia elegans* habitat is small in a local and regional context, and not considered significant.

### 3.2.2. Biological values (fauna) - Clearing Principles (a) and (b)

#### Assessment

A basic fauna assessment was conducted over the application area and surrounds by Bamford Consulting Ecologists (Bamford) during November 2018, September 2019 and October 2019 (Bamford, 2021). The assessment covered approximately 1,730 hectares (Bamford, 2021; Preston, 2021).

The following fauna habitat was recorded within the application area:

- **Kwongan heath (VSA 1):** low, dense, proteaceous/myrtaceous shrubland on yellow and pale sands. This VSA contained several *Banksia* species that were in flower during September 2019. This habitat occurs across the majority of the project area and varies with landscape position from high to low on stabilised dunes.

The habitat within the application area may provide habitat for multiple conservation significant species (Bamford, 2021; Preston, 2021) (Appendix C.3). The kwongan heath habitat is extensive in the region, being widespread in the nearby Yandanogo and Beekeepers Nature Reserves (Bamford, 2021).

A desktop assessment identified a total of 206 vertebrate fauna species which have the potential to occur within the application area and surrounds (Bamford, 2021). This includes 24 mammals, 122 birds, 50 reptiles and ten amphibians (Bamford, 2021). It is expected that at least 13 mammals, and possibly one bird and one reptile have become locally extinct (Bamford, 2021). The expected vertebrate assemblage includes 17 vertebrate species of conservation significance (Bamford, 2021).

One species of conservation significance was recorded during the field assessments of the much larger survey area: Carnaby's black cockatoo (*Calyptorhynchus latirostris*, EN) (Bamford, 2021).

Carnaby's black cockatoo (herein referred to as black cockatoos) is listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Biodiversity Conservation Act 2016* (BC Act). Black cockatoos nest in hollows in live or dead trees of karri, marri, wandoo, tuart, salmon gum, jarrah, flooded gum, York gum, and powderbark (Commonwealth of Australia, 2017).

They are known to forage on the seeds and flowers of a large variety of plants including banksias, hakeas, eucalypt trees, acacias and Woody Pears (*Xylomelum*) (Valentine & Stock, 2008; Bamford, 2021). Black cockatoo habitat can be considered in terms of breeding habitat, night roosting habitat, and foraging habitat. Black cockatoos will generally forage up to 12 kilometres from an active breeding site (DSEWPaC, 2012; DoEE, 2017; DPaW, 2013). Following breeding, they will flock in search of food, usually within six kilometres of a night roost (DSEWPaC, 2012; DoEE, 2017; DPaW 2013), but may range up to 20 kilometres (Commonwealth of Australia, 2017).

Food resources within the range of breeding sites and roost sites are important to sustain populations, and foraging resources are therefore viewed in the context of known breeding and night roosting sites, particularly within 12 kilometres of an impact area (Commonwealth of Australia, 2017). The Carnaby's Cockatoo recovery plan (DPaW, 2013) summarises habitat critical to the survival for Carnaby's cockatoos as:

- The eucalypt woodlands that provides nest hollows used for breeding, together with nearby vegetation that provides feeding, roosting and watering habitat that supports successful breeding;
- Woodland sites known to have supported breeding in the past and which could be used in the future, provided adequate nearby food and/or water resources are available or are re-established; and
- In the non-breeding season the vegetation that provides food resources as well as the sites for nearby watering and night roosting that enable the cockatoos to effectively utilise the available food resource.

The Carnaby's Cockatoo Recovery Plan states that there are multiple reasons for the decline of Carnaby's Cockatoos, however the decline to date has primarily been through the extensive clearing of nesting and feeding habitat (DPaW, 2013). The long-term survival of Carnaby's Cockatoos depends on the availability of suitable breeding habitat and hollows, as well as foraging habitat capable of providing enough food to sustain the population (DPaW, 2013).

