



## 1. Application details

### 1.1. Permit application details

Permit application No.: 2050/1

Permit type: Purpose Permit

### 1.2. Proponent details

Proponent's name: Alcoa of Australia Limited

### 1.3. Property details

Property: LOT 100 ON PLAN 23015 (House No. 80 ANKETELL HOPE VALLEY 6165)  
 LOT 60 ON DIAGRAM 73814 (House No. 303 HOPE VALLEY HOPE VALLEY 6165)  
 LOT 61 ON DIAGRAM 73814 (House No. 270 ABERCROMBIE HOPE VALLEY 6165)  
 LOT 3 ON DIAGRAM 31429 (House No. 307 HOPE VALLEY HOPE VALLEY 6165)  
 LOT 4 ON DIAGRAM 31429 (House No. 321 HOPE VALLEY HOPE VALLEY 6165)  
 LOT 5 ON DIAGRAM 31429 (House No. 339 HOPE VALLEY HOPE VALLEY 6165)

Local Government Area: Town Of Kwinana

Colloquial name: Clause 6 Alumina Refinery Agreement Act 1961

### 1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
19.1		Mechanical Removal	Mineral Production

## 2. Site Information

### 2.1. Existing environment and information

#### 2.1.1. Description of the native vegetation under application

##### Vegetation Description

Heddlie et al (1980) described and mapped the vegetation complexes of the Darling System, Western Australia on a scale of 1:250,000 and noted that the distribution of these related to landforms, soils and climatic conditions. A majority of the vegetation within the application area is mapped as the Cottesloe Complex - Central and South. This is a mosaic of woodland of *Eucalyptus gomphocephala* (Tuart) and open forest of *E. gomphocephala* - *E. marginata* (Jarrah) - *Corymbia calophylla* (Marri) on deeper sands while limestone outcrops support closed heaths. The vegetation in the north eastern corner of the application area is mapped as Karrakatta Complex - Central and South, which consists of predominantly open woodland of Tuart-Jarrah-Marri and woodland of Jarrah-Banksia species.

Gibson et al (1994) established 509, 10m x 10m plots when they undertook a floristic survey of the Swan Coastal Plain (SCP). All vegetation communities on the SCP can be classified as one of the Floristic Community Types described by Gibson et al (1994).

Bennett Environmental Consulting Pty Ltd (hereafter referred to as Bennett) conducted a vegetation survey which encompassed the application area on the 4th

##### Clearing Description

Alcoa have applied to clear up to 19.1 hectares of native vegetation at their Kwinana refinery site, within a total application area of approximately 66.2 ha. The area applied to clear is located within the Town of Kwinana and is surrounded on all sides but the western side by land zoned Rural A or B, which may be used for rural purposes or in the case of Rural B, for extractive industries, tailings ponds, processing and other purposes applicable to that zone and for purposes incidental thereto and for no other purpose (Town of Kwinana, 2007). The Hope Valley/Wattleup Redevelopment Area is located to the west of the application area, with the land earmarked as Precinct 1, Southern Industrial in the Master Plan (LandCorp, 2004). In addition, the northern and western boundaries of the application area are immediately adjacent to Hope Valley and Abercrombie Roads respectively, while a buffer of at least 30 metres of native vegetation separates the southern boundary of the application area from Anketell Road.

The majority of the application area has been previously cleared for sand and limestone extraction and is mostly devoid of vegetation with only small isolated patches of regrowth including weeds (Alcoa Hatch Engineering Alliance, 2007). In calculating the area applied to clear, Alcoa have allowed for up to 10 ha of clearing within this previously cleared area, to account for all possible remaining patches of vegetation which may need to be cleared.

The application area has been divided into 4 areas, and the site visit undertaken by DoIR

##### Vegetation Condition

Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery 1994)

to

Completely Degraded: No longer intact; completely/almost completely without native species (Keighery 1994)

##### Comment

The condition of the vegetation was described and mapped by Bennett (2001). Bennett's findings were confirmed and updated through a site visit undertaken by Department of Industry and Resources (DoIR) Native Vegetation Assessors on the 7th November 2007 (DoIR, 2007a; DoIR, 2007b). The site has been highly disturbed through a combination of (probable) historical clearing, limestone quarrying and weed infestation.

September 2001. The findings of this survey were confirmed and updated through a site visit undertaken by Department of Industry and Resources (DoIR) Native Vegetation Assessors on the 7th November 2007 (DoIR, 2007a; DoIR, 2007b). Two vegetation communities were identified within the area under application, and these were matched with the Floristic Community Types described by Gibson et al (1994):

1. Woodland of *Eucalyptus gomphocephala* (Tuart) and *Eucalyptus marginata subsp. marginata* (Jarrah) with occasional to dense *Banksia attenuata* (Slender Banksia) over a Shrubland of mixed species dominated by *Xanthorrhoea preissii* (Grass Tree) and *Macrozamia reidlei* (Zamia) in brownish yellow sand. Bennett noted that the understorey varied considerably depending on the age since fire. This community was matched to Floristic Community Type 28 - Spearwood *Banksia attenuata* or *Banksia attenuata* - *Eucalyptus* woodlands.

2. Areas of outcropping limestone on the mid-western edge of the application area, adjacent to Abercrombie Road were mapped by Bennett (2001) as Closed Tall Scrub to Shrubland of *Melaleuca huegelii subsp. huegelii* over a Herbland of weeds in brownish yellow sand with limestone outcropping. A high percentage of weeds were recorded as understorey plants in this community. This community was matched to Floristic Community Type 26a - *Melaleuca huegelii* - *M. systema* shrublands on limestone ridges.

