



## CLEARING PERMIT

*Granted under section 51E of the Environmental Protection Act 1986*

<b>Purpose Permit number:</b>	CPS 7843/1
<b>Permit Holder:</b>	Public Transport Authority of Western Australia
<b>Duration of Permit:</b>	31 August 2018 – 31 August 2029

### ADVICE NOTE

The funds referred to in condition 17 of this Permit are intended for contributing towards the purchase of 35 hectares of native vegetation containing Carnaby's cockatoo habitat and vegetation representative of the Banksia Woodlands of the Swan Coastal Plain ecological community.

The Permit Holder is authorised to clear native vegetation subject to the following conditions of this Permit.

### PART I – CLEARING AUTHORISED

#### 1. Purpose for which clearing may be done

Clearing for the purpose of geotechnical investigations and unexploded ordnance (UXO) surveys.

#### 2. Land on which clearing is to be done

Lot 9603 on Deposited Plan 411703, Alkimos  
Lot 9602 on Deposited Plan 409771, Alkimos  
Lot 9100 on Deposited Plan 406241, Yanchep  
Lot 904 on Deposited Plan 21926, Yanchep  
Lot 9046 on Deposited Plan 412577, Alkimos  
Lot 9043 on Deposited Plan 411744, Alkimos  
Lot 9038 on Deposited Plan 67829, Yanchep  
Lot 9037 on Deposited Plan 54895, Yanchep  
Lot 9032 on Deposited Plan 404822, Yanchep  
Lot 9029 on Deposited Plan 411250, Alkimos  
Lot 9007 on Deposited Plan 410177, Eglinton  
Lot 9004 on Deposited Plan 408512, Yanchep  
Lot 803 on Deposited Plan 404604, Eglinton  
Lot 802 on Deposited Plan 404604, Eglinton  
Lot 801 on Deposited Plan 404604, Eglinton  
Lot 800 on Deposited Plan 404604, Eglinton  
Lot 701 on Deposited Plan 407869, Alkimos  
Lot 6 on Diagram 26989, Carabooda  
Lot 603 on Deposited Plan 58922, Yanchep  
Lot 500 on Deposited Plan 73964, Yanchep  
Lot 5002 on Deposited Plan 74301, Butler  
Lot 5001 on Deposited Plan 411250, Alkimos  
Lot 3000 on Deposited Plan 409080, Eglinton  
Lot 201 on Diagram 75865, Yanchep  
Lot 2001 on Deposited Plan 409771, Alkimos  
Lot 2000 on Deposited Plan 409771, Alkimos  
Lot 1 on Deposited Plan 56558, Eglinton  
Lot 135 on Deposited Plan 69318, Yanchep  
Lot 1339 on Deposited Plan 77093, Alkimos  
Lot 11353 on Diagram 76481, Yanchep

Lot 109 on Deposited Plan 21521, Yanchep  
Lot 105 on Deposited Plan 21520, Yanchep  
Road Reserve (PIN 11878370), Butler  
Road Reserve (PIN 12248171), Butler  
Road Reserve (PIN 12104520), Alkimos  
Road Reserve (PIN 12069148), Alkimos  
Road Reserve (PIN 12080990), Alkimos  
Road Reserve (PIN 12083814), Alkimos  
Road Reserve (PIN 12085579), Alkimos  
Road Reserve (PIN 12167655), Alkimos  
Road Reserve (PIN 12231031), Alkimos  
Road Reserve (PIN 12303982), Alkimos  
Road Reserve (PIN 12292826), Alkimos  
Road Reserve (PIN 11927328), Alkimos  
Road Reserve (PIN 11928405), Yanchep  
Road Reserve (PIN 11928410), Yanchep  
Road Reserve (PIN 11749609), Eglinton  
Road Reserve (PIN 11984277), Yanchep  
Road Reserve (PIN 11660767), Yanchep  
Road Reserve (PIN 11749749), Yanchep  
Road Reserve (PIN 1191916), Two Rocks

**3. Area of Clearing**

The Permit Holder must not clear more than 6.56 hectares of native vegetation within the combined areas cross-hatched yellow on attached Plan 7843/1(a), Plan 7843/1(b), Plan 7843/1(c), Plan 7843/1(d) and Plan 7843/1(e).

**4. Period in which clearing is authorised**

The Permit Holder shall not clear any native vegetation after 31 August 2023.

**5. Application**

This Permit allows the Permit Holder to authorise persons, including employees, contractors and agents of the Permit Holder, to clear native vegetation for the purposes of this Permit subject to compliance with the conditions of this Permit and approval from the Permit Holder.

**6. Type of clearing authorised**

This Permit authorises the Permit Holder to clear native vegetation for the purpose described in condition 1 of this Permit to the extent that the Permit Holder has the power to carry out works involving clearing for that purpose under the *Public Works Act 1902* or any other written law.

**PART II –MANAGEMENT CONDITIONS**

**7. Avoid, minimise and reduce the impacts and extent of clearing**

In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in order of preference:

- (a) avoid the clearing of native vegetation;
- (b) minimise the amount of native vegetation to be cleared; and
- (c) reduce the impact of clearing on any environmental value.

**8. Dieback and weed control**

When undertaking any clearing authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds* and *dieback*:

- (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared; and
- (b) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

**9. Fauna management**

The Permit Holder shall retain all *habitat trees* found within the combined areas cross hatched yellow on attached Plan 7843/1(a), Plan 7843/1(b), Plan 7843/1(c), Plan 7843/1(d) and Plan 7843/1(e).

- 10. Carnaby's cockatoo habitat management**  
The Permit Holder shall not clear more than 5.74 hectares of habitat that is suitable to be utilised for foraging by Carnaby's cockatoo (*Calyptorhynchus latirostris*).
- 11. Threatened Ecological Community management**  
The Permit Holder shall not clear vegetation representative of the '*Melaleuca huegelii* - *Melaleuca systena* shrublands on limestone ridges (Gibson et al. 1994 type 26a)', threatened ecological community.
- 12. Threatened Ecological Community management**  
The Permit Holder shall not clear more than 0.75 hectares of vegetation representative of the 'Banksia woodlands of the Swan Coastal Plain ecological community', threatened ecological community.
- 13. Priority Ecological Community management**  
The Permit Holder shall not clear more than 2.17 hectares of vegetation representative of the 'Northern Spearwood shrublands and woodlands (community type 24)', Priority Ecological Community.
- 14. Priority Ecological Community management**  
The Permit Holder shall not clear more than 0.03 hectares of vegetation representative of the 'Tuart (*Eucalyptus gomphocephala*) woodlands of the Swan Coastal Plain', Priority Ecological Community.
- 15. Priority Ecological Community management**  
The Permit Holder shall not clear more than 1.25 hectares of vegetation representative of the 'Banksia dominated woodlands of the Swan Coastal Plain IBRA region', Priority Ecological Community.
- 16. Bush Forever site management**  
The Permit holder shall not clear more than 0.72 hectares of Bush Forever site 289, known as Ningana Bushland, Yanchep/Eglinton.
- 17. Monetary contributions to a fund maintained for the purpose of establishing or maintaining vegetation (offset)**  
Prior to undertaking any clearing authorised under this Permit, the Permit Holder shall provide documentary evidence to the *CEO* that funding of \$131,950 has been transferred to the Department of Water and Environmental Regulation to purchase land for the purpose of establishing or maintaining native vegetation.
- 18. Retain vegetative material and topsoil, revegetation and rehabilitation**  
The Permit Holder shall:
- (a) Retain the vegetative material and topsoil removed by clearing authorised under this Permit and stockpile the vegetative material and topsoil in an area that has already been cleared.
  - (b) At an optimal time within 12 months following completion of geotechnical investigations and unexploded ordnance surveys, *revegetate* and *rehabilitate* areas not required for future scheduled and approved development, by:
    - (i) ripping the ground on the contour to remove soil compaction; and
    - (ii) laying the vegetative material and topsoil retained under condition 18(a) on the cleared area(s).
  - (c) Within 24 months of laying the vegetative material and topsoil on the cleared area in accordance with condition 18(b) of this Permit:
    - (i) engage an *environmental specialist* to determine the species composition, structure and density of the area *revegetated* and *rehabilitated*; and
    - (ii) where, in the opinion of an *environmental specialist*, the composition structure and density determined under condition 18(c)(i) of this Permit will not result in a similar species composition, structure and density to that of pre-clearing vegetation types in that area, *revegetate* the area by deliberately *planting* and/or *direct seeding* native vegetation that will result in a similar species composition, structure and density of native vegetation to pre-

- clearing vegetation types in that area and ensuring only *local provenance* seeds and propagating material are used.
- (d) Where additional *planting* or *direct seeding* of native vegetation is undertaken in accordance with condition 18(c)(ii) of this Permit, the Permit Holder shall repeat condition 18(c)(i) and 18(c)(ii) within 24 months of undertaking the additional *planting* or *direct seeding* of native vegetation.
  - (e) Where a determination by an *environmental specialist* that the composition, structure and density within areas *revegetated* and *rehabilitated* will result in a similar species composition, structure and density to that of pre-clearing vegetation types in that area, as determined in condition 18(c)(i) and (ii) of this Permit, that determination shall be submitted for the *CEO's* consideration. If the *CEO* does not agree with the determination made under condition 18(c)(ii), the *CEO* may require the Permit Holder to undertake additional *planting* and *direct seeding* in accordance with the requirements under condition 18(c)(ii).