The application area is located within the known distribution of black cockatoos (Commonwealth of Australia, 2012; GIS Database). A database search targeting Carnaby's black cockatoo identified that the application area falls outside of the modelled breeding range but within the foraging and roosting range (GIS Database). According to available GIS datasets, the nearest black cockatoo record is 6.8 kilometres east, the nearest breeding site is 52.6 kilometres east, and the nearest roost site is 26.7 kilometres north of the application area (GIS Database).

The nearest black cockatoo roost recorded during a 2016 fauna survey is located approximately 6.3 kilometres south-southeast of the application area (Bamford, 2021). This roost recorded a flock of more than 300 individuals (Bamford, 2021). In 2015 a flock of more than 500 individuals were recorded roosting approximately 23.2 kilometres north of the application area (Bamford, 2021). There were multiple locations with evidence of black cockatoo foraging located approximately 7.9 to 9 kilometres north of the application area (Bamford, 2021). Two flocks (one of 50 individuals) were spotted approximately 9.5 kilometres north of the application area during the September 2019 field assessment (Bamford, 2021).

The fauna habitat assessment determined that the kwongan heath habitat is considered high value foraging habitat for black cockatoos (Bamford, 2021; Preston, 2021). This was determined by the high proportion of key food species within this fauna habitat (Bamford, 2021). Foraging records occur within the same kwongan heath habitat located within the application area (Bamford, 2021).

The application area and surrounds is unlikely to support breeding habitat due to a lack of suitable nesting sites (no large trees to provide nesting hollows) (Bamford, 2021). There are large trees (river gums) along the drainage system approximately 5.5 kilometres east of the application area and possibly along the Arrowsmith River to the south and east (Bamford, 2021). It is possible these trees contain hollows of suitable size for nesting black cockatoos (Bamford, 2021).

#### Conclusion

Based on the above assessment, the proposed clearing will result in the clearing of 0.25 hectares of foraging habitat for black cockatoos. Given the extent of uncleared native vegetation within 20 kilometres of the application area, and kwongan heath fauna habitat being widespread within the region, the proposed clearing is unlikely lead to a significant residual impact. It is noted that the mulching technique of the proposed clearing is likely to facilitate natural regeneration of the application area, which will result in black cockatoo foraging values being reinstated in the near future.

#### Conditions

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

- Directional clearing, which requires slow, progressive, one directional clearing to allow terrestrial fauna to disperse ahead of the clearing activity should they occur on site at the time of clearing.

### **3.3. Relevant planning instruments and other matters**

This clearing permit application is related to the Arrowsmith North Silica Sand Project, which is currently undergoing formal assessment by the Environmental Protection Authority (EPA), under Part IV of the *Environmental Protection Act 1986* (EP Act). The proposed clearing is for the construction of an alternative bore, and is considered investigation work to support the assessment of the project by the EPA, pursuant to section 41 of the EP Act.

There is one native title claim (WC2019/008) over the area under application (DPLH, 2022). This claim has been determined by the Federal Court on behalf of the claimant group. However, the mining tenure has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore, the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There are no registered Aboriginal Sites of Significance within the application area (DPLH, 2022). 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 that may be 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. Site characteristics