Native Vegetation Assessors reviewed the vegetation and flora taxa present in each of these areas, and the condition of the vegetation in them (DoIR, 2007a; DoIR, 2007b):

Area 1: Approximately 3.9 hectares of vegetation at the southern end of the application area, adjoining the southern boundary of the property, will be cleared. The vegetation is in a degraded to very degraded condition and was described as Woodland of *Eucalyptus gomphocephala* (Tuart) and *Eucalyptus marginata subsp. marginata* (Jarrah) with *Banksia grandis* (Bull Banksia) over a Shrubland of mixed species dominated by *Xanthorrhoea preissii* (Grass Tree) and *Macrozamia reidlei* (Zamia) over a herbland of weeds in brownish yellow sand. A total of 20 flora taxa were recorded, with 10 of these being weed species;

Area 2: Approximately 2.2 hectares of vegetation in the north-eastern quadrant of the application area will be cleared. The vegetation was in a very degraded condition and was described as planted vegetation with some naturally occurring species. An incomplete list of 7 flora taxa were recorded, with 2 of these being weed species;

Area 3: Up to 3 hectares of vegetation may be cleared within a 4.9 hectare strip along the western side of the application area for construction of a perimeter security fence and groundwater monitoring bores. The vegetation was described as Woodland of *Eucalyptus gomphocephala* (Tuart) with occasional *Banksia attenuata* (Slender Banksia) over a Shrubland of mixed species dominated by *Xanthorrhoea preissii* (Grass Tree) and *Macrozamia reidlei* (Zamia) over a herbland of weeds in brownish yellow sand. There was a small patch of *Melaleuca huegelii* (Chenille Honey myrtle) over a herbland of weeds in brownish yellow sand with limestone outcropping in the middle of this buffer strip;

Area 4: Vegetation in this area will be cleared in its entirety. The vegetation was described as recolonising *Acacia rostellifera* (Summer-scented Wattle) shrubland over a herbland of weeds in the limestone quarry. A total of 7 flora taxa were recorded, with 4 of these being weed species. As the native vegetation is sparse, it has been difficult to accurately determine the area to be cleared. As such, the applicant has stated that up to 10 hectares of vegetation will be cleared within the total area of 55.2 hectares in Area 4.

### 3. Assessment of application against clearing principles

#### (a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

##### Comments

##### **Proposal is not likely to be at variance to this Principle**

The two vegetation communities mapped by Bennett (2001) as occurring within the application area matched Floristic Community Types (FCT) 28 and 26a (Gibson et al, 1994). Both were in a degraded to highly degraded condition (Bennett, 2001; DoIR, 2007a).

FCT 28 is well reserved and its conservation status is classified as having low risk by Gibson et al (1994). This community is present in all three of the local Bush Forever sites 267, 268 and 392 (Government of Western Australia, 2000), and it is therefore well reserved locally.

FCT 26a is listed by the Department of Environment and Conservation as a Threatened Ecological Community

and has an Endangered status (DEC, 2006). While it is not Critically Endangered it is facing a very high risk of total destruction in the near future (DEC, 2007a). DEC (2007a) states that the current distribution of this TEC is limited and while there may be many occurrences, the total area covered by this TEC is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes. Bennett (2001) recorded that the vegetation condition of this FCT was degraded with the understorey replaced by weeds. The site visit undertaken by DoIR Native Vegetation Assessors on the 7th November 2007 enabled further examination of this community, and recorded a small patch of *Melaleuca huegelii* (Chenille Honey Myrtle) over a herbland of weeds in brownish yellow sand with limestone outcropping in the middle of Area 2 (DoIR, 2007a). A number of isolated individuals of *M. huegelii* were the only plants remaining which indicated that this community may have historically been FCT 26a. A number of these were dead or dying, and it was noted that there is no recruitment of this species.

The southern half of the application area occurs within a TEC buffer zone for Threatened Ecological Community (SCP 26a, referred to above as FCT 26a). The TEC is located outside of the application area and will not be cleared as it is conserved in the buffer of at least 30 metres of native vegetation which separates the southern boundary of the application area from Anketell Road. DEC (2007b) have advised a low concern regarding clearing in the TEC buffer, given the poor condition of the site, and that hydrology seems unlikely to be impacted.

No recordings were made of fauna during the site visit. It is likely that a number of bird species are present and utilise the patches of remnant vegetation for foraging, nesting or roosting. The western and southern belts of vegetation within the application have well established Tuart populations, with age ranging from sapling to habitat trees. The average height of the mature Tuarts on the site was estimated to be between 20 and 25 m.

There are at least 2 habitat trees on the site. These are old Tuart trees, with dead stags and hollows and a trunk diameter of greater than 1.5m. These trees can be habitat for significant bird species. These are located in the southern belt of vegetation (Area 1) which will be cleared.

No large vertebrate fauna were observed during the site visit. It is not likely that the site is utilised as significant habitat for vertebrate fauna due to the degraded nature of the vegetation and current limestone quarrying activities at the site.

The application area is characterised by degraded to completely degraded vegetation exhibiting a low species diversity, which implies a low fauna diversity as well.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology** Alcoa (2007).  
Bennett Environmental (2001).  
DEC (2006).  
DEC (2007a).  
DoIR (2007a).  
DEC (2007b).  
Gibson et al (1994).  
Government of Western Australia (2000).

**(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 indigenous to Western Australia.**

**Comments Proposal may be at variance to this Principle**

The application area was assessed for its importance as significant habitat for fauna during the site visit survey which was conducted by DoIR Native Vegetation Assessors on 7 November 2007 (DoIR, 2007a; DoIR, 2007b).

No large vertebrate fauna were observed during the site visit (DoIR, 2007a). It is not likely that the site is utilised as significant habitat for vertebrate fauna due to the degraded nature of the vegetation and current limestone quarrying activities at the site.

While no recordings were made of fauna during the site visit, it is likely that a number of bird species are present and utilise the patches of remnant vegetation for foraging, nesting or roosting (DoIR, 2007a). The western (Area 3) and southern belts (Area 1) of vegetation within the application have well established Tuart populations, with age ranging from sapling to habitat trees. The average height of the mature Tuarts on the site was estimated to be between 20 and 25 m.

