



## Kwinana Nickel Refinery

*Eucalyptus gomphocephala*

## (Tuart) TEC Assessment

BHP Nickel West

10 June 2021



## 1. Introduction and Background

BHP Nickel West (Nickel West) operates the Kwinana Nickel Refinery in Kwinana, approximately 45 kilometres (km) south of Perth, Western Australia (**Figure 1**). Nickel West has previously submitted a Native Vegetation Clearing Permit (NVCP) application for an area permit to clear native vegetation to support the construction of two interconnecting Effluent Storage Ponds. The NVCP (CPS 8462) was granted under section 51E of the *Environmental Protection Act 1986* (EP Act) on the 14 June 2019. Nickel West now wish to extend the time frame on the current clearing permit to July 2023.

Following the request to extend the time frame of the current NVCP, Nickel West were requested by the State Department of Water and Environmental Regulation (DWER) to assess the potential occurrence of the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community; a threatened ecological community (TEC), listed in July 2019 as critically endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Biologic Environmental Survey Pty Ltd (Biologic) was commissioned by Nickel West to complete a flora, vegetation and fauna survey of the Kwinana Nickel Refinery to support the original NVCP application in 2019. Biologic described and mapped the occurrence of numerous woodlands dominated by tuart trees, however the TEC community was not formally listed at the time of NVCP submission, so no occurrence assessment was undertaken.

To address the request by DWER, Nickel West commissioned Biologic to undertake a TEC occurrence assessment on the tuart patches located within the Kwinana Nickel Refinery (herein referred to as the study area).

## 2. Methods


The Commonwealth Department of Agriculture, Water and Environment (DAWE) (formerly the Department of the Environment and Energy; DoEE) has released conservation advice to assist with determining the occurrence of the TEC (DoEE, 2019; TSSC, 2019). Biologic reviewed the key diagnostic criteria from DoEE (2019) and TSSC (2019), with the flora and vegetation data collected in 2019 (Biologic, 2019), as well as information collected by the BHP Nickel West onsite environmental officer and a brief site visit by Principal Botanist to determine the occurrence of the TEC within the Kwinana Nickel Refinery.

To assist in the occurrence assessment, four patches of vegetation previously identified by Biologic during the 2019 field survey (Biologic, 2019), were assessed to determine the presence of the TEC (Figure 2). As the NVCP relates to the vegetation located in the north of the refinery boundaries, the brief site visit concentrated on Patch 1 (Figure 2). The site visit was undertaken on the 2<sup>nd</sup> of June 2021 by Principal Botanist Clinton van den Bergh. Clinton also completed the flora, vegetation and fauna assessment in 2019. The occurrence assessment for the remaining three patches was completed utilising floristic information previously collected in 2019 (Biologic, 2019) with no additional field work undertaken.





**Legend**

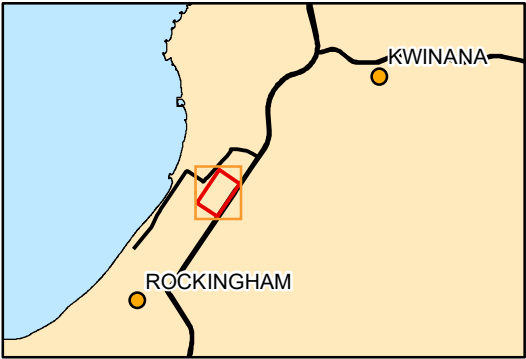
 Study Area

0 100 200 Meters

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Transverse Mercator  
Datum: GDA 1994 Created 31/05/2021