### A.1. Site characteristics

Characteristic	Details
Local context	The area proposed to be cleared is located approximately 33.5 kilometres south-southeast of Port Denison, within the Shire of Irwin. The application area is adjacent Brand Highway, within the intensive land use zone of Western Australia. The dominant land use in the Lesueur Sandplains subregion is dry-land agriculture, with less areas of conservation. The application area is part of a larger area of uncleared native vegetation.
Conservation areas and ecological linkage	The application area is located within the Arrowsmith Lake Area environmentally sensitive area (Register of National Estate). Beekeepers Nature Reserve is located approximately 3 kilometres west of the application area. The application area represents a very small area of native vegetation within a much larger remnant. The proposed clearing area is unlikely to represent an ecological linkage.
Vegetation description	<p>The vegetation of the application area is broadly mapped as the following Beard vegetation association:</p> <p>378: Shrublands; scrub-heath with scattered <i>Banksia</i> spp, <i>Eucalyptus todtiana</i> &amp; <i>Xylomelum angustifolium</i> on deep sandy flats in the Geraldton Sandplains Region (GIS Database).</p> <p>A flora and vegetation survey was conducted over the application area and surrounds by Mattiske Consulting (Mattiske) during 19-22nd of May 2020. The following vegetation type was recorded within the application area (Mattiske, 2021):</p> <p><b>S6:</b> Open shrubland of <i>Acacia blakelyi</i> and <i>Allocasuarina campestris</i>, over <i>Ecdeiocolea monostachya</i>, <i>Jacksonia hakeoides</i> and <i>Lepidobolus preissianus</i> on cream/grey sand on flats to lower slopes.</p>
Vegetation condition	<p>The vegetation survey (Mattiske, 2021) indicates that the vegetation within the proposed clearing area is in excellent (Keighery, 1994) condition, described as:</p> <ul style="list-style-type: none"> <li>Excellent – Vegetation structure intact, with disturbance affecting individual species; weeds are non-aggressive species.</li> </ul> <p>The full Keighery (1994) condition rating scale is provided in Appendix C.</p>
Climate and landform	The application area is mapped within elevations of 30-40 metres AHD. The climate of the region is Mediterranean, with an average rainfall of approximately 399.2 millimetres per year (BoM, 2022; CALM, 2002).
Soil description and land degradation risk	The soil is mapped as level to gently undulating sandplain; yellow deep sand.
Waterbodies	The desktop assessment and aerial imagery indicated that no watercourses intersect the area proposed to be cleared. The ephemeral Arrowsmith River is located approximately 120 metres southwest of the application area.
Hydrogeography	The application area is not within any legislated surface water area. The application area is located within the Arrowsmith Ground Water Area proclaimed under the <i>Rights in Water and Irrigation Act 1914</i> . The mapped groundwater salinity is 1000-3000 milligrams per litre which is described as brackish water quality.
Flora	No Threatened or Priority flora species have previously been recorded within the application area, however a number of Priority flora have been recorded in the surrounds. The desktop assessment within the flora and vegetation survey report identified 27 conservation significant flora species to occur within the much larger Arrowsmith survey area (Mattiske, 2021; Preston, 2021). The likelihood of these species occurring was determined by known soil type, topography and distribution (Mattiske, 2021; Preston, 2021).
Ecological communities	There are no known Threatened or Priority Ecological Communities that occur within the application area. The nearest TEC records are the state listed Ferricrete floristic community (Rocky Springs type) (VU) and Assemblages of organic mound springs of the Three Springs area (EN), located approximately 33 kilometres east of the application area.
Fauna	There are 12 fauna species of conservation significance that have the potential to occur within the application area and there is a known black cockatoo roost site 6.3 kilometres south-southeast.

## A.2. Flora analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix E.1), and biological survey information (Matiske, 2021; Preston, 2021), the following conservation significant flora species have the potential to occur within the Arrowsmith survey area (Appendix G).

Species	Conservation Status	Likelihood of Occurrence
<b>Threatened Species</b>		
<i>Conostylis dielsii</i> subsp. <i>Teres</i>	Endangered	Moderate
<i>Conostylis micrantha</i>	Endangered	Moderate
<i>Eucalyptus impensa</i>	Endangered	Low
<i>Hemiandra gardneri</i>	Endangered	Moderate
<i>Leucopogon obtectus</i>	Endangered	Moderate
<i>Paracaleana dixonii</i>	Endangered	Moderate
<i>Tetradlea nephelioides</i>	Critically Endangered	Moderate
<b>Priority Species</b>		
<i>Acacia vittata</i>	Priority 2	Moderate
<i>Banksia elegans</i>	Priority 4	High
<i>Beyeria gardneri</i>	Priority 3	Moderate
<i>Caladenia denticulate</i> subsp. <i>albicans</i>	Priority 1	Moderate
<i>Drosera pedicularis</i>	Priority 1	Moderate
<i>Eucalyptus zopherophloia</i>	Priority 4	Low
<i>Grevillea erinacea</i>	Priority 3	Low
<i>Guichenotia quasicalva</i>	Priority 2	Low
<i>Hemiandra</i> sp. Eneabba (H. Demarz 3687)	Priority 3	High
<i>Hopkinsia anoectocolea</i>	Priority 3	Low
<i>Hypocalymma tetrapterum</i>	Priority 3	Low
<i>Schoenus griffinianus</i>	Priority 4	High
<i>Scholtzia calcicola</i>	Priority 2	Moderate
<i>Stawellia dimorphantha</i>	Priority 4	High
<i>Stylidium longitubum</i>	Priority 4	Low
<i>Synaphea oulopha</i>	Priority 3	Low
<i>Triglochin protuberans</i>	Priority 3	Low
<i>Verticordia dasystylis</i> subsp. <i>oestopoia</i>	Priority 1	Low
<i>Verticordia luteola</i> var. <i>rosea</i>	Priority 1	Moderate
<i>Verticordia luteola</i> var. <i>luteola</i>	Priority 3	Moderate