There are at least 2 habitat trees on the site (DoIR, 2007a; DoIR, 2007b). These are old Tuart trees, with dead stags and hollows and a trunk diameter of greater than 1.5m. These trees can be habitat for significant bird species. These are located in the southern belt of vegetation (Area 1) which will be cleared. The remnant vegetation that they are in is a degraded to very degraded Woodland of *Eucalyptus gomphocephala* (Tuart) and *Eucalyptus subsp marginata* (Jarrah) with *Banksia grandis* (Bull Banksia) over a Shrubland of mixed species dominated by *Xanthorrhoea preissii* (Grass Tree) and *Macrozamia reidleyi* (Zamia) over a herbland of weeds in brownish yellow sand.

The issue of the habitat trees was noted during the site visit and brought to the attention of the Environmental Scientist from Alcoa's Kwinana Refinery (DoIR, 2007a), but no management measures specific to these habitat trees were discussed at the time.

Biodiversity advice was subsequently sought from the DEC with regard to significance of the habitat trees and Tuart population as habitat for fauna. The DEC (2007c) advised that:

- in terms of habitat for bird species, the habitat trees observed and the Tuart population in general, the upper canopy would offer vantage points for raptors (birds of prey) to watch for potential prey. As with all upper story vegetation these trees would offer temporary roosting points for a whole suite of avian fauna. The hollows could be utilized by an extremely wide range of avian fauna, most notably Carnaby's Cockatoos, for whom they could represent a nesting hollow;

- it does not consider that the presence of the two habitat trees which will be cleared would cause the assessment of principle b to go beyond "may be at variance", unless they have been inspected by an environmental specialist, and confirmed as being currently utilized by fauna with very specific requirements, such as Carnaby's Cockatoos.

- a qualified tree arborist should be able to salvage any viable hollows that exist within the Tuarts that may be felled. Any such salvaged hollows can then be affixed to the trunk of a Tuart of comparable height that is to be retained. DEC have advised that they would insist on an agreement (by license condition) compelling Alcoa to revegetate an area with *Eucalyptus gomphocephala* (Tuart). The actual area or number of *Eucalyptus gomphocephala* (Tuart) should recognize that it will take approximately a century for any seedlings that survive to provide hollows of comparable dimensions.

Alcoa have responded to this advice in a letter (Lance Whitewood 2007, pers. comm., 28 November), stating that:

- Alcoa is prepared to involve a qualified tree arborist to salvage any viable hollows that exist within the *Eucalyptus gomphocephala* (Tuarts trees) that may be felled in Area 1. Salvaged hollows will then be affixed to the trunk of a Tuart tree of comparable height, that is to be retained either in Area 1 or Area 3.

- Alcoa will also commit to carry out infill planting of *Eucalyptus gomphocephala* (Tuart trees) within Area 3 at a density agreed with the DEC.

Discussion with the Environmental Scientist from Alcoa's Kwinana Refinery during the site visit survey included Alcoa's proposed management and strategies for minimisation of clearing within Areas 1 and 3 (DoIR, 2007a):

- With regard to Alcoa's proposed management of clearing within the southern belt of vegetation (Area 1), the Environmental Scientist noted that some trees will be retained in a narrow strip between the road and boundary fence to the south of residue disposal area N; and

- With regard to Alcoa's proposed management of clearing within the western belt of vegetation (Area 3), the Environmental Scientist noted that:

\* The new boundary fence on the western side will require removal of a few small trees and some branches may need to be trimmed; and

\* Alcoa will endeavour where possible to install groundwater monitoring bores in areas devoid of native species. Machinery used for installing the bores will avoid native vegetation where possible.

Based on the above, the proposed clearing may be at variance to this Principle.

**Methodology** DEC, 2007c.  
DoIR, 2007a.  
DoIR, 2007b.

**(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.**

**Comments Proposal is not likely to be at variance to this Principle**

A review of the GIS database of Declared Rare and Priority Flora found a total of 18 species within a 10 km radius of the application area. These are, with a statement of their likely presence in the application area and significance ordered from highest to lowest:

- \* DRF - *Caladenia huegelii*. Possible, but unlikely due to significant competition from weeds in the understorey.
- \* DRF - *Diuris micrantha*. Habitat damp areas. Presence unlikely.
- \* DRF - *Drakaea elastica*. Habitat white-grey sand adjacent to damp areas. Presence unlikely.
- \* DRF - *Diuris purdiei*. Habitat damp areas. Presence unlikely.
- \* DRF - *Drakaea micrantha*. Habitat white-grey sand. Presence unlikely.
- \* DRF - *Verticordia plumosa var pleiobotrya*. Habitat damp areas. Presence unlikely.
- \* DRF - *Tetraria australiensis*. White/grey sands on dunes in Pinjarra Plain (Western Australian Herbarium, 1998-2007). Presence unlikely.
- \* P1 - *Acacia lasiocarpa var bracteolata* long peduncle variant. Habitat damp areas. Presence unlikely.

- \* P3 - *Dillwynia dillwynioides*. Habitat damp areas. Presence unlikely.
- \* P3 - *Rhodanthe pyrethrum*. Habitat damp areas. Presence unlikely.
- \* P3 - *Baeckea* sp Perth Region. Habitat damp areas. Presence unlikely.
- \* P4 - *Jacksonia sericea*. Presence possible within application area.
- \* P4 - *Drosera occidentalis subsp occidentalis*. Habitat damp areas. Presence unlikely.
- \* P4 - *Villarsia submersa*. Habitat damp areas. Presence unlikely.
- \* P4 - *Aponogeton hexatepalus*. Habitat damp areas. Presence unlikely.
- \* P4 - *Anthotium junciforme*. Habitat damp areas. Presence unlikely.
- \* P4 - *Dodonaea hackettiana*. Shrub or tree 1-5m high. Sand and/or outcropping limestone. Presence possible in application area.
- \* P4 - *Verticordia lindleyi subsp lindleyi*. Habitat damp areas. Presence unlikely.