### **PART III - RECORD KEEPING AND REPORTING**

#### **19. Records must be kept**

The Permit Holder must maintain the following records for activities done pursuant to this Permit:

- (a) In relation to the clearing of native vegetation authorised under this Permit:
  - (i) the species composition, structure and density of the cleared area;
  - (ii) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings;
  - (iii) the date that the area was cleared;
  - (iv) the size of the area cleared (in hectares);
  - (v) actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with condition 7 of this Permit; and
  - (vi) actions taken to minimise the risk of the introduction and spread of *dieback* and *weeds* in accordance with condition 8 of this Permit; and
  - (vii) the number and location of habitat trees retained within the application area under condition 9 of this Permit.
- (b) In relation to the revegetation of areas pursuant to condition 18 of this Permit:
  - (i) the location of any area *revegetated* and *rehabilitated* recorded as a *shapefile*;
  - (ii) a description of the *revegetation* and *rehabilitation* activities undertaken;
  - (iii) the size of the area *revegetated* and *rehabilitated* (in hectares);
  - (iv) the date that the area was *revegetated* and *rehabilitated*; and
  - (v) a copy of a report(s), prepared by an *environmental specialist*, detailing the *revegetation* and *rehabilitation* activities undertaken and results for the monitoring of density, diversity, structure and weed cover.

#### **20. Reporting**

- (a) The Permit Holder must provide to the *CEO* on or before 30 June of each year, a written report:
  - (i) of records required under condition 19 of this Permit; and
  - (ii) concerning activities done by the Permit Holder under this Permit between 1 January to 31 December of the preceding calendar year.
- (b) If no clearing authorised under this Permit was undertaken between 1 January to 31 December of the preceding calendar year, a written report confirming that no clearing under this permit has been carried out, must be provided to the *CEO* on or before 30 June of each year.
- (c) Prior to 31 May 2029, the Permit Holder must provide to the *CEO* a written report of records required under condition 19 of this Permit, where these records have not already been provided under condition 20(a) of this Permit.

#### **DEFINITIONS**

The following meanings are given to terms used in this Permit:

***CEO***: means the Chief Executive Officer of the Department responsible for the administration of the clearing provisions under the *Environmental Protection Act 1986*.

***dieback*** means the effect of *Phytophthora* species on native vegetation.

**direct seeding** means a method of re-establishing vegetation through the establishment of a seed bed and the introduction of seeds of the desired Plant species;

**environmental specialist:** means a person who holds a tertiary qualification in environmental science or equivalent, and has experience relevant to the type of environmental advice that an environmental specialist is required to provide under this Permit, or who is approved by the CEO as a suitable environmental specialist;

**habitat tree(s):** means trees that have a diameter, measured at 1.5 metres from the base of the tree, of 500 millimetres or greater;

**mulch** means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

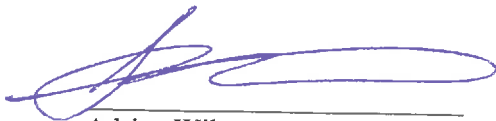
**planting** means the re-establishment of vegetation by creating favourable soil conditions and Planting seedlings of the desired species;

**rehabilitate/ed/ion** means actively managing an area containing native vegetation in order to improve the ecological function of that area;

**revegetate/ed/ion** means the re-establishment of a cover of *local provenance* native vegetation in an area using methods such as natural *regeneration*, *direct seeding* and/or *Planting*, so that the species composition, structure and density is similar to pre-clearing vegetation types in that area;

**weed/s** means any Plant -

- (a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or
- (b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or
- (c) not indigenous to the area concerned.

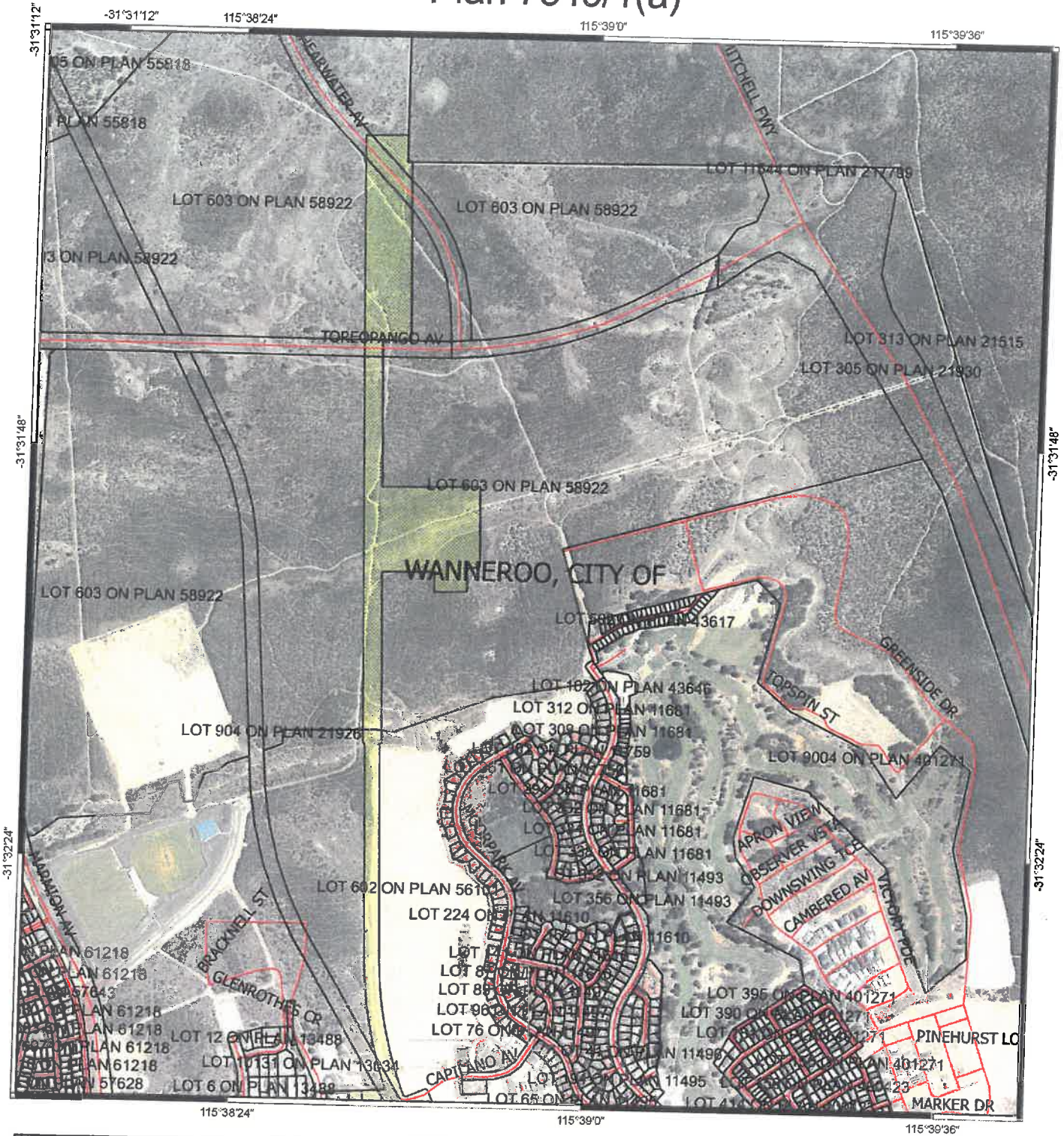


Adrian Wiley  
SENIOR MANAGER  
NATIVE VEGETATION REGULATION

*Officer delegated under Section 20  
of the Environmental Protection Act 1986*

7 August 2018

# Plan 7843/1(a)



## Legend

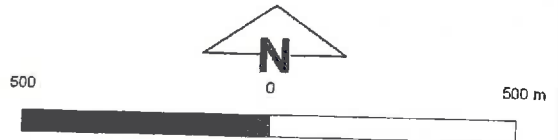
base layers

- Cadastre
- Local Government Authority

— roads

flora (rare, PEC, TEC)