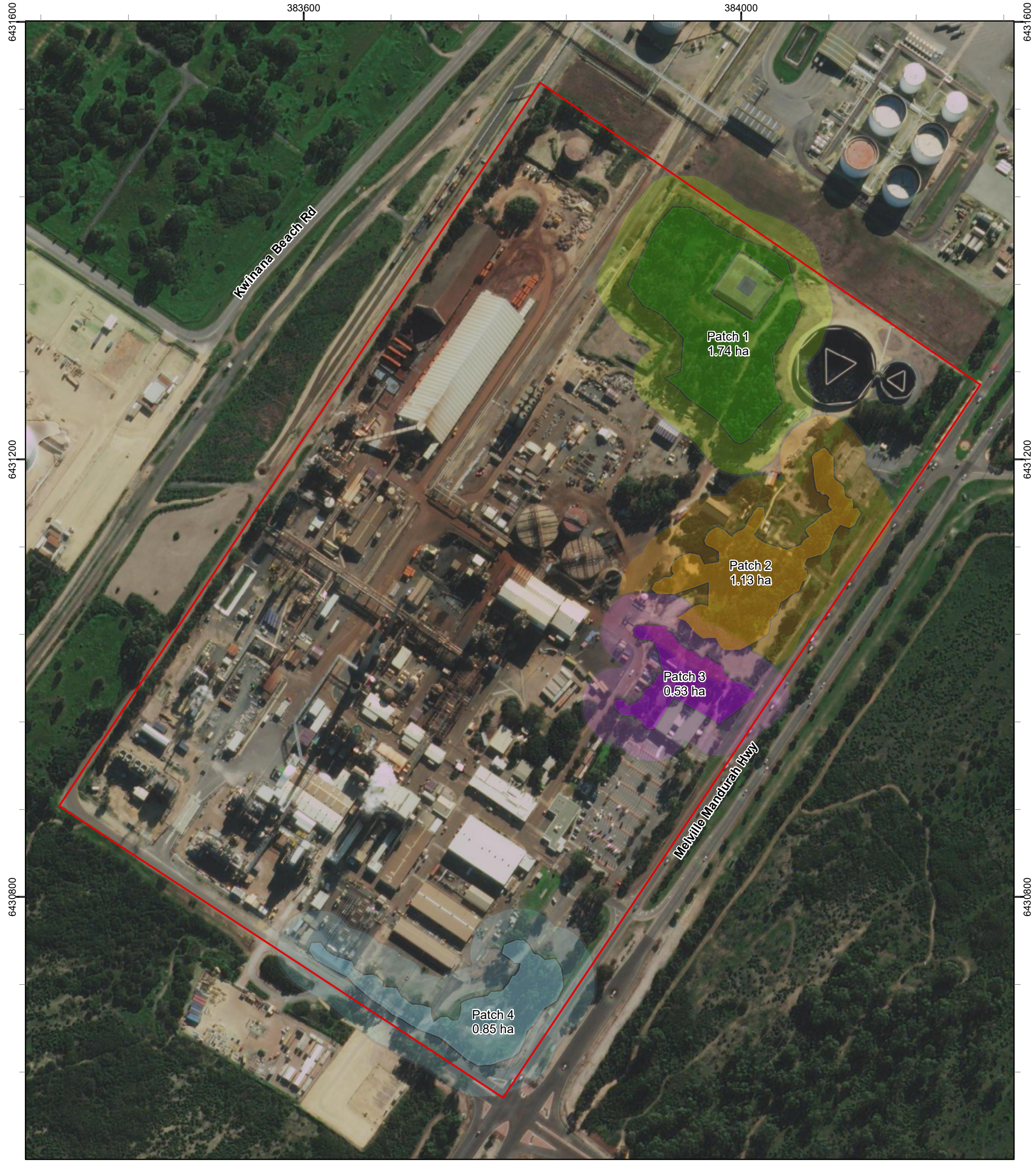
Scale: 1:5,000



**BHP NICKEL WEST**  
**NiW Tuart TEC**  
**Assessment Kwinana**

**Figure 1: Study Area**



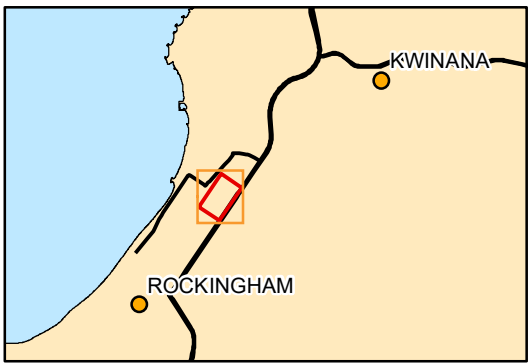


**Legend**

- Study Area
- Tuart Patch with 30 m Buffer
- Patch 1
- Patch 2
- Patch 3
- Patch 4