Of the species listed, 3 have the potential to be present within the application area. These are *Caladenia huegelii* (Grand Spider Orchid), *Jacksonia sericea* (Waldjumi) and *Dodonaea hackettiana* (Hackett's Hop Bush).

Bennett conducted a vegetation survey which encompassed the application area on the 4th September 2001 (Bennett, 2001). No Rare or Priority Flora were recorded during the survey.

No significant flora were recorded during the site visit survey conducted by DoIR Native Vegetation Assessors on the 7th November 2007 (DoIR, 2007a). The site visit did not involve an intensive survey of the application area. Despite this, it is considered highly unlikely that either the Grand Spider Orchid or Hackett's Hop Bush are present within the area, the former due to aggressive competition provided by weed species which constitute most of the understorey of the vegetated areas. The Native Vegetation Assessor conducting the survey is familiar with the morphology and general appearance of Hackett's Hop Bush, which is a shrub or tree between 1 and 5 metres high. This plant is relatively distinctive, particularly in Spring, when its propagules are reddish green, engorged and densely clustered amongst the branches of the plant. No plants of this species were observed either at locations visited, or from the vehicle during the site visit survey on the 7th November 2007.

There is some possibility that *Jacksonia sericea* may be present within the application area. This species is a low-spreading shrub to 0.6 m high (Western Australian Herbarium, 1998-2007), which flowers between December and February. The competition presented by the dominant aggressive of weeds in the understorey of the vegetated portion of the application area reduce the likelihood of this species being present. Considering the low-lying morphology of this species and the fact that the site visit survey on 7 November 2007 was not intensive, however, it is not possible to categorically rule out the potential for this species to be present. It is also noted that the flora survey conducted in by Bennett (2001) did not locate this species.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology** Bennett, 2001.  
DoIR, 2007a.  
Western Australian Herbarium, 1998-2007.  
GIS database: Declared Rare and Priority Flora List - CALM 01/07/05

**(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.**

**Comments Proposal may be at variance to this Principle**

One of the two vegetation communities mapped by Bennett (2001) as occurring within the application area matched Floristic Community Type (FCT) 26a, *Melaleuca huegelii* - *M. systema* shrublands on limestone ridges (Gibson et al, 1994). FCT 26a is listed by the Department of Environment and Conservation as Threatened Ecological Community (TEC) SCP 26a and has an Endangered status (DEC, 2006). While it is not is not Critically Endangered it is facing a very high risk of total destruction in the near future (DEC, 2007a). DEC (2007a) states that the current distribution of this TEC is limited and while there may be many occurrences, the total area covered by this TEC is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

The site visit survey undertaken by DoIR Native Vegetation Assessors on the 7 November 2007 confirmed that the vegetation of this community within the application area was in a highly degraded condition (DoIR, 2007a). The site visit enabled further examination of this community, and recorded a small patch of *Melaleuca huegelii* (Chenille Honey myrtle) over a herbland of weeds in brownish yellow sand with limestone outcropping in the middle of Area 2. A number of isolated individuals of *M. huegelii* were the only plants remaining which indicated that this community may have historically been SCP 26a. A number of these were dead or dying, and it was noted that there is no recruitment of this species.

The southern half of the application area occurs within a TEC buffer zone for Threatened Ecological Community SCP 26a. The TEC is located outside of the application area and will not be cleared as it is conserved in the buffer of at least 30 metres of native vegetation which separates the southern boundary of the application area from Anketell Road.

Discussion with the Environmental Scientist from Alcoa's Kwinana Refinery during the site visit survey and in

subsequent communications included Alcoa's management of TEC SCP 26a immediately south of the application area (DoIR, 2007a; Nick Brockman 2007, pers comm. 8 November):

- Alcoa have a management plan which is updated on an annual basis for the buffer vegetation and the TEC (Alcoa, 2007b). This includes proposed weed control, replanting using tubestock and seed collection.
- Alcoa have noted that there is limited seedling recruitment or success within the TEC, and this has been attributed to grazing by rabbits. Alcoa has conducted some planting of seedlings within the TEC and is considering installation of a rabbit proof fence around the TEC.

Biodiversity advice was sought from the DEC with regard to the proposed clearing within the TEC buffer zone. The DEC (2007b) advised that:

- The TEC was mapped by the Consultant (Bennett, 2001) as SCP 26a, and Alcoa were very keen to rehabilitate it at the time. This is not a particularly good example of this community type and was not in very good condition when DEC (then the Department of Conservation and Land Management) surveyed it with Alcoa staff in March 2004. It did contain some of the species representative of the Limestone ridge 26a type, but it is not possible to completely clarify floristic communities present in degraded areas.
- DEC consider that the proposed clearing "may be at variance" to principle (d) and are not overly concerned about the clearing in the buffer, given the general poor condition of the site, and that hydrology seems unlikely to be impacted.
- DEC would like to see conditions on the permit (should it be granted) for monitoring, and rehabilitation of the area mapped as TEC, especially weed control.
- DEC recommend that an offset condition for the rehabilitation of the TEC on ALCOA land be placed on the permit, should it be granted.

Alcoa have responded to this advice in a letter (Lance Whitewood 2007, pers. comm., 28 November), stating that:

- Alcoa recognises that the TEC in the area between the Kwinana Residue Area Access Road and Anketell Road should be managed to minimise direct and indirect impacts. Alcoa is prepared to commit to the development and implementation of a management plan for this area including weed control, additional planning and protection from grazing.

Based on the above, the proposed clearing may be at variance to this Principle.

**Methodology** Alcoa (2007).  
DEC (2006).  
DEC (2007a).  
DEC (2007b).  
DoIR (2007a).  
Bennett Environmental (2001).