- Areas Approved to Clear
- Virtual Mosaic - WA Now



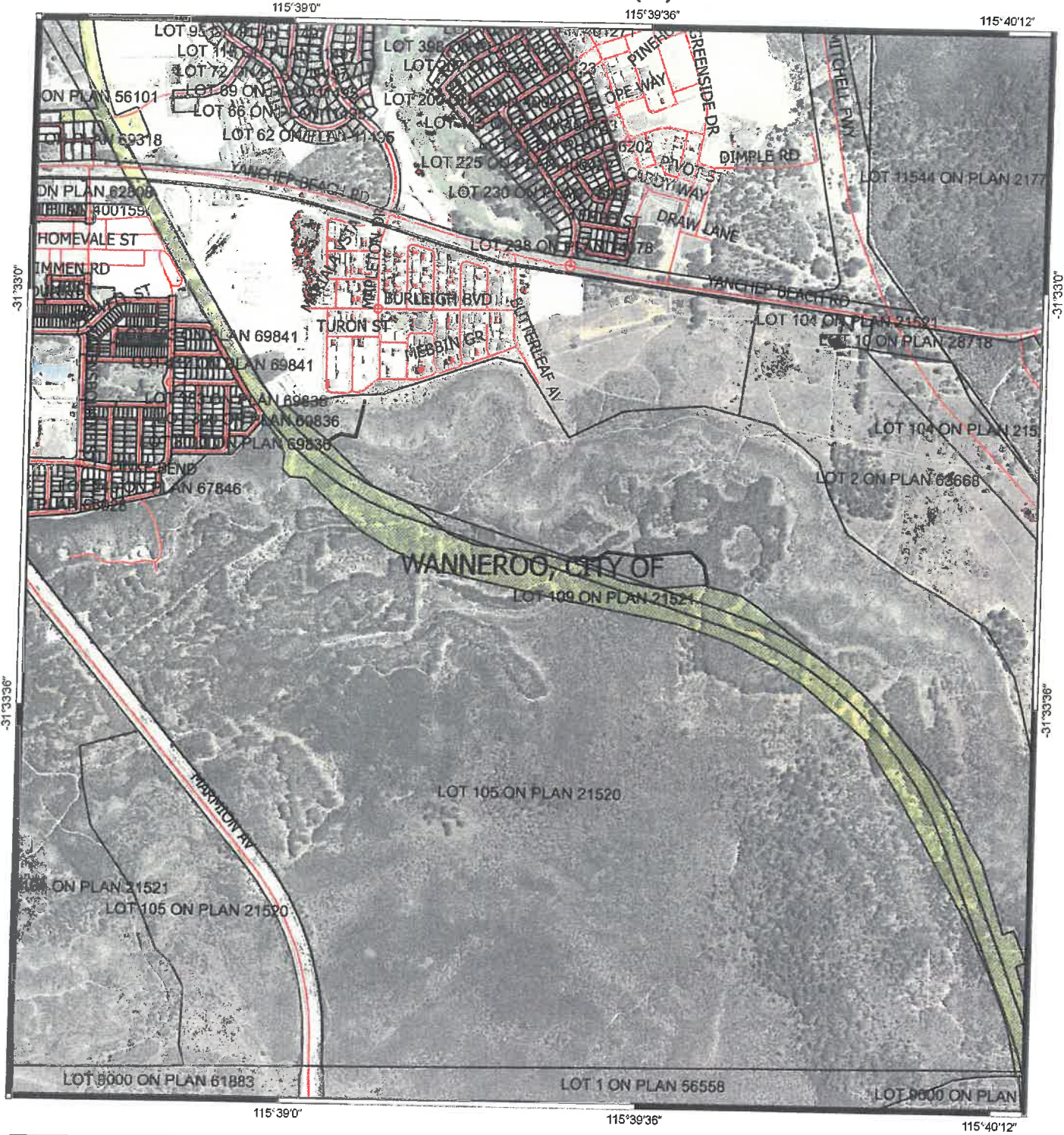
MGA 84  
Geocentric Datum of Australia 1994  
Date: 7/8/18

Officer with delegated authority under Section 20  
of the Environmental Protection Act 1986



GOVERNMENT OF  
WESTERN AUSTRALIA

# Plan 7843/1(b)



## Legend

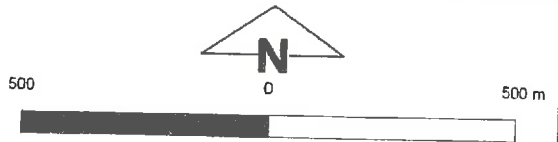
base layers

- Cadastre
- Local Government Authority

— roads

flora (rare, PEC, TEC)

- Areas Approved to Clear
- Virtual Mosaic - WA Now



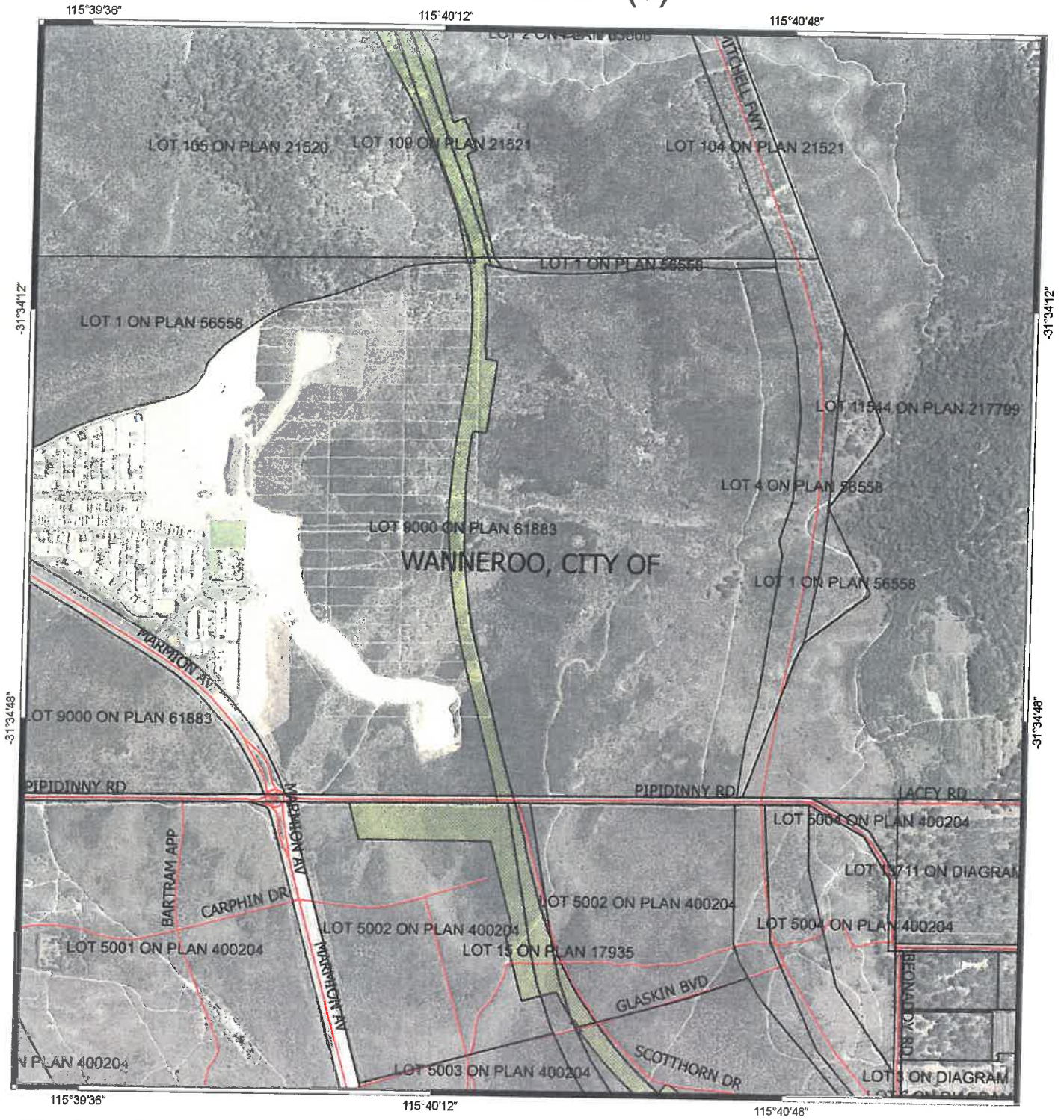
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Geocentric Datum of Australia 1994  
*[Signature]* Date 7/8/18

Officer with delegated authority under Section 20  
of the Environmental Protection Act 1986



GOVERNMENT OF  
WESTERN AUSTRALIA

# Plan 7843/1(c)



## Legend

base layers

Cadastre

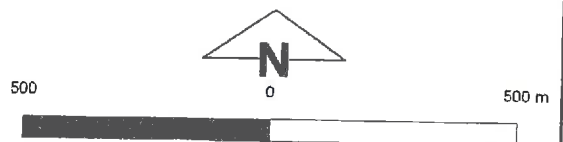
Local Government Authority

roads

flora (rare, PEC, TEC)