0 50 100 150 Meters

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Transverse Mercator  
Datum: GDA 1994 Created 31/05/2021



**BHP NICKEL WEST**  
**NiW Tuart TEC**  
**Assessment Kwinana**

**Figure 2: Patch Locations**  
**within Locations**



### 3. Results

The four patches met the initial diagnostic characteristics, including:

- Occurring on the Swan Coastal Plain;
- Occurring on the Quindalup dune system;
- The primary defining feature of the presence of two or more alive tuart trees in the upper most canopy;
- The patches of vegetation supporting a low open woodland to low woodland of tuart trees;
- Native understorey flora present (although in limited density and diversity); and
- The size of the patches are greater than 0.5 hectares (ha), but less than 5 ha.

Of the four patches of tuart assessed to determine occurrence within the refinery boundaries (Figure 2), none met the criteria for inclusion as the TEC. The key reason the patches of vegetation did not meet the criteria was the condition of the patches and the limited native understorey present (Table 1) (Appendix A). The four patches were considered to be in Moderate to Poor condition, while the understorey diversity and density did not meet the criteria for listing as High condition. Furthermore, the size of the patches were limited, with none exceeding 5 hectares (ha) (Table 1) (Appendix A).

**Table 1: TEC requirements and criteria summary within the Study Area (TSSC, 2019).**

Patch ID	Relevant biotic thresholds criteria	Relevant patch size criteria	Discussion and conclusion
Patch 1	<b><u>Moderate condition</u></b> ≥50 % of all understorey vegetation cover is native <b>or</b> At least 4 native understorey species per 0.01 ha.	Patch is 1.74 ha, but 4 ha including the buffer zone.	This patch meets the minimum patch size requirements, however, it met the biotic threshold for moderate condition when considering understorey vegetation cover; and therefore is <b>NOT CONSIDERED PART OF THE TEC</b> . It may be considered a focus for local protection or restoration.
Patch 2	<b><u>Moderate condition</u></b> ≥50 % of all understorey vegetation cover is native <b>or</b> At least 4 native understorey species per 0.01 ha	Patch is 1.13 ha, but 3.4 ha including the buffer zone.	This patch meets the minimum patch size requirements, however, it met the biotic threshold for moderate condition when considering understorey vegetation cover; and therefore is <b>NOT CONSIDERED PART OF THE TEC</b> . It may be considered a focus for local protection or restoration.
Patch 3	<b><u>Poor Condition</u></b> as <50 % of all understorey vegetation cover is native <b>and</b> less than 4 native understorey species per 0.01 ha (10 m x 10 m plot or equivalent sample unit)	Patch is 0.53 ha, but 2.0 ha including the buffer zone.	This patch, just meets the minimum patch size requirements, however, it is considered as poor condition and contains lawn under maintenance so is <b>NOT CONSIDERED PART OF THE TEC</b> . It may be considered a focus for local protection or restoration.
Patch 4	<b><u>Moderate condition</u></b> ≥50 % of all understorey vegetation cover is native <b>or</b> At least 4 native understorey species per 0.01 ha	Patch is 0.85 ha, but 3 ha including the buffer zone	This patch meets the minimum patch size requirements, however, it met the biotic threshold for moderate condition when considering understorey vegetation cover; and therefore is <b>NOT CONSIDERED PART OF THE TEC</b> . It may be considered a focus for local protection or restoration.

The vegetation within Patch 1 (Appendix B) was considered most likely to be considered a TEC prior to the on-ground assessment. This patch is subjected under the clearing permit and although it meets the minimum patch size requirement and contains large trees significant for habitat, the sparse native understorey and subsequent moderate condition grading precludes it from being representative of the TEC (as per DoEE, 2019 and TSSC, 2019 criteria). This site is degraded and consists of old revegetation (20 + years old) and scattered natives. The dominant native understorey taxa located in this patch include *Acacia cyclops*, *Acacia cochlearis*, *Templetonia retusa*, *Acacia saligna* and *Rhagodia baccata*. Some patches of vegetation within Patch 1 do contain a greater than 60% native cover, however, these patches are dominated by one species (i.e., *Rhagodia baccata* was prevalent as an understory species in some areas and absent in others). Additional native understorey species observed within the patch, but in low numbers, included *Hardenbergia comptoniana*, *Ficinia nodosa* and *Clematis linearifolia*. In addition, Bridal creeper (*\*Asparagus asparagoides*), a Weed of National Significance, numbers have increased since the previous survey conducted in 2019. Furthermore, the Weed of National Significance, *\*Tamarix aphylla* (Athel pine), was present within Patch 1. The understorey of Patch 1 was mostly dominated by introduced grasses and herbs, with *\*Ehrharta longiflora* being the most prevalent.