**(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.**

**Comments Proposal may be at variance to this Principle**

The National Objectives and Targets for Biodiversity Conservation 2001-2005 (Commonwealth of Australia 2001) recognise that the retention of 30 per cent or more of the pre-clearing extent of each ecological community is necessary if Australia's biological diversity is to be protected. This is the threshold level, below which species loss appears to accelerate exponentially and loss below this level should not be permitted. This level of recognition is in keeping with the targets recommended in the review of the National Strategy for the Conservation of Australia's Biological Diversity (ANZECC 2000) and in the EPA's Position Statement No 2 on environmental protection of native vegetation in Western Australia (EPA 2000).

The level of 30% representation does not consider the effect of habitat fragmentation and isolation. Studies have shown that larger areas of native vegetation support more species than smaller areas (e.g. Kitchener et al., 1980a, 1980b & 1982), and that smaller areas are more vulnerable to edge effects and other disturbances. Habitat fragmentation acts to reduce the area of available habitat. Representation levels may need to be increased considerably above 30% in already fragmented landscapes in order to maintain biodiversity.

In extensively cleared landscapes the task of mapping and classifying the extent of woody vegetation remaining becomes increasingly more complex as areas of native vegetation become smaller and more fragmented, and the quality of the vegetation more variable. Thus in fragmented landscapes the estimates of remaining native vegetation are less reliable. In these areas mapping is likely to incorporate aggregations of trees and degraded native vegetation with limited understorey component, as well as intact native bushland. Moreover there is likely to have been some further reduction in vegetated areas since the information was captured. Therefore the current area of intact native vegetation is likely to be significantly less than the indicated figure. It would therefore be prudent to adopt a target of 40% rather than 30% as being cause for concern and further investigation.

EPA Guidance Statement No 10 (2006), 'Level of assessment for proposals affecting natural areas within the System 6 Region and Swan Coastal Plain portion of the System 1 region', includes criteria for the identification of regionally significant natural areas in the System6/part System 1 region (outside the Bush Forever study

area). The criteria include representation of ecological communities, diversity, rarity, maintaining ecological processes or natural systems, scientific or evolutionary importance and general criteria for protection of wetland, streamline, and estuarine fringing vegetation and coastal vegetation. In applying the criteria, individual area attributes are considered including size and shape, vegetation condition and uplands and wetlands.

The following table provides details regarding the original, remaining and protected extents of vegetation on the Swan Coastal Plain and in the IBRA subregion of Perth. Specifically, the table illustrates that the Karrakatta Complex - Central and South has a Vulnerable conservation status on the Swan Coastal Plain and is poorly reserved. Both this and the Cottesloe Complex - Central and South have less than 40% of their original extent remaining, and on the Swan Coastal Plain, where the landscape has been significantly fragmented by many competing land uses, this value is a more prudent target to adopt in order to maintain biodiversity values. Both complexes are more protected within the Town of Kwinana than they are on the wider Swan Coastal Plain IBRA sub-region.

	Pre-European area (ha)	Current extent (ha)	Remaining %	Conservation Status**	% of Pre-European extent protected in IUCN Class I-IV Reserves or other (and % of current veg extent)
IBRA Bioregion - Swan Coastal Plain*	1,511,812	575,132	38	Depleted	10 (24)
IBRA Subregion - Perth*	1,128,538	464,223	41	Depleted	11 (24)
Local Government - Town of Kwinana^^	11,983	4,643	39	Depleted	17 (43)
Hedde veg complex - Swan Coastal Plain^					
Cottesloe Complex - Central & South	44,995	18,474	41	Depleted	8.7 (21)
Karrakatta Complex - Central & South	49,912	14,729	29	Vulnerable	2.4 (9)
Hedde veg complex - Town of Kwinana^^					
Cottesloe Complex - Central & South	3,790	1,412	37.3	Depleted	22 (59)
Karrakatta Complex - Central & South	1,634	538	32.9	Depleted	15 (45)

\* Shepherd et al. (2001) updated 2005

\*\* Department of Natural Resources and Environment (2002)

^ Hedde et al (1980)

^^ Town of Kwinana (2007)

The Draft 'A Future for Kwinana's Natural Areas' released by the Town of Kwinana in May 2007 represents the first stage in the development and implementation of a Local Biodiversity Strategy. The aim of this Strategy is to provide long-term protection for a proportion of Local Natural Areas which have no current protection, with preference being given to those that have the highest environmental value wherever possible. It states that "under EPA policy the Karrakatta Central and South Complex is recognised as a regionally significant vegetation complex (Environmental Protection Authority 2006). The policy indicates that efforts should be made to protect the larger occurrences of this complex at the local level, such as through Local Structure Planning. Only 8% (or 2590 of 34,532 hectares) of this vegetation complex has been protected within the Perth Metropolitan Region, and it is therefore considered regionally rare and under-protected at the regional level (EPA, 2006; Del Marco et al 2004)" (p35-36). At the local level, 15% (or 241 of the original 1634 hectares) of the Town's original extent of this vegetation complex has been protected. The Town's preferred protection target for this complex is 18% and presents a strategy for achieving this protection. It states one constraint being that "68 ha (42ha being Rural A zoning and 26 ha Rural B zoning) most of which is within ALCOA's residue disposal areas, and approved for clearing. A 70m buffer of native vegetation will be retained around the disposal sites" (p36). The north eastern quadrant of the application area is mapped as Karrakatta Central and South Complex, however, none of this vegetation appears to be remaining within this area as it has been cleared for the limestone quarry, or horticultural and associated residential purposes.