Areas Approved to Clear

Virtual Mosaic - WA Now



MGA 94  
Geocentric Datum of Australia 1994  
*[Signature]* Date 7/8/18

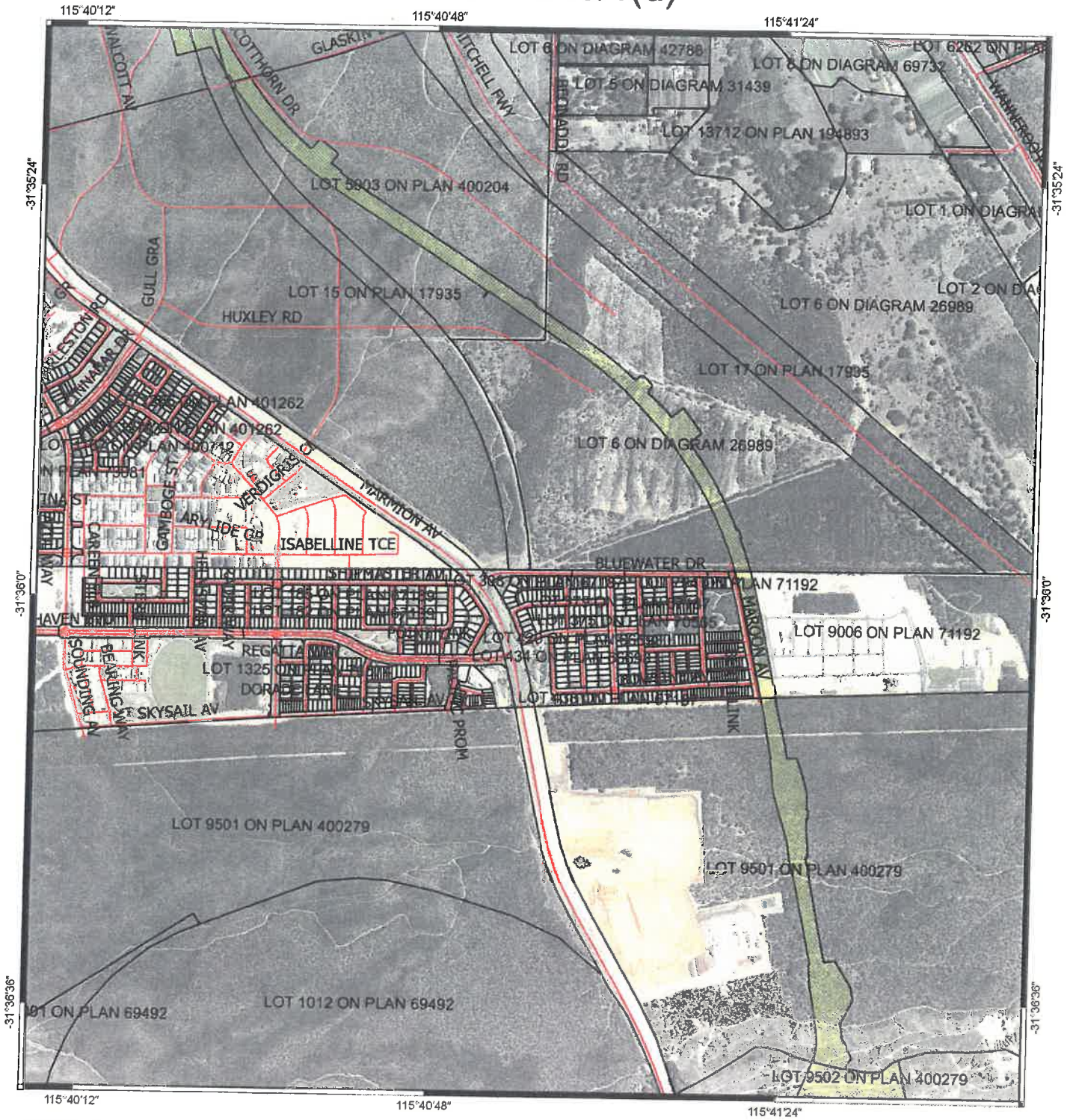
Officer with delegated authority under Section 20  
of the Environmental Protection Act 1986



GOVERNMENT OF  
WESTERN AUSTRALIA



# Plan 7843/1(d)



## Legend

base layers

- Cadastre
- Local Government Authority

— roads

flora (rare, PEC, TEC)

- Areas Approved to Clear
- Virtual Mosaic - WA Now



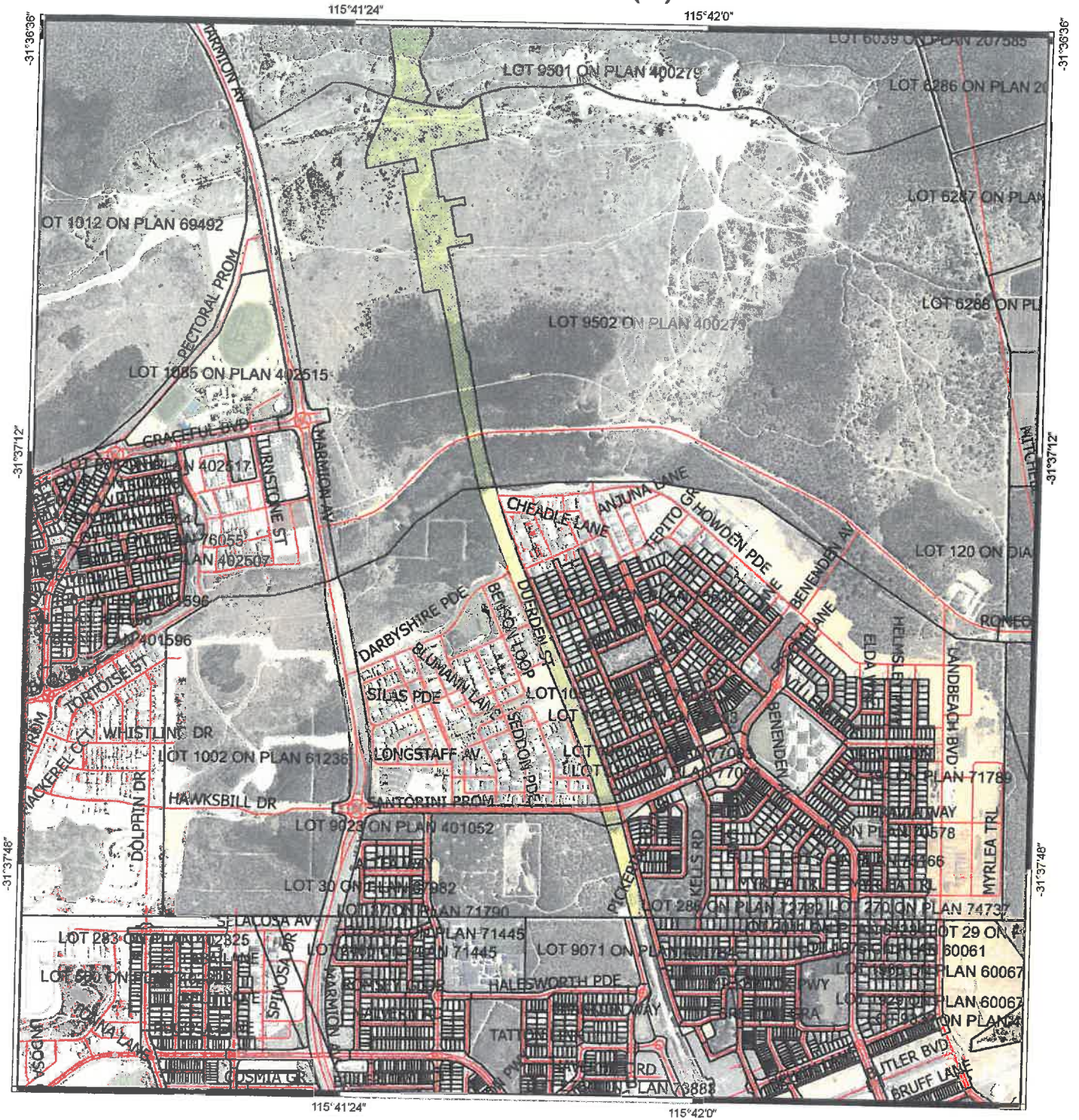
MGA 94  
Geocentric Datum of Australia 1994  
Date 7/9/18

Officer with delegated authority under Section 20  
of the Environmental Protection Act 1986



GOVERNMENT OF  
WESTERN AUSTRALIA

# Plan 7843/1(e)



## Legend

base layers

- Cadastre
- Local Government Authority

— roads

flora (rare, PEC, TEC)

- Areas Approved to Clear
- Virtual Mosaic - WA Now



MGA 94  
Geocentric Datum of Australia 1994

*[Signature]* Date 7/8/18

Officer with delegated authority under Section 20  
of the Environmental Protection Act 1986



GOVERNMENT OF  
WESTERN AUSTRALIA



# Clearing Permit Decision Report

## 1. Application details

### 1.1. Permit application details

Permit application No.: 7843/1  
Permit type: Purpose Permit

### 1.2. Applicant details

Applicant's name: Public Transport Authority  
Application received date: 31 October 2017

### 1.3. Property details

Property:

- Lot 9603 on Plan 411703, Alkimos
- Lot 9602 on Plan 409771, Alkimos
- Lot 9100 on Plan 406241, Yanchep
- Lot 904 on Plan 21926, Yanchep
- Lot 9046 on Plan 412577, Alkimos
- Lot 9043 on Plan 411744, Alkimos
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- Lot 3000 on Plan 409080, Eglinton
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- Lot 2001 on Plan 409771, Alkimos
- Lot 2000 on Plan 409771, Alkimos
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- Road Reserve (PIN 11749609), Eglinton
- Road Reserve (PIN 11984277), Yanchep
- Road Reserve (PIN 11660767), Yanchep
- Road Reserve (PIN 11749749), Yanchep
- Road Reserve (PIN 1191916), Two Rocks

Local Government Authority: City of Wanneroo

### 1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	Purpose category:
6.56		Mechanical Removal	Geotechnical investigations

## 1.5. Decision on application

**Decision on Permit Application:** Grant

**Decision Date:** 7 August 2018

**Reasons for Decision:**

The clearing permit application has been assessed against the clearing principles, planning instruments and other matters in accordance with section 51O of the *Environmental Protection Act 1986* (EP Act). It has been concluded that the proposed clearing is at variance to Principles (a), (b), (d) and (h), and is not likely to be at variance to any of the remaining clearing principles.