Patch 2 and Patch 4, similar to Patch 1 met the minimum patch size requirements of the TEC and contain large trees significant for habitat, however the sparse native understorey and subsequent moderate condition grading precludes them from being representative of the TEC. Patch 3 met the size requirements for the TEC, however there was evidence of lawn mowing and/or garden maintenance (reticulation) within the understory, which automatically means this cannot be classed as a TEC (TSSC, 2019).

It is therefore considered that none of the vegetation within the study area represents that of the “Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain” conservation significant ecological community. The patches under assessment within the refinery boundaries, although not consistent with the criteria of the “Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain” TEC, could still be considered to have a level of local significance. Very little information and guidance (e.g., conservation advice) exists on the determination of locally significant tuart woodland communities at a state level (as it is a state listed Priority 3 ecological community). However, it still retains many of the significant values outlined in the federal conservation advice (Appendix A). Therefore, these patches in the refinery boundary are considered to have a level of local significance.

#### 4. Conclusion

No patches of vegetation within the Kwinana Nickel Refinery boundary met the criteria for acceptance as the “Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain” TEC. However, the patch located within the bounds of the clearing permit CPS 8462 (Patch 1), and the other patches assessed, still retain many of the significant values outlined in the federal conservation advice. Therefore, these patches are considered to hold a level of local significance and play a role as a refuge and contain large habitat trees, significant to local fauna.

## 5. References

- Biologic. (2019). *Kwinana Nickel Refinery, Flora, Vegetation and Fauna Assessment*. Unpublished report prepared for BHP Billiton Nickel West Pty Ltd:
- DoEE. (2019). *Approved Conservation Advice (incorporating listing advice) for the Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain ecological community*. Canberra: Department of the Environment and Energy. Available from: <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/153-conservation-advice.pdf>. In effect under the EPBC Act from 04-Jul-2019.
- TSSC, Threatened Species Scientific Committee. (2019). *Approved Conservation Advice (incorporating listing advice) for the Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain ecological community*. Canberra: TSSC,, Threatened Species Scientific Committee.

## Appendix A: Tuart Woodland and Forests TEC Patch Criteria Assessment



Key Diagnostic Characteristic/ Threshold		Does it meet the criteria?			
		Patch 1	Patch 2	Patch 3	Patch 4
Step 1 – Diagnostic characteristics					
Location and physical environment	Swan Coastal Plain bioregion	Yes, all patches included in the assessment were within the Swan Coastal Plain bioregion.			
Soils and landform	Spearwood and Quindalup dunes systems (but also Bassendean dunes and Pinjarra Plain and banks of rivers and wetlands).	Yes, all patches in the assessment were in the Quindalup dune system.			
Composition	The presence of at least two living established <i>Eucalyptus gomphocephala</i> (tuart) trees in the uppermost canopy layer, although they may co-occur with trees of other species. There is a gap of no more than 60 m between the outer edges of the canopies of adjacent tuart trees. The tuart trees may occur either as single stemmed trees or as a mallee growth form.	Yes  Multiple Tuart trees present with canopy gap of <60 m.	Yes  At least thirteen Tuart trees within the patch with canopy gap <60 m.	Yes  At least five Tuart trees within the patch with canopy gap <60 m.	Yes  At least six Tuart trees present within the patch with canopy gap <60 m.
Structure	Usually woodland but can be forest, open forest, woodland, open woodland and various mallee forms.	Yes Tuart trees in open woodland vegetation.	Yes Tuart trees in open to scattered woodland vegetation.	Possible Scattered tuart trees.	Yes Scattered top open woodland of tuart trees.
	Other tree species may be present in the canopy or sub-canopy. They commonly include <i>Agonis flexuosa</i> , <i>Banksia grandis</i> , <i>B. attenuata</i> , <i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> , <i>B. menziesii</i> and <i>B. prionotes</i> .	No Next dominant species are <i>Acacia cyclops</i> , <i>Acacia xanthina</i> and <i>Spyridium globulosum</i> .	No <i>Eucalyptus gomphocephala</i> canopy over introduced grasses and herbs.	No <i>Eucalyptus gomphocephala</i> canopy over managed lawn and gardens.	No <i>Eucalyptus gomphocephala</i> canopy is mixed with <i>Eucalyptus camaldulensis</i> , with varying midstory of native shrubs and introduced sedges over introduced grasses and herbs.