Twenty two percent of the original extent of the Cottesloe Central and South Complex in the Town is currently reserved, but the preferred protection target for this complex is 26%. In its strategy for achievement of this target, the Town of Kwinana stated that the high target would be to protect all of the 10 ha of vegetation within Alcoa's residue buffer. The Town of Kwinana made a direct interest submission in regard to protection of this buffer vegetation (Andrew Trosic 2007, pers. comm., 5 October):

"As part of approval of the extractive industry (and as a precursor to the eventual storage of residue on the land), the following two conditions were imposed and are relevant to the clearing permit:

1.5 Extraction on the subject land only to occur within the extent of the future residue disposal operations and in any case no closer than 50m to either the southern or western boundaries of the subject land, to the satisfaction

of the Town of Kwinana. Such and extent of future residue disposal operations should be consistent with the adopted Long Term Residue Management Strategy.

1.11 The southern and western portions of the subject land outside the extent of future residue operations (being not less than 50m from the lot boundaries), being planted with screen vegetation to the satisfaction of the Town of Kwinana. Screen vegetation to be of local indigenous species. Accordingly, the Town of Kwinana does not support clearing of vegetation within 50 m of either the southern or western boundaries of the subject land. This should require modification to the clearing permit to exclude all vegetation within 50 m of the western boundary."

It should be noted that the southern vegetation buffer referred to in the Town of Kwinana's direct interest submission is located immediately south and outside of the application area, and as such, is not proposed to be cleared under this application.

Based on the above, the proposed clearing may be at variance to this Principle.

**Methodology** ANZECC (2000).  
Commonwealth of Australia (2001).  
Del Marco et al (2004).  
Department of Natural Resources and Environment (2002).  
EPA (2000).  
EPA (2006).  
Heddle et al (1980).  
Kitchener et al (1980a).  
Kitchener et al (1980b).  
Kitchener et al (1982).  
Sheperd et al (2001).  
Town of Kwinana (2007).

**(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.**

**Comments Proposal is not at variance to this Principle**

There are no watercourses or wetlands present within the application area (GIS Databases; DoIR, 2007a; DoIR, 2007b).

Based on the above, the proposed clearing is not at variance to this Principle.

**Methodology** DoIR (2007a).  
DoIR (2007b).  
GIS Databases:  
Hydrography, linear (hierarchy) - DOW  
Hydrography, linear - DOE 1/2/04  
Wild Rivers - DOW  
Geomorphic Wetlands (Classification), Swan Coastal Plain - DEC  
ANCA, Wetlands - CALM 08/01\_1  
Geodata, Lakes - GA 28/06/02

**(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.**

**Comments Proposal is not likely to be at variance to this Principle**

The application area is within the Spearwood Dune System, which consist of a core of limestone overlain by yellow sand (Churchward & McArthur, 1980). There has been differential wind erosion in the Spearwood Dunes, and this has produced two distinctly different landscapes. Both are mapped within the application area, with a majority being the Cottesloe unit, consisting of shallow yellow brown sands and exposed limestone. The Karrakatta unit, which is mapped in the north eastern corner of the application area, has deep yellow brown sands.

There is a high risk of wind erosion on the Spearwood Dune system (State of Western Australia, 2005) following clearing of native vegetation on this site. The high erosion potential is due to the sandy nature of the topsoil and without appropriate ground cover, windbreaks or adequate dust suppression on exposed surfaces the proposal would be likely to cause land degradation. However, the risks of physical land degradation resulting from vegetation clearing are low as the site will be developed into a residue storage facility.

Based on the above, the proposed clearing is not likely to be at variance to this principle.

**Methodology** Churchward & McArthur (1980)  
State of Western Australia (2005)



**(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.**

**Comments Proposal may be at variance to this Principle**

The area under application is located approximately;

- 2 km north east of Bush Forever Site 349;
- 1.8 km south west of Bush Forever Site 267;
- 2.5 km south east of Bush Forever Site 349; and
- 1.5 km to the west of Bush Forever Sites 268 and 269 (Government of Western Australia 2000; GIS Database).

Given this distance and the degraded condition of the vegetation under application, the proposed clearing is not considered likely to impact any nearby conservation areas.

Despite the degraded nature of the vegetation communities within the application area, the well established Tuart populations in the western (Area 3) and southern belts (Area 1) of vegetation are considered to provide some value in terms of an ecological linkage between surrounding conservation reserves for avian fauna .

Based on the above, the proposed clearing may be at variance to this Principle.

**Methodology** Government of Western Australia (2000)  
GIS Database: Bushforever - MFP 07/01

**(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.**

**Comments Proposal is not likely to be at variance to this Principle**

Prior to commencement of limestone quarrying in the application area, the centre of the site would have been a low hilltop, with a height of approximately 40m above sea level (aSL) (GIS Database). The quarrying has effectively levelled the hill, and the remaining natural ground slopes down away from the quarry. Soils at the site consist of sand over limestone and as such, are well drained.

The application area is found within Cockburn groundwater area, which covers a total area of 15,743 ha (GIS database). Groundwater depths have been determined by reviewing borelogs from WIN Groundwater Sites (GIS database). A bore drilled along the western boundary of the site in 1983 measured groundwater at 9.75m below ground level (bGL), while another drilled in 1973 at what is now the cattery north east of the application area measured groundwater at 11.7m (bGL).

Groundwater salinity of superficial aquifers is between 250 and 1000 mg/L Total Dissolved Solids (GIS database). The confined Leederville Aquifer has a groundwater salinity of 1000 to 1,500 mg/L TDS, while the underlying Yarragadee Aquifer has a groundwater salinity of 1,500 to 3,000 mg/L TDS (GIS database).

The acid sulphate soil risk mapping on the Swan Coastal Plain (GIS database) indicates that there is no known risk of acid sulphate soils in the application area.

The closest wetland is 270 m to the west of the application area. This is classified as a resource enhancement dampland (GIS database), and is less than 5m ASL (GIS database). It is located within farmland which has been cleared in the majority, with the wetland itself being partially cleared (GIS database). The nearest watercourse is the Peel Main Drain located approximately 2.4km to the east.