During the assessment of the application, the applicant has provided a commitment to minimising the extent of clearing within a Bush Forever site, on a threatened ecological community (TEC) and three priority ecological communities (PEC's), excluding the recorded occurrence of another TEC, excluding suitable habitat for a number of priority flora species and to retaining habitat trees to minimise impacts to Carnaby's cockatoo (*Calyptorhynchus latirostris*) breeding habitat. In order to ensure that these commitments are adhered to, the delegated officer has placed the following conditions on the clearing permit:

- The requirement to retain all habitat trees, which are defined as trees that have a diameter at breast height of greater than 500 millimetres;
- The requirement to clear no more than 0.75 hectares of vegetation that is representative of the Banksia Woodlands of the Swan Coastal Plain ecological community (TEC);
- The requirement to clear no more than 1.25 hectares of the *Banksia* dominated woodlands of the Swan Coastal Plain IBRA region PEC;
- The requirement to clear no more than 0.03 hectares of the Tuart (*Eucalyptus gomphocephala*) woodlands of the Swan Coastal Plain PEC;
- The requirement to clear no more than 2.17 hectares of the Northern Spearwood shrublands and woodlands (community type 24) PEC;
- The requirement to avoid clearing any areas representative of the *Melaleuca huegelii* to *Melaleuca systema* shrublands of limestone ridges TEC; and
- The requirement to clear no more than 0.72 hectares of Bush Forever site 289.

Taking into account the above information, the Delegated Officer determined that the proposed clearing will result in the following significant residual environmental impacts:

- The loss of up to 5.74 hectares of Carnaby's cockatoo foraging habitat;
- The loss of up to 0.72 hectares of vegetation within Bush Forever site 289; and
- The loss of up to 0.75 hectares of the Banksia Woodlands of the Swan Coastal Plain ecological community (TEC).

After consideration of the above, the Delegated Officer determined that the acquisition and conservation of 35 hectares of native vegetation that contains suitable foraging habitat for Carnaby's cockatoo and vegetation representative of the Banksia Woodlands of the Swan Coastal Plain ecological community, will counterbalance the significant residual impacts (see Section 5).

The Delegated Officer determined that the proposed clearing may also increase the spread of weeds and dieback into conservation areas. To minimise this impact, a condition has been placed on the permit requiring the implementation of weed and dieback management measures.

In determining to grant a clearing permit subject to conditions, the Delegated Officer found that the proposed clearing is unlikely to lead to an unacceptable risk to the environment.

## 2. Site Information

**Clearing Description** The applicant has advised that as part of the planning and design for the Metronet project, which involves the extension of the existing Joondalup railway line from Butler to Yanchep, additional investigations are required to define the geotechnical conditions and determine the risk of unexploded ordnance (UXO) presence along the alignment (PTA, 2018). These investigations are separate to the implementation of the rail extension proposal, and involve targeted investigations works with clearing of native vegetation at locations within a clearing footprint (the application area) of 104.54 hectares. The actual area of proposed clearing within the larger footprint is 6.56 hectares. The application area occurs within numerous properties in the localities of Butler, Yanchep, Eglington, Alkimos and Two Rocks.

The application area has been mapped as the following vegetation types (Hedde et al. 1980):

- Cottesloe Complex-Central and South which comprises a mosaic of woodland of *Eucalyptus gomphocephala* (tuart) and open forest of *Eucalyptus gomphocephala* (tuart) and *Eucalyptus marginata* (jarrah) and *Corymbia calophylla* (marri) with closed heath on the limestone outcrops;
- Cottesloe Complex-North comprises predominantly low open forest and low woodland of *Banksia attenuata* (Slender Banksia) - *Banksia menziesii* (Firewood Banksia) - *Eucalyptus todtiana* (Pricklybark); closed heath on the limestone outcrops; and

**Vegetation Description**

- Coastal dune complex consisting mainly of two alliances - the strand and fore-dune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of *Melaleuca lanceolata* (Rottneest teatree), *Callitris preissii* (Rottneest island pine), and closed scrub of *Acacia rostellifera* (Summer-scented Wattle) and the low closed *Agonis flexuosa* (Peppermint) forest of Geopraphe Bay.

The applicant has undertaken several biological assessments which cover various portions of the application area, with the findings of these assessments merged into a larger document titled 'Public Transport Authority, Yanchep Rail Extension, Biological Assessment. January 2018' (the Assessment). The merged survey areas will herein be referred to as the Survey Area.

The larger Survey Area encompassed the entirety of the application area and included three components (GHD, 2018):

- 2016/17 survey (original alignment): approximately 13.7 kilometres long and 40 metres wide, increasing width at some station locations and other areas as required. The original alignment covers 87.39 hectares;
- 2017 (extension one): an additional 1.7 kilometre section north of the original alignment and a 10 metre buffer of the original alignment within Bush Forever site 289. The additional areas cover approximately 21.84 hectares; and
- 2017 (extension two): an additional 400 metres south and multiple extensions of varying length and width in an east and west direction of the original alignment. The additional areas cover approximately 55.90 hectares.

GHD botanists completed a dual season detailed vegetation and flora assessment of the original alignment, a reconnaissance survey of extension one and a detailed survey of extension two (GHD, 2018). Searches for conservation significant ecological communities and flora taxa were also undertaken during the field surveys. The Assessment notes that the survey methodology employed by GHD was undertaken with reference to the Environmental Protection Authority (EPA) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (GHD, 2018).

The above surveys identified 13 vegetation types (VT's) within the application area, which are outlined within Table 1 below (GHD, 2018). The "extent proposed for clearing" figures in Table 1 relate to the likely proposed clearing area (6.56 hectares), noting that this may be subject to minor variations in location (not overall size) depending on the geotechnical and unexploded ordnance findings.

**Table 1. Vegetation Types Recorded within the Application Area.**

Vegetation Type	Description	Landform and Substrate	Approximate Extent Within Application Area (hectares)	Approximate Extent Proposed for Clearing (hectares)
<i>Acacia saligna</i> and <i>Xanthorrhoea preissii</i> tall shrubland (Vegetation Type (VT01))	<i>Acacia saligna</i> , <i>Xanthorrhoea preissii</i> tall shrubland over mixed introduced sparse herbland/grassland.	Slopes of dunes with brown sandy soils.	9.61	1.38
<i>Banksia sessilis</i> and <i>Melaleuca systema</i> mid shrubland (VT02)	<i>Banksia sessilis</i> , <i>Melaleuca systema</i> , <i>Calothamnus quadrifidus</i> , <i>Hakea lissocarpa</i> mid-shrubland over <i>Hibbertia hypericoides</i> low open shrubland over mixed sparse herbland.	Slopes of dunes with yellow sandy soils.	6.12	0.66
<i>Banksia sessilis</i> and <i>Spyridium globulosum</i> tall shrubland (VT03)	<i>Banksia sessilis</i> , <i>Spyridium globulosum</i> tall shrubland over <i>Calothamnus quadrifidus</i> , <i>Melaleuca systema</i> low shrubland over open sedgeland of <i>Mesomelaena pseudostygia</i> and <i>Desmocladius flexuosus</i> .	Dune swales with brown sandy soils.	18.95	1.65
<i>Banksia attenuata</i> , <i>B. menziesii</i> low	<i>Banksia attenuata</i> , <i>B. menziesii</i> low woodland over shrubland <i>Calothamnus quadrifidus</i> ,	Undulating plain with brown yellow sandy soils.	16.09	1.2