## A.3. Fauna analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix F.1), and biological survey information (Bamford, 2021; Preston, 2021), the following conservation significant fauna species have the potential to occur within the Arrowsmith survey area (Appendix G).

Species	Conservation listing	Presence within survey area	Expected status
<b>Invertebrates</b>			
Bothriembryontid Land Snail ( <i>Bothriembryon perobesus</i> )	P1	Unconfirmed	Uncertain Records within 50 km of survey area
Kwongan Heath Shield-Backed Trapdoor Spider ( <i>Idiosoma kwongan</i> )	P1	Unconfirmed	Uncertain Records within 12 km of survey area
Springtime Corroboree Stick Katydid (Eneabba) ( <i>Phasmodes jeeba</i> )	P3	Unconfirmed	Uncertain Records within 50 km of survey area
Thorny Bush Katydid (Moora) ( <i>Hemisaga vepreculae</i> )	P2	Unconfirmed	Resident
Woollybush Bee ( <i>Hylaeus globuliferus</i> )	P3	Unconfirmed	Resident
<b>Reptiles</b>			
Black-striped Snake ( <i>Neelaps calonotos</i> )	P3	Confirmed	Resident
<b>Birds</b>			
Malleefowl ( <i>Leipoa ocellata</i> )	V, S3	Unconfirmed	Irregular visitor
Fork-Tailed Swift ( <i>Apus pacificus</i> )	M, S5	Unconfirmed	Regular migrant
Peregrine Falcon ( <i>Falco peregrinus</i> )	S7	Unconfirmed	Irregular visitor
Carnaby's Black-Cockatoo ( <i>Calyptorhynchus latirostris</i> )	E, S2	Unconfirmed	Regular migrant
<b>Mammals</b>			
Brush Wallaby ( <i>Notamacropus Irma</i> )	P4	Confirmed	Resident

Rakali ( <i>Hydromys chrysogaster</i> )	P4	Unconfirmed	Irregular visitor
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EPBC Act listed species: V = Vulnerable, E = Endangered, C = Critically Endangered, M = Migratory. BC Act listed species: S1 – S7 = Schedule 1 - 7; DBCA Priority Species: P1 - P5 = Priority 1 - 5. \* SRE