Due to the well drained nature of the soils and the location of the application area within the landscape, it is not likely that the clearing will affect the quality of the surface or underground water, the depth of the water tables or water regimes of groundwater dependent ecosystems.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology** GIS databases:  
RIWI Act, Groundwater Areas - DOW  
WIN Groundwater Sites, Other - non DoW  
Groundwater Salinity, Superficial Aquifers  
Groundwater Salinity, Confined Aquifers  
Acid Sulfate Soil Risk Map, Swan Coastal Plain - DEC

**(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.**

**Comments Proposal is not likely to be at variance to this Principle**

Prior to commencement of limestone quarrying in the application area, the centre of the site would have been a low hilltop, with a height of approximately 40m ASL (GIS Database). The quarrying has effectively levelled the hill, and the remaining natural ground slopes down away from the quarry. Soils at the site consist of sand over limestone and as such, are well drained.

The closest wetland is 270 m to the west of the application area. This is classified as a resource enhancement dampland (GIS database), and is less than 5m ASL (GIS database). It is located within farmland which has been cleared in the majority, with the wetland itself being partially cleared (GIS database). The nearest watercourse is the Peel Main Drain located approximately 2.4km to the east.

The application area is found within Cockburn groundwater area, which covers a total area of 15,743 ha (GIS database). Groundwater depths have been determined by reviewing borelogs from WIN Groundwater Sites (GIS database). A bore drilled along the western boundary of the site in 1983 measured groundwater at 9.75m bGL, while another drilled in 1973 at what is now the cattery north east of the application area measured groundwater at 11.7m bGL. Groundwater levels in the superficial aquifers within the Perth Metropolitan area have been declining due to the drying climate that Perth has experienced over the last 30 years, and increased abstraction from domestic, commercial, industrial and public bores.

The vegetation to be cleared is in a degraded to very degraded condition (DoIR, 2007a). Each of the 4 Areas into which the application area has been divided and the risk the clearing presents to the groundwater are summarised below:

\* The vegetation to be cleared consists in the majority (10ha) of Recolonising *Acacia rostellifera* (Summer-scented Wattle) shrubland over a herbland of weeds in the limestone quarry (Area 2). It is not likely that this vegetation interacts with the groundwater table considering the depth to groundwater.

\* The Woodland of Tuarts, Jarrahs and Bull Banksias in Area 1 at the south of the application area will be cleared in its entirety (3.9ha). It is likely that the tree species present in this vegetation interact with the groundwater table.

\* Alcoa have stated that Area 3 which also supports similar woodland will only be cleared for the purposes of installation of a perimeter security fence and groundwater monitoring bores. The fence will require removal of a few small trees and branch trimming, while Alcoa will endeavour where possible to install groundwater monitoring bores in areas devoid of native species and avoid native vegetation during the installation process (DoIR, 2007a). These management measures will ensure that removal of vegetation which interacts with the groundwater in this area will be minimal.

\* Area 2 consists of Planted vegetation with some native species and will be cleared in its entirety (2.2ha). Native trees within this area which possibly interact with the groundwater table are Tuarts, and *Banksia attenuata* trees.

Due to the distance of the application area to the nearest watercourse and wetland, the size of Cockburn Groundwater Area relative to the application area, the declining nature of groundwater levels in the superficial aquifers in the Perth Metropolitan Area, the permeability of the soils and the limited clearing of vegetation which interacts with groundwater within the application area, it is not considered likely that the proposed clearing would cause or exacerbate the incidence of flooding.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology** GIS Databases:  
RIWI Act, Groundwater Areas - DOW  
Geomorphic Wetlands (Classification), Swan Coastal Plain - DEC  
Swan Coastal Plain Central 20cm Orthomosaic - DLI06  
Topographic Contours, Statewide - DOLA 12/09/02  
WIN Groundwater Sites, Other - non DoW  
Hydrography, linear (hierarchy) - DOW

### **Planning instrument, Native Title, Previous EPA decision or other matter.**

#### **Comments**

The clearing permit application was advertised by DoIR, inviting submissions from the public and direct interest parties. Two direct interest submissions were received:

1. The Town of Kwinana made an electronic submission on 5 October 2007, stating that "the Town of Kwinana has already approved an extractive industry on the subject land, and is in the process of amending its Town Planning Scheme to permit residue disposal operations to occur on the subject land consistent with the adopted Long Term Residue Management Strategy. As part of approval of the extractive industry (and as a precursor to the eventual storage of residue on the land), the following two conditions were imposed and are relevant to the clearing permit:

1.5 Extraction on the subject land only to occur within the extent of the future residue disposal operations, and in any case no closer than 50m to either the southern or western boundaries of the subject land, to the satisfaction of the Town of Kwinana. Such extent of future residue disposal operations to be consistent with the adopted Long Term Residue Management Strategy.

1.11 The southern and western portions of the subject land outside the extent of future residue operations (being not less than 50m from the lot boundaries), being planted with screen vegetation to the satisfaction of the Town of Kwinana. Screen vegetation to be of local indigenous species. Accordingly, the Town of Kwinana does not support clearing of vegetation within 50m of either the southern or western boundaries of the subject land. This should require modification to the clearing permit to exclude all vegetation within 50m of the western boundary."

2. The South West Aboriginal Land and Sea Council made a submission dated 18 October 2007 stating, 'There is particular concern that Aboriginal heritage issues may not have been addressed and that any Aboriginal sites or areas of significance may be adversely affected if the proposed permit is issued without a heritage survey first being conducted. Had a heritage survey been conducted, it would be appreciated if a copy of the survey report can be forwarded to this office. This will then be presented at the Gnaala Karla Booja (Region 3) working party meeting for consideration. We should then be in a position to provide a further response and comments in this regard. Kindly take note that the Native Title Parties may request that Aboriginal monitors must be present during the clearing process.'