woodland (VT04)	<i>Hakea trifurcata</i> , <i>Hibbertia hypericoides</i> , <i>Xanthorrhoea preissii</i> over sparse sedgeland <i>Mesomelaena pseudostygia</i> , <i>Desmocladius flexuosus</i> .			
<i>Lomandra</i> sp. herbland (VT05)	<i>Melaleuca systema</i> , <i>Hibbertia hypericoides</i> isolated shrubs over <i>Lomandra</i> sp. <i>Conostylis candidans</i> , and <i>Kennedia prostrata</i> herbland.	Dunes ridges with white to brown sandy soils.	8.83	0.91
<i>Eucalyptus gomphocephala</i> tall woodland (VT06)	<i>Eucalyptus gomphocephala</i> tall woodland over <i>Spyridium globulosum</i> tall sparse shrubland.	Slopes of dunes with brown sandy soils.	2.14	0.02
<i>Eucalyptus</i> sp. and <i>Agonis flexuosa</i> woodland (VT07)	<i>Eucalyptus</i> sp., <i>Agonis flexuosa</i> woodland over <i>Spyridium globulosum</i> sparse shrubland.	Slopes of dunes with brown sandy soils.	0.32	Nil
<i>Melaleuca huegelii</i> and <i>M.systema</i> shrubland (VT08)	<i>Melaleuca huegelii</i> , <i>M.systema</i> , <i>Grevillea preissii</i> shrubland over sparse herbland <i>Hardenbergia comptoniana</i> .	Upper slopes and ridge of dunes with brown to yellow sandy soils and numerous limestone outcropping.	0.59	Nil
<i>Banksia attenuata</i> woodland (VT09)	<i>Banksia attenuata</i> low woodland over <i>Melaleuca systema</i> , <i>Spyridium globulosum</i> , <i>Xanthorrhoea preissii</i> shrubland over sparse mixed sedgeland.	Undulating plain and dune swales with brown sandy soils.	7.09	0.04
<i>Xanthorrhoea preissii</i> shrubland (VT10)	<i>Xanthorrhoea preissii</i> tall shrubland over <i>Jacksonia calcicola</i> , <i>Hakea prostrata</i> , <i>Banksia dallanneyi</i> low open shrubland over <i>Lomandra</i> sp., <i>Conostylis</i> spp. open herbland.	Slopes of dunes with brown sandy soils.	2.04	0.01
<i>Eucalyptus decipiens</i> woodland (VT11)	<i>Eucalyptus decipiens</i> woodland over <i>Banksia sessilis</i> , <i>Hibbertia hypericoides</i> , <i>Xanthorrhoea preissii</i> shrubland over <i>Conostylis aculeata</i> , <i>Mesomelaena pseudostygia</i> , and <i>Desmocladius flexuosus</i> sparse herbland.	Undulating plain with brown sandy soils.	0.26	0.05
Planted (VT12)	Areas with planted shrubs and trees of both native and introduced species. Understorey is generally comprised of introduced herbs and grasses.	Undulating plain and dune slopes with sandy soils.	8.41	0.06
Scattered Natives (VT13)	Areas with isolated native shrubs, normally <i>Acacia</i> spp., over mixed introduced grasses and herbs.	Undulating plain and dunes slopes with sandy soils.	7.91	0.53
Cleared	Areas devoid of native vegetation that have been cleared for housing and infrastructure or partially	N/A	12.43	N/A

	revegetated within the rail corridor.			
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## Vegetation Condition

The Assessment identified that the condition of vegetation within the application area ranges from completely degraded to pristine (Keighery, 1994), as outlined within Table 2 below (GHD, 2018).

**Table 2. Vegetation Condition Recorded within the Application Area.**

Vegetation Condition	Approximate Extent Within Application Area (hectares)	Approximate Extent Proposed for Clearing (hectares)
Completely degraded	34.1	1.7
Degraded	11.4	0.8
Good	15.1	1.3
Very Good	22.7	0.6
Excellent	16.5	1.9
Pristine	1.25	0.2



**Figure 1. Application Area (a) (footprint area).**



**Figure 2. Application Area (b) (footprint area)**

### 3. Minimisation and mitigation measures

On 22 March 2018, DWER wrote to the applicant to advise that the proposed clearing had the potential to result in several environmental impacts, which included the following:

- The clearing of up to 1.28 hectares of native vegetation that is representative of the *Melaleuca huegelii* - *Melaleuca systena* shrublands on limestone ridges (Gibson et al. 1994 type 26a) state listed threatened ecological community (TEC);
- The clearing of suitable habitat and potential occurrences of priority flora;
- The clearing of up to 67 potential Carnaby's cockatoo breeding trees;
- The clearing of up to five hectares of the *Banksia* Woodlands of the Swan Coastal Plain ecological community, which is a federally listed TEC (Banksia Woodlands TEC); and
- The clearing of up to five hectares of Bush Forever Site 289, known as 'Ningana Bushland, Yanchep and Eglinton'.

The applicant subsequently amended the clearing footprint area (via the relocation of proposed access tracks, and reducing the number of proposed borehole and CPT locations) and provided a commitment to minimising environmental impacts, which include the following:

- The avoidance of all potential Carnaby's cockatoo breeding trees (determined to be 21 within the revised footprint area);
- Minimising the extent of clearing of the Banksia Woodlands TEC to 0.75 hectares;
- Avoidance of the recorded occurrence of the *Melaleuca huegelii* - *Melaleuca systena* shrublands on limestone ridges (Gibson et al. 1994 type 26a) state listed TEC (associated with the recorded Vegetation Type (VT) 08);
- Minimising the extent of clearing within Bush Forever Site 289, known as 'Ningana Bushland, Yanchep and Eglinton' to 0.72 hectares of which approximately 0.52 hectares is in a degraded to completely degraded (Keighery, 1994) condition; and

- Avoiding suitable habitat and potential occurrences of a number of priority listed flora species (see Principle (a)), through avoiding impacts to VT08.

In addition to the measures outlined above, the applicant has also advised that the following management measures will be undertaken (PTA, 2018):

- Environmental personnel will flag out *Melaleuca huegelii* to *Melaleuca systena* shrublands of limestone ridges state listed TEC prior to clearing works commencing (demarcating the no go zone).
- The applicant will issue internal ground disturbance permits prior to any clearing works; and
- Pre-start meeting will be held with contractors to highlight the requirements to avoid clearing of trees and minimise impacts to conservation significant vegetation. All clearing, investigation and survey works will be supervised by environmental personnel.

#### 4. Assessment of application against clearing principles

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

###### Proposed clearing is at variance to this Principle

The larger geotechnical investigations and unexploded ordnance footprint area (application area) comprises 104.56 hectares over a linear area of approximately 14 kilometres. The applicant proposes to clear up to 6.56 hectares of native vegetation within the larger application area, and has provided an indicative footprint of this area which may be subject to minor variations.

The Assessment identified 13 vegetation types within the application area, which include five mixed shrubland types, two Banksia woodland types, three Eucalyptus woodland types, one herbland type and two modified vegetation types (see Table 1 under Section 2) (GHD, 2018). The application area is in a highly variable condition and largely ranges from an excellent to completely degraded (Keighery, 1994) condition (see Table 2 under Section 2) (GHD, 2018).

Based on the vegetation and landform types recorded within the Survey Area, the Assessment identified that the following conservation significant flora species may occur within the Survey Area, as outlined within Table 3 below.

**Table 3.** Conservation Significant Flora with the Potential to Occur in the Survey Area (GHD, 2018).

Taxon	Conservation Status	Description (WA Herbarium 1998–, DotE 2015)	Likelihood of Occurrence
<i>Leucopogon maritimus</i>	Priority (P)1	Low, spreading shrub to 0.4 metres high, to 0.6 metres wide. Flowers Pink. Deep, calcareous sands on the mid to upper slopes of dunes or in shallows and over limestone.	Possible – suitable habitat was found within the Survey Area.
<i>Acacia benthamii</i>	P2	Shrub, to 1 metre high. Flowers yellow, August to September. Typically on limestone breakaways.	Possible – there is some suitable habitat present within the survey area. This species is not cryptic, but the survey was outside of the reported flowering period.
<i>Lecania turicensis</i>	P2	No description available	Possible – as no description is available for this species.
<i>Beyeria cinerea</i> subsp. <i>cinerea</i>	P3	Shrub to one metre high. Flowers September to October. Slopes, grey sand.	Likely – suitable habitat was found within the Survey Area.
<i>Calandrinia oraria</i>	P3	Annual herb to 10 centimetres, pink flowers. Stable coastal dunes, over limestone	Possible – suitable habitat was found within the Survey Area.
<i>Conostylis bracteata</i>	P3	Rhizomatous, tufted or shortly proliferous perennial, grass-like or herb, 0.2-0.45 metres high. Flowers yellow, August to September. Sand, limestone. Consolidated sand dunes.	Possible – suitable habitat was found within the Survey Area.
<i>Hibbertia spicata</i> subsp. <i>leptotheca</i>	P3	Erect or spreading shrub, 0.2-0.5 metres high. Flowers yellow, July to October. Sand. Near-coastal limestone ridges, outcrops & cliffs.	Known within the Survey Area.
<i>Lasiopetalum membranaceum</i>	P3	Multi-stemmed shrub, 0.2-1 metre high. Flowers pink-blue-purple, September to December. Sand over limestone.	Possible – suitable habitat was found within the survey area.
<i>Leucopogon</i> sp. Yanchep (M. Hislop 1986)	P3	Erect shrub, 0.15-1 metres high, to 0.6 metres wide. Flowers white/pink, April to June or September. Light grey-yellow sand, brown loam, limestone, laterite, granite. Coastal plain, breakaways, valley slopes, low hills.	Possible – suitable habitat was found within the Survey Area.
<i>Pimelea calcicola</i>	P3	Erect to spreading shrub, 0.2-1 metres high. Flowers pink, September to November. Sand. Coastal limestone ridges.	Possible – suitable habitat was found within the Survey Area.
<i>Sarcozona bicarinata</i>	P3	Shrub, to 0.1 metres high. Flowers white, August. White sand.	Possible – suitable habitat was found within the Survey Area.