Key Diagnostic Characteristic/ Threshold		Does it meet the criteria?			
		Patch 1	Patch 2	Patch 3	Patch 4
	An understorey of native plants is typically present, which may include grasses, herbs and shrubs, although this is often modified by disturbance.	<p>Possible</p> <p>Vegetation was degraded, with native vegetation predominantly mixed with introduced grasses and herbs. Native taxa present was often those more resilient to disturbance (e.g., <i>Acacia cyclops</i> and <i>Acacia cochlearis</i>). <i>Templetonia retusa</i> was located, which is a species found in the Tuart TEC.</p>	<p>Possible</p> <p>Vegetation was completely degraded, with native vegetation predominantly mixed with introduced herbs and grasses.</p>	<p>No</p> <p>Trees were over managed lawn and gardens. No native understorey.</p>	<p>Possible</p> <p>Vegetation was completely degraded, with native vegetation predominantly mixed with introduced herbs and grasses.</p>



Key Diagnostic Characteristic/ Threshold		Does it meet the criteria?			
		Patch 1	Patch 2	Patch 3	Patch 4
<b>Step 2 – Condition thresholds and categories</b>					
<b>Indicative condition measures/thresholds</b>	<p>If the patch is smaller than 0.5 ha it is not part of the nationally protected ecological community. If the patch is at least 0.5 ha and up to 5 ha in size, conduct on ground surveys.</p> <p><b>Biotic thresholds for patches ≥0.5 ha &lt;2 ha:</b>  <b>Very high condition</b>            ≥80 % of all understorey vegetation cover is native <b>or</b> at least 12 native understorey species per 0.01 ha (10m x 10m plot or equivalent). Part of the protected ecological community.</p> <p><b>High condition</b>            ≥60 % of all understorey vegetation cover is native <b>or</b> at least 8 native understorey species per 0.01 ha. <b>AND</b> That have:            an important landscape role (≤100 m to native vegetation)  <b>or</b> have a habitat role (≥2 very large trees per 0.5 ha)  <b>or</b> show regeneration (≥15 seedlings and/or saplings per 0.5 ha). Part of the protected ecological community.</p> <p><b>Moderate condition</b>            ≥50 % of all understorey vegetation cover is native <b>or</b> At least 4 native understorey species per 0.01 ha.            Not part of the protected ecological community (but may be a focus for local protection or restoration)</p> <p><b>Poor condition</b>            Less than 50 % of all understorey vegetation cover is native# and less than 4 native understorey species per 0.01 ha.            Not part of the protected ecological community (but may be a focus for local protection or restoration)</p>	<p>Patch is 1.74 ha, but 4 ha including the buffer zone.</p> <p>The understorey vegetation was degraded and within the patch, condition is considered to be moderate (at least 4 native understorey species present and or ≥50 % of all understorey vegetation cover is native).</p> <p><b>Not part of the protected ecological community</b></p> <p>(but may be a focus for local protection or restoration)</p>	<p>Patch is 1.13 ha, but 3.4 ha including the buffer zone.</p> <p>The understorey vegetation was degraded and within the patch, condition is considered to be moderate (at least 4 native understorey species present and or ≥50 % of all understorey vegetation cover is native).</p> <p><b>Not part of the protected ecological community</b></p> <p>(but may be a focus for local protection or restoration)</p>	<p>Patch is 0.53 ha, but 2.0 ha including the buffer zone.</p> <p>The vegetation was considered as completely degraded and its condition is considered to be poor, as the understory is comprised of introduced herbs and grasses with no native midstory species).</p> <p><b>Not part of the protected ecological community.</b></p> <p>(but may be a focus for local protection or restoration)</p>	<p>Patch is 0.85 ha, but 3 ha including the buffer zone.</p> <p>The understorey vegetation was degraded and within the patch, condition is considered to be moderate (at least 4 native understorey species present and or ≥50 % of all understorey vegetation cover is native).</p> <p><b>Not part of the protected ecological community</b></p> <p>(but may be a focus for local protection or restoration)</p>