## Appendix B. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
<b>Environmental value: biological values</b>		
<p><b>Principle (a):</b> “Native vegetation should not be cleared if it comprises a high level of biodiversity.”</p> <p><b>Assessment:</b> The area proposed to be cleared contains suitable habitat for several conservation significant flora species.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.1, above.</i>
<p><b>Principle (b):</b> “Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna.”</p> <p><b>Assessment:</b> The area proposed to be cleared contains high value foraging habitat for Carnaby’s black cockatoo.</p>	At variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><b>Principle (c):</b> “Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.”</p> <p><b>Assessment:</b> There are no known records of Threatened flora within the application area (GIS Database). A flora survey of the application area did not record any species of Threatened flora and the vegetation is not expected to support any species of Threatened flora (Mattiske, 2021; Preston, 2021).</p> <p>The vegetation type recorded within the application area is well represented within the local area (Mattiske, 2021; GIS Database). The vegetation proposed to be cleared is unlikely to be necessary for the continued existence of any species of Threatened flora.</p>	Not likely to be at variance	No
<p><b>Principle (d):</b> “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><b>Assessment:</b> There are no known Threatened Ecological Communities (TECs) located within or in close proximity to the application area (GIS Database). A flora and vegetation survey of the application area did not identify any vegetation representative of a TEC (Mattiske, 2021).</p>	Not likely to be at variance	No
<b>Environmental value: significant remnant vegetation and conservation areas</b>		
<p><b>Principle (e):</b> “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><b>Assessment:</b> The application area falls within the Geraldton Sandplains Bioregion of the Interim Biogeographic Regionalisation for Australia (IBRA) (GIS Database). Approximately 44% of the pre-European vegetation still exists in the IBRA Geraldton Sandplains Bioregion (Government of Western Australia, 2019).</p> <p>The application area is broadly mapped as Beard vegetation association 378: Shrublands; scrub-heath with scattered <i>Banksia</i> spp, <i>Eucalyptus todtiana</i> &amp; <i>Xylomelum angustifolium</i> on deep sandy flats in the Geraldton Sandplains Region (GIS Database). Approximately 64% of the pre-European extent of this vegetation association remains uncleared at both the state and bioregional level (Government of Western Australia, 2019).</p> <p>The vegetation proposed to be cleared is not a significant remnant in an area that has been extensively cleared.</p>	Not likely to be at variance	No
<p><b>Principle (h):</b> “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.”</p> <p><b>Assessment:</b> The application area is located within the Arrowsmith Lake Area environmentally sensitive area (Register of National Estate). Arrowsmith Lake is located approximately 1 kilometre north-northwest of the application area. The proposed clearing does not intersect any ephemeral watercourses that drain to Arrowsmith Lake.</p>	Not likely to be at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
Beekeepers Nature Reserve is located approximately 3 kilometres west of the application area. The proposed clearing is unlikely to impact on the environmental values of any conservation area.		
<b>Environmental value: land and water resources</b>		
<p><b>Principle (f):</b> <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><b>Assessment:</b> Given no permanent or ephemeral water courses or wetlands are recorded within application area, the proposed clearing is unlikely to impact on- or off-site hydrology and water quality.</p>	Not at variance	No
<p><b>Principle (g):</b> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</i></p> <p><b>Assessment:</b> The sandy soils of the application area may be susceptible to erosion. Noting the excellent condition of the vegetation, the location of the proposed clearing occurring within a much larger remnant of native vegetation, and the relatively small amount of clearing (0.25 ha), the proposed clearing is unlikely to lead to significant appreciable land degradation.</p> <p>The method of clearing (raised blade) will leave rootstock and topsoil intact, further reducing the potential for erosion (Preston, 2021).</p>	Not likely to be at variance	No
<p><b>Principle (i):</b> <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><b>Assessment:</b> There are no Public Drinking Water Source Areas within or in close proximity to the application area (GIS Database). There are no permanent watercourses or wetlands within the area proposed to clear (GIS Database). The proposed clearing is unlikely to result in significant changes to surface water flows or to cause deterioration in the quality of underground water.</p>	Not likely to be at variance	No
<p><b>Principle (j):</b> <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><b>Assessment:</b> The climate of the region is Mediterranean, with an average rainfall of approximately 399.2 millimetres per year (BoM, 2022; CALM, 2002). Given no watercourses are recorded within the application area, the proposed clearing is unlikely to contribute to waterlogging.</p>	Not likely to be at variance	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.