<i>Sphaerolobium calcicola</i>	P3	Slender, multi-stemmed, erect shrub, to 1.5 metres high. Flowers orange/red, June or September to November. White-grey-brown sand, sandy clay over limestone, black peaty sandy clay. Tall dunes, winter-wet flats, interdunal swamps, low-lying areas.	Possible – suitable habitat was found within the Survey Area.
<i>Conostylis pauciflora</i> subsp. <i>euryrhipis</i>	P4	Rhizomatous, stoloniferous perennial herb, 0.06-0.18 metres high. Flowers yellow from August to October. White, grey or yellow sand. Consolidated dunes.	Likely – suitable habitat was found within the Survey Area.
<i>Conostylis pauciflora</i> subsp. <i>pauciflora</i>	P4	Rhizomatous, stoloniferous perennial, grass-like or herb, 0.1-0.35 metres high. Flowers yellow, August to October. Grey sand, limestone. Hillslopes, consolidated dunes.	Likely – suitable habitat was found within the Survey Area.
<i>Jacksonia sericea</i>	P4	Low spreading shrub, to 0.6 metres high. Flowers orange, usually December or January to February. Calcareous & sandy soils.	Possible – suitable habitat was found within the Survey Area
<i>Lepidium pseudotasmanicum</i>	P4	Erect annual or biennial, herb, 0.2-0.4 metres high. Flowers white-green, February or December. Loam, sand.	Possible – suitable habitat was found within the Survey Area.

The Department of Biodiversity, Conservation and Attractions (DBCA) provided comment on the adequacy of the Assessment and its associated surveys and advised that “for the purpose of the clearing permit assessment for geotechnical and unexploded ordnance investigations, this level of information will suffice, as impacts from these types of investigations are expected to have low proportional impacts to conservation significant taxa, assuming a commitment is made by the proponent to minimise impacts on significant areas of potential habitat for these taxa” (DBCA, 2018a).

As outlined within Table 3, one conservation significant flora species was recorded within the Survey Area, being *Hibbertia spicata* subsp. *leptotheca* (Priority 3). This record occurs within the application area, and specifically within VT08 (GHD, 2018). DBCA provided comment on the potential impact to this species and advised that “the distribution of this taxon largely coincides with areas subject to development pressures on the Swan Coastal Plain. Any newly recorded populations have the potential to be of conservation significance. Only one plant was recorded in the Survey, which appears to be located in the original alignment. This taxon occurs in sand, near-coastal limestone ridges, outcrops and cliffs. If impacts to the potential habitat (limestone outcropping) are minimised, then it is unlikely that the current geotechnical investigations and unexploded ordnance surveys would impact significantly on the conservation status of this species” (DBCA, 2018a).

With regard to *Lecania turicensis* (Priority 2), DBCA advised that “there are only two WA Herbarium records of this species. This species has been recorded from coastal rocks, limestone. The proposal area is further inland than both of the known records. Based on limited available information, it would appear that there is a low likelihood of occurrence of *L. turicensis* within the proposal area, however, if it were to occur within the proposal area, then any impacts would potentially be significant. Avoidance of suitable habitat (limestone breakaways) is recommended” (DBCA, 2018a).

While *Baeckea* sp. Limestone (N. Gibson & M.N. Lyons 1425) (Priority 1) was not identified within the Assessment as potentially occurring, DBCA advised that “potentially suitable limestone outcropping habitat occurs within the application area” and noted that “many of the previously recorded populations occur in areas that have subsequently been cleared and it appears that only five populations may be extant...[and] any impacts to this taxon are potential significant. Avoidance of suitable limestone habitats is recommended during the geotechnical and unexploded ordnance investigations” (DBCA, 2018a).

With regard to *Leucopogon maritimus* (Priority 1), DBCA advised that “many of the WA Herbarium records indicate that [this species] is locally abundant where it occurs, so the current geotechnical and unexploded ordnance investigations are unlikely to impact significantly on the conservation of the species” (DBCA, 2018a).

While suitable habitat for *Acacia benthamii* (Priority 2) occurs within the application area, DBCA advised that “the impact from geotechnical and unexploded ordnance investigations [is] unlikely to impact significantly on the conservation of *A. benthamii*, however, avoidance of suitable habitat (limestone breakaways) is recommended where practicable” (DBCA, 2018a).

The applicant has committed to avoiding the limestone outcropping landform type which corresponds with VT08. Through avoiding this habitat type it is considered that the proposed clearing is unlikely to impact on the conservation status of the abovementioned species, and notably *Baeckea* sp. Limestone, *Lecania turicensis*, and *Hibbertia spicata* subsp. *leptotheca*.

With regard to *Conostylis pauciflora* subsp. *pauciflora*, noting that the abovementioned flora surveys did not identify this species, and that it has a moderate distribution and is known from 14 records over 167 kilometres, the proposed clearing is not likely to significantly impact on this Priority 4 species.

With respect to the remaining Priority 3 and 4 listed flora species identified within Table 3, DBCA advised that “the geotechnical and unexploded ordnance investigations are unlikely to impact significantly on the conservation of the abovementioned Priority 3 and 4 listed taxa” (DBCA, 2018a).

As discussed under Principle (c), the proposed clearing is not likely to impact on any rare flora species. The Assessment identified that the vegetation within the Survey Area aligned with three Priority Ecological Communities (PEC) and two Threatened Ecological Communities (TEC) which include the following (GHD, 2018):

- The *Banksia* Woodlands of the Swan Coastal Plain ecological community TEC (Banksia woodland TEC), which is listed as Endangered under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) (approximately 19.18 hectares of the vegetation within the application area is representative of this community and 0.75 hectares is within the proposed clearing area);
- The *Melaleuca huegelii* - *Melaleuca systema* shrublands on limestone ridges (Gibson et al. 1994 type 26a) TEC, which is listed as Endangered by DBCA (approximately 0.59 hectares of the vegetation within the application area is representative of this community, aligning with VT08, and the applicant has committed to retaining the entirety of this portion);
- The *Banksia* dominated woodlands of the Swan Coastal Plain IBRA region PEC (Banksia woodland PEC) (Priority 3) (approximately 1.25 hectares is within the proposed clearing area);
- The Tuart (*Eucalyptus gomphocephala*) woodlands of the Swan Coastal Plain PEC (Priority 3) (approximately 2.14 hectares of the vegetation within the application area is representative of this community and 0.03 hectares is within the proposed clearing area); and
- The Northern Spearwood shrublands and woodlands (community type 24) PEC (Priority 3) (approximately 25.1 hectares of the vegetation within the application area is representative of this community and 2.17 hectares is within the proposed clearing area).

The current mapped extent of the Northern Spearwood shrublands and woodlands is 1008.96 hectares and the proposed clearing represents approximately 0.22 per cent of its mapped occurrence. Noting this, and that the proposed clearing comprises several small scattered areas along a nine kilometre area, the proposed clearing is not likely to significantly impact on this PEC.

Noting the minimal extent (0.03 hectares) of clearing proposed with regard to the Tuart (*Eucalyptus gomphocephala*) woodlands of the Swan Coastal Plain PEC, the proposed clearing is not likely to significantly impact on this community. The applicant has also provided a commitment to retaining 21 tuart habitat trees within the application area, which will minimise impacts to this community.

Noting the minimal extent of clearing proposed with regard to the Banksia woodland PEC (1.25 hectares), the proposed clearing is unlikely to significantly impact on this community. It is also noted that the offset required under Section 5 will likely address any residual impacts to the clearing of 1.25 hectares of this community.

As discussed under Principle (d), the applicant has committed to retaining all of the *Melaleuca huegelii* – *Melaleuca systema* shrublands of limestone ridges TEC that was recorded within the application area (represented by VT08). With regard to the Banksia woodland TEC, the applicant has advised that no more than 0.75 hectares of this TEC will be impacted, which comprises 13 small areas, within larger mapped occurrences of this community.

As discussed under Principle (b) three conservation significant fauna species have been recorded within the application area, being Carnaby's cockatoo, western brush wallaby (P4) and rainbow bee-eater. While the proposed clearing is considered unlikely to impact on significant habitat for the western brush wallaby and rainbow bee-eater, the applicant has advised that 5.74 hectares of Carnaby's cockatoo foraging habitat will be impacted by the proposed clearing, which is considered to be significant for this species.

Noting that the proposed clearing will comprise of small scattered areas over 14 kilometres in length, the proposed clearing is unlikely to significantly impact on any ecological linkages.

The application area contains a number of vegetation and habitat types, one priority flora species, is representative of two TEC's, two PEC's and significant habitat for Carnaby's cockatoo, therefore, the proposed clearing is considered to comprise a high level of biological diversity and is at variance to this Principle.

To minimise impacts to biodiversity the applicant has committed to avoiding the Melaleuca TEC, which will also result in the avoidance of potential impacts to a number of priority flora species, and to reducing the extent of impact on the Banksia Woodland TEC to 0.75 hectares.

Taking into account the applicant's avoidance and minimisation measures, it is considered that a suitable offset will counterbalance the loss of 5.74 hectares of habitat for Carnaby's cockatoo and 0.75 hectares of vegetation that is representative of the Banksia Woodland TEC. Section 5 provides further information on the adequacy of the offset provided.

It is considered that with the measures outlined above, the proposed clearing is not likely to have a significant impact on the level of biological diversity, and will not lead to an unacceptable risk to the environment.