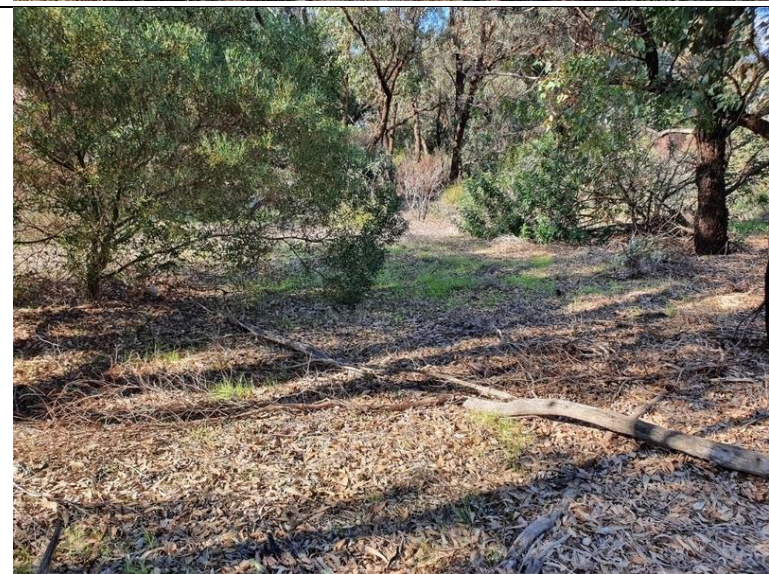


Key Diagnostic Characteristic/ Threshold		Does it meet the criteria?			
		Patch 1	Patch 2	Patch 3	Patch 4
Relevant further considerations					
<b>Relationship with Other Ecological Communities:</b>	<p>The TEC intergrades and/or interacts with other ecological communities of the Swan Coastal Plain, including some listed under the EPBC Act. Most of these are distinct from Tuart Woodlands and Forests, but several have similar characteristics in some occurrences. The TEC intergrades and/or interacts with:</p> <ul style="list-style-type: none"> <li>• Banksia woodlands of the SCP</li> <li>• Sedgelands in Holocene Dune Swales</li> <li>• Aquatic root mat community of caves of the SCP</li> </ul> <p>Contextual factors including disturbance histories (including fire, flooding and grazing), recent rainfall and drought conditions should all be taken into account when identifying areas that are part of the TEC, taking into account that these factors may sometimes temporarily mask good condition states.</p>	Patches did not contain any <i>Banksia</i> species, and none of the survey area met the criteria and had no characteristics of any other federal listed TECs.			
<b>Buffer zone</b>	Surrounding or adjoining native vegetation	To calculate patch size, 30 m buffer zones were used, but these did include the roads and some car parking areas surrounding the patches. The patches themselves however still met the size criteria without the buffers.			
<b>Revegetated Areas</b>	Revegetated sites that meet the key diagnostics and minimum condition thresholds are considered part of the Tuart TEC. Sites outside of the described natural range of Tuart Woodlands and Forests are not part of the TEC.	NA	NA	NA	NA
<b>Gardens</b>	Gardens that meet the key diagnostics and minimum condition thresholds are not considered part of the Tuart TEC.	NA	NA	Not TEC. Mowing and maintenance of lawn evident at patch.	NA
<b>Do patches meet criteria for inclusion as TEC?</b>		<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

## Appendix B: Patch photos



**Representative Photos from Patch 1**





**Representative Photos from Patch 1**