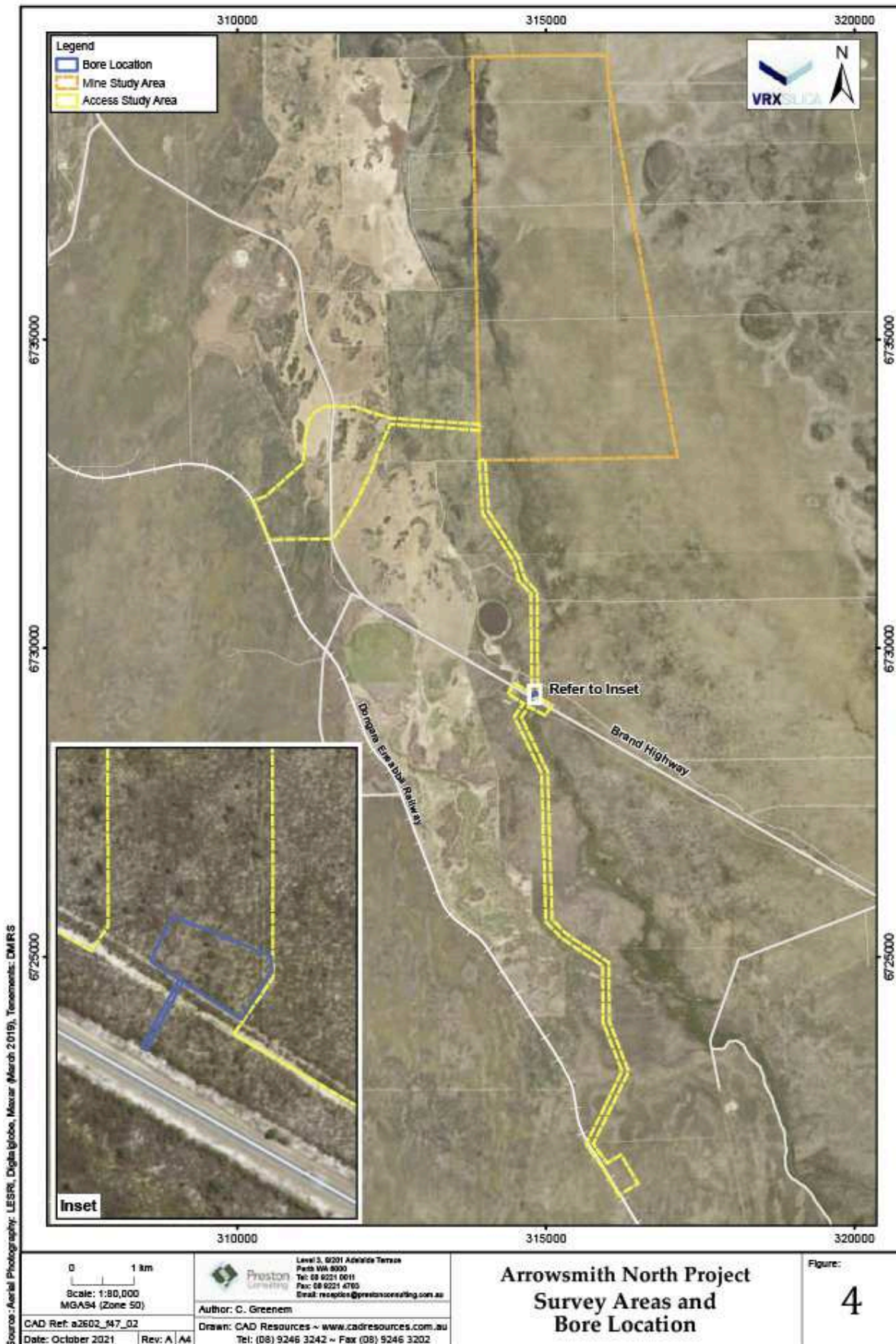
Considering its location, the scale below was used to measure the condition of the vegetation proposed to be cleared. This scale has been extracted from Keighery, B.J. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc). Nedlands, Western Australia.