Alison White emailed Kiera Foster attaching a letter from the EPA to the Town of Kwinana, dated 6 March 2007 regarding referral of the scheme amendment titled 'Town of Kwinana TPS 2 Amendment 89 rezoning from Rural A to Rural B'. This scheme amendment relates specifically to rezoning of land coinciding with Area N of the Long Term Residue Management Strategy. The EPA advised that it 'considers the proposed scheme amendment should not be assessed under Part IV Division 3 of the Environmental Protection Act 1986 but provides the following advice and recommendations.' Advice and recommendations relevant to this clearing permit have been extracted from the letter and are: 'The Department of Environment and Conservation's database and the submitted scheme report note that a Threatened Ecological Community is identified on the south of the subject land near Anketell Road. It is noted that this area will be protected within a 30 metre buffer to the residue area.'

There is one native title claim over the area under application. This claim (WC98/058) has been registered with the National Native Title Tribunal on behalf of the claimant groups (GIS Database). However, the land under the application (Lot 100 on Plan 23015) is privately owned by Alcoa of Australia, and as such, Native Title has been extinguished under the Native Title Act 1993. Therefore the clearing is considered to be a secondary approval and not a future act under the Native Title Act 1993.

There are no registered Sites of Aboriginal Significance within the area applied to clear (GIS database). It is the proponent's responsibility to comply with the Aboriginal Heritage Act 1972 and ensure that no Sites of Aboriginal Significance are damaged through the clearing process.

**Methodology** GIS Databases:

- Aboriginal Sites of Significance - DIA 04/07/02.
- Native Title Claims - DLI 19/12/04.

#### 4. Assessor's comments

Purpose	Method	Applied area (ha)	Comment
Mineral Production	Mechanical Removal	19.1	The proposal has been assessed against the Clearing Principles and the proposal has been found it is not at variance to Principle (f), may be at variance to Principles (b), (d), (e), and (h) and is not likely to be at variance to Principles (a), (c), (g), (j) and (i).

It is recommended that should a permit be granted, conditions be endorsed on the permit with regards to management of the adjacent TEC to the south of the area, Tuart trees, habitat trees, and weeds.

#### 5. References

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## 6. Glossary

### Acronyms:

<b>BoM</b>	Bureau of Meteorology, Australian Government.
<b>CALM</b>	Department of Conservation and Land Management, Western Australia.
<b>DAFWA</b>	Department of Agriculture and Food, Western Australia.
<b>DA</b>	Department of Agriculture, Western Australia.
<b>DEC</b>	Department of Environment and Conservation
<b>DEH</b>	Department of Environment and Heritage (federal based in Canberra) previously Environment Australia
<b>DEP</b>	Department of Environment Protection (now DoE), Western Australia.
<b>DIA</b>	Department of Indigenous Affairs
<b>DLI</b>	Department of Land Information, Western Australia.
<b>DoE</b>	Department of Environment, Western Australia.
<b>DoIR</b>	Department of Industry and Resources, Western Australia.
<b>DOLA</b>	Department of Land Administration, Western Australia.
<b>DoW</b>	Department of Water
<b>EP Act</b>	Environment Protection Act 1986, Western Australia.
<b>EPBC Act</b>	Environment Protection and Biodiversity Conservation Act 1999 (Federal Act)
<b>GIS</b>	Geographical Information System.
<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>RIWI</b>	Rights in Water and Irrigation Act 1914, Western Australia.
<b>s.17</b>	Section 17 of the Environment Protection Act 1986, Western Australia.

TECs Threatened Ecological Communities.

### **Definitions:**

{Atkins, K (2005). *Declared rare and priority flora list for Western Australia, 22 February 2005*. Department of Conservation and Land Management, Como, Western Australia} :-

- P1 Priority One - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P2 Priority Two - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P3 Priority Three - Poorly Known taxa:** taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.
- P4 Priority Four – Rare taxa:** taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.
- R Declared Rare Flora – Extant taxa (= Threatened Flora = Endangered + Vulnerable):** taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.
- X Declared Rare Flora - Presumed Extinct taxa:** taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

{Wildlife Conservation (Specially Protected Fauna) Notice 2005} [Wildlife Conservation Act 1950] :-

- Schedule 1 Schedule 1 – Fauna that is rare or likely to become extinct:** being fauna that is rare or likely to become extinct, are declared to be fauna that is need of special protection.
- Schedule 2 Schedule 2 – Fauna that is presumed to be extinct:** being fauna that is presumed to be extinct, are declared to be fauna that is need of special protection.
- Schedule 3 Schedule 3 – Birds protected under an international agreement:** being birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be fauna that is need of special protection.
- Schedule 4 Schedule 4 – Other specially protected fauna:** being fauna that is declared to be fauna that is in need of special protection, otherwise than for the reasons mentioned in Schedules 1, 2 or 3.

{CALM (2005). *Priority Codes for Fauna*. Department of Conservation and Land Management, Como, Western Australia} :-

- P1 Priority One: Taxa with few, poorly known populations on threatened lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P2 Priority Two: Taxa with few, poorly known populations on conservation lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P3 Priority Three: Taxa with several, poorly known populations, some on conservation lands:** Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P4 Priority Four: Taxa in need of monitoring:** Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
- P5 Priority Five: Taxa in need of monitoring:** Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

**Categories of threatened species (*Environment Protection and Biodiversity Conservation Act 1999*)**

- EX**            **Extinct:** A native species for which there is no reasonable doubt that the last member of the species has died.
- EX(W)**       **Extinct in the wild:** A native species which:  
(a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or  
(b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
- CR**            **Critically Endangered:** A native species which is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
- EN**            **Endangered:** A native species which:  
(a) is not critically endangered; and  
(b) is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
- VU**            **Vulnerable:** A native species which:  
(a) is not critically endangered or endangered; and  
(b) is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
- CD**            **Conservation Dependent:** A native species which is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.