#### Measuring vegetation condition for the South West and Interzone Botanical Province (Keighery, 1994)

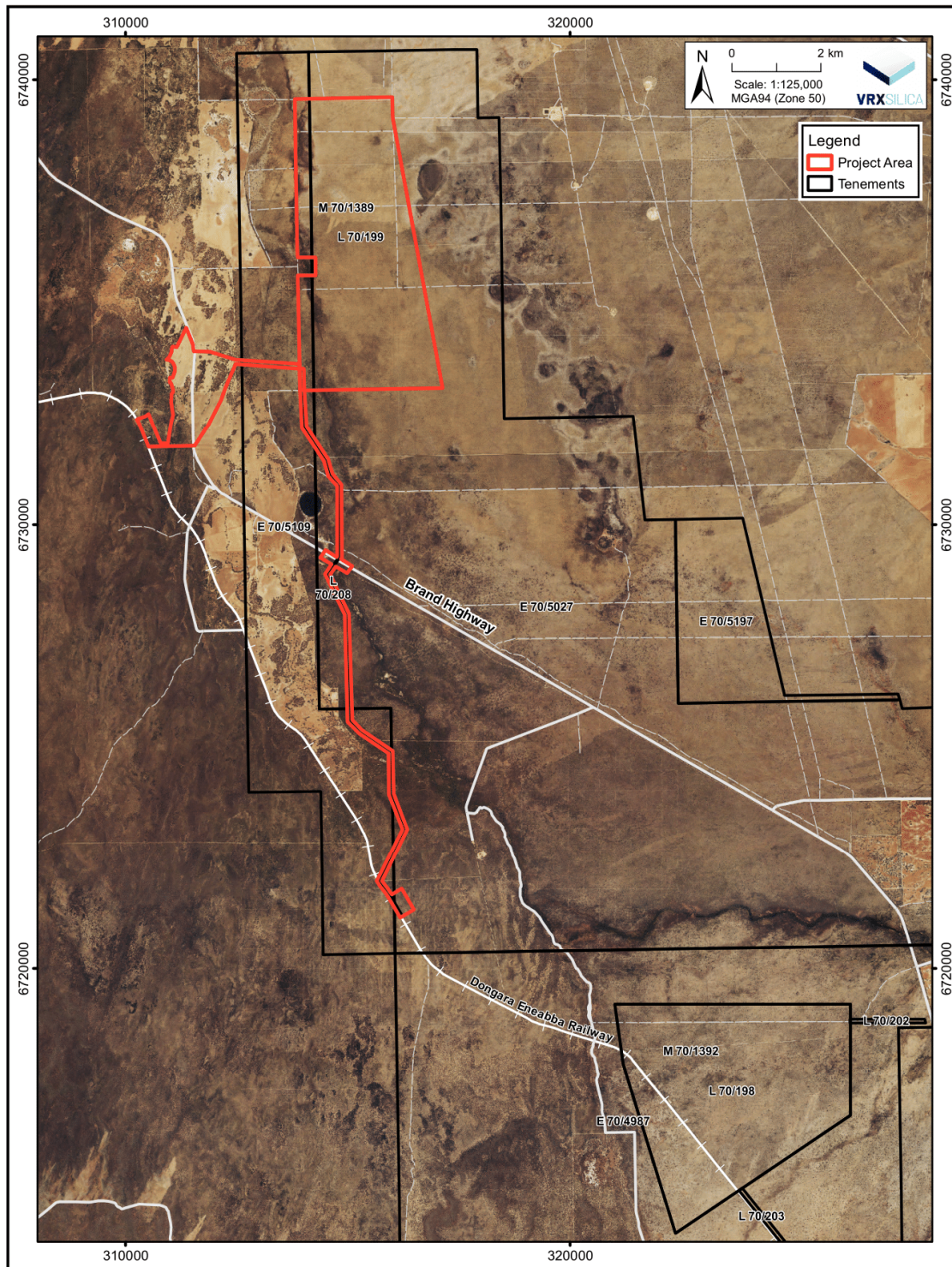
Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, with disturbance affecting individual species; weeds are non-aggressive species.
Very good	Vegetation structure altered, with obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and/or grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and/or grazing.



Condition	Description
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and/or grazing.
Completely degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.



(1) Arrowsmith North Project flora and vegetation survey area and bore location (Preston, 2021).



(2) Arrowsmith North Project fauna survey area (Bamford, 2021).

## Appendix E. Sources of information

### E.1. GIS databases

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

- 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)
- Groundwater Salinity Statewide (DWER-026)
- Hydrography, Linear (DWER-031)
- IBRA Vegetation Statistics
- Pre-European Vegetation Statistics
- 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:

- Black Cockatoo WTBC Breeding
- Black Cockatoo BC Roosts
- Black Cockatoo BC Feeding SCP
- Black Cockatoo Feeding JF
- Black Cockatoo Feeding Areas Buffered
- Black Cockatoo Carnabys Distribution
- 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

- Bamford (2021) Fauna Assessment of Arrowsmith North. Extensive Kwongan in the VRX Arrowsmith North project area (M. Bamford). Prepared by Bamford Consulting, for VRX Silica Limited, March 2021.
- BoM (2022) Bureau of Meteorology Website – Climate Data Online, Mingenew. Bureau of Meteorology. <http://www.bom.gov.au/climate/data/> (Accessed 18 May 2022).
- Commonwealth of Australia (2017) Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black Cockatoo.
- Department of the Environment and Energy (DotEE) (2016). Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (s 266B). Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community.
- Department of Environment Regulation (DER) (2013) *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](https://www.der.wa.gov.au/images/documents/your-environment/native-vegetation/Guidelines/Guide2_assessment_native_veg.pdf)
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012) EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (Endangered) *Calyptorhynchus latirostris*, Baudin's cockatoo (Vulnerable) *Calyptorhynchus baudinii*, Forest red-tailed black cockatoo (Vulnerable) *Calyptorhynchus banksii naso*. Department of Sustainability, Environment, Water, Population and Communities (now the Department of Agriculture, Water and Environment), Canberra.
- Department of Planning, Lands and Heritage (DPLH) (2022) Aboriginal Heritage Inquiry System. Department of Planning, Lands and Heritage. <https://espatial.dplh.wa.gov.au/AHIS/index.html?viewer=AHIS> (Accessed 11 May 2022).
- Department of Primary Industries and Regional Development (DPIRD) (2021) NRInfo Digital Mapping. Department of Primary Industries and Regional Development. Government of Western Australia. URL: <https://maps.agric.wa.gov.au/nrm-info/> (Accessed 16 May 2022).
- 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](https://dwer.wa.gov.au/sites/default/files/Procedure_Native_vegetation_clearing_permits_v1.pdf)
- DPaW (2013) Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan. Department of Parks and Wildlife, October 2013.
- Environmental Protection Authority (EPA) (2021) Arrowsmith North Silica Sand Project. Decision on whether to assess this proposal, May 2021. [https://www.epa.wa.gov.au/sites/default/files/Extract\\_of\\_determination/CMS17888%20-%20Chair%20Determination.pdf](https://www.epa.wa.gov.au/sites/default/files/Extract_of_determination/CMS17888%20-%20Chair%20Determination.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/Tech%20guidance-%20Terrestrial%20Fauna%20Surveys-Dec-2016.pdf](https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Tech%20guidance-%20Terrestrial%20Fauna%20Surveys-Dec-2016.pdf)
- 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](http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA%20Technical%20Guidance%20-%20Flora%20and%20Vegetation%20survey_Dec13.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>
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Mattiske (2021) Flora & Vegetation Assessment. Arrowsmith North Transport Corridor Survey Area. Prepared by Mattiske Consulting Pty Ltd, for VRX Silica Limited, February 2021.
- Preston (2021) Arrowsmith North Alternative Bore Location. Native Vegetation Clearing Permit Application Supporting Information. Prepared by Preston Consulting, for VRZ Silica Limited, November 2021.
- Valentine, L. and Stock, W. (2008) Food Resources of Carnaby's Black-Cockatoos in the Gngangara Sustainability Study Area. Report prepared for the Gngangara 577 Sustainability Strategy, Perth, Australia.

## 4. Glossary

## Acronyms:

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