**(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.**

**Proposed clearing is at variance to this Principle**

The Assessment noted that nine broad fauna habitats were recorded within the Survey Area, which include the following (GHD, 2018):

- *Eucalyptus* woodland;
- *Banksia sessilis* over low mixed shrubland;
- Mixed *Banksia* woodland;
- Mixed tall shrubland;
- *Lomandra* herb lands on secondary dunes;

- Limestone ridge lines;
- Planted *Eucalyptus* woodland;
- *Acacia* shrubland; and
- Highly disturbed.

The Assessment notes that 68 vertebrate fauna species, including 51 birds, eight reptiles and nine mammals were recorded within the Survey Area during the fauna surveys. Of these, three species of conservation significance were recorded, being (GHD, 2018):

- Carnaby's cockatoo (*Calyptorhynchus latirostris*);
- western brush wallaby (*Macropus irma*); and
- rainbow bee-eater (*Merops ornatus*).

The Assessment noted that a further five conservation significant fauna species were assessed as likely to occur within the Survey Area, and it is considered that suitable habitat for these species also occurs within the application area. These species include:

- quenda (*Isoodon obesulus fusciventer*) – Listed as Priority 4 by DBCA.
- peregrine falcon (*Falco peregrinus*) – Listed as 'other specially protected fauna' under the Wildlife Conservation (Specially Protected Fauna) Notice 2017 (WC Fauna Notice).
- chuditch (*Dasyurus geoffroyi*) – Listed as Vulnerable under the EPBC Act and 'fauna that is rare or is likely to become extinct as vulnerable fauna' under the WC Fauna Notice.
- jewelled south west ctenotus (*Ctenotus gemmula*) – Listed as Priority 3 by DBCA.
- black striped snake (*Neelaps calonotos*) – Listed as Priority 3 by DBCA.

With regards to Carnaby's cockatoo, the application area includes approximately 64.16 hectares of suitable foraging habitat for this species and foraging evidence was identified at several locations within the application area. Carnaby's cockatoos were also observed in several small groups foraging and flying over the larger Survey Area (GHD, 2018). The Assessment identified 21 potential breeding trees (all tuart trees) within the application area, one of which contained hollows of a suitable size for Carnaby's cockatoo breeding (GHD, 2018).

The applicant has provided a commitment to clearing no more than 5.74 hectares of foraging habitat for Carnaby's cockatoo, and to retaining all 21 potential habitat trees identified within the application area.

The applicant has further categorised the value of the habitat under application as follows (GHD, 2018):

- *Banksia sessilis* over low mixed shrubland, mixed *Banksia* woodland and *Eucalyptus* woodland, which was determined to be high value foraging habitat (3.4 hectares);
- mixed tall shrubland (*Acacia saligna* and *Xanthorrhoea preissii* tall shrubland) and planted *Eucalyptus* woodland, which was determined to be medium value foraging habitat (1.82 hectares); and
- mixed tall shrubland (scattered natives), which was considered to provide low value foraging habitat (0.52 hectares).

The recovery plan for Carnaby's cockatoo defines breeding habitat as including nesting sites, and the foraging habitat and water sources within foraging distance of nesting sites (Parks and Wildlife, 2013). These areas are considered to be habitat critical to the survival of this species (Parks and Wildlife, 2013). The loss or degradation of foraging habitat within 12 kilometres of nesting sites is considered to pose the greatest risk to Carnaby's cockatoo (Parks and Wildlife, 2013). Given the presence of a confirmed breeding site approximately 2.6 kilometres from the application area, and presence of Beonaddy Swamp, Pippidiny Swamp, Wilgarup Lake, Yonderup Lake and Loch Mcness all within two kilometres of the application area, it is considered that the 5.74 hectares of native vegetation proposed for clearing, of which 3.4 hectares is considered to comprise high value foraging habitat, is significant for Carnaby's cockatoo.

While the application area is considered to provide suitable habitat for quenda, peregrine falcon, chuditch, jewelled south west ctenotus, black striped snake, and rainbow-bee eater, noting the extent of clearing proposed, which largely comprises linear portions and small fragments over a distance of 14 kilometres, within a local area that retains approximately 63.6 per cent native vegetation, the application area is unlikely to provide significant habitat for these species.

Given that the application area provides significant foraging habitat for Carnaby's cockatoo, the proposed clearing is at variance to this Principle.

Taking into account the applicant's avoidance and minimisation measures, it is considered that a suitable offset will counterbalance the loss of 5.74 hectares of foraging habitat for Carnaby's cockatoo. Section 5 provides further information on the adequacy of the offset provided.

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

**Proposed clearing is not likely to be at variance to this Principle**

According to available datasets, no rare flora species have been recorded within the application area. There are three known rare flora species recorded within the local area, being *Marianthus paralius*, *Eucalyptus argutifolia* and *Melaleuca* sp. Wanneroo (G.J. Keighery 16705).

The Assessment included a likelihood of occurrence assessment, which took into account the habitats present, known species distribution, previous records and intensity of field surveys and season, for rare flora taxa identified in desktop searches. This assessment determined that no rare flora species are likely to occur within the larger Survey Area (GHD, 2018).

Targeted searches for conservation significant flora taxa were undertaken during the dual season flora surveys of the Survey Area, and no rare flora species were recorded (GHD, 2018).

The three abovementioned flora species all occur on limestone outcropping habitat types. Noting that the applicant has committed to retaining the limestone outcropping habitat type (VT08), and that these species were not recorded within the dual season flora surveys, the proposed clearing is not likely to include, or be necessary for the continued existence of rare flora.

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

**(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.**

**Proposed clearing is at variance to this Principle**

Portions of the application area are mapped by the Commonwealth Department of the Environment and Energy (DotEE) as a 'likely to occur' areas for the Banksia Woodlands of the Swan Coastal Plain ecological community (Banksia Woodlands TEC), which is listed as an endangered TEC under the EPBC Act. DotEE's mapping provides an indicative distribution of the ecological community, defining areas mapped as 'likely to occur' and 'may occur'.

The approved conservation advice for this community states that "Ground-truthing (e.g. an on-ground survey) is required to verify if a particular site meets the required key diagnostic characteristics and minimum condition thresholds to be the described ecological community" (Threatened Species Scientific Committee, 2016).

The Assessment, which incorporated an assessment of vegetation types recorded within the Survey Area based on dominant species and general field observations, determined that two vegetation types, VT04 and VT09, align with the Banksia Woodlands TEC (GHD, 2018). The Assessment identified that approximately 19.18 hectares of the vegetation within the application area is representative of this TEC (GHD, 2018). The total mapped (likely to occur) occurrence of this TEC is 321,728 hectares (DBCA, 2018b). The applicant has provided an indicative clearing area within this larger footprint, with the total area of proposed clearing 6.56 hectares. In providing this indicative clearing area, the applicant has committed to clearing no more than 0.75 hectares of this TEC. The portions of the proposed clearing area aligning with this TEC occur as scattered fragments over 13 locations and form part of larger patches that are likely to constitute this TEC. The 0.75 hectares proposed for clearing represents approximately 0.00023 per cent of the TEC's mapped occurrence.

The Assessment identified that 0.59 hectares of the vegetation within the Survey Area is representative of the *Melaleuca huegelii* - *Melaleuca systena* shrublands on limestone ridges (Gibson et al. 1994 type 26a) TEC (Melaleuca TEC). This TEC is highly restricted and known from massive limestone ridges around Yanchep north of Perth, and south of Perth near Lake Clifton (DBCA, 2018b). The community is currently known from a total area of approximately 164 hectares, and therefore the removal of 0.59 hectares would be significant to this community, as confirmed by DBCA which advised that "it is considered that all occurrences and habitat of occurrences are significant" (DBCA, 2018b).

The application area contains 19.18 hectares of the Banksia woodland TEC and 0.59 hectares of the Melaleuca TEC, therefore the proposed clearing is at variance to this Principle. To minimise impacts to these communities the applicant has committed to removing no more than 0.75 hectares of vegetation that is representative of the Banksia woodland TEC and to completely avoiding vegetation that is representative of the Melaleuca TEC (VT08).

Taking into account the applicant's avoidance and minimisation measures, it is considered that a suitable offset will counterbalance the loss of 0.75 hectares of vegetation that is representative of the Banksia woodland TEC. Section 5 provides further information on the adequacy of the offset provided.

**(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.**

**Proposed clearing is not likely to be at variance to this Principle**

The national objectives and targets for biodiversity conservation in Australia has a target to prevent clearance of ecological communities with an extent below 30 percent of that present pre-1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia, 2001).

As indicated in table 1, the application area occurs within the Swan Coastal Plain Interim Biogeographic Regionalisation of Australia (IBRA) bioregion, which retains approximately 38.5 per cent of its pre-European vegetation extent (Government of Western Australia, 2018). The vegetation under application is mapped as Quindalup Complex, Cottesloe Complex – North and Cottesloe Complex – Central and South, which retain approximately 60, 58 and 32 per cent of their pre-European vegetation extents within the IBRA bioregion respectively (Government of Western Australia, 2018). These figures are all greater than the abovementioned 30 per cent threshold.

The local area (10 kilometre radius - taking into account the coastal watermark) retains approximately 63.6 per cent native vegetation cover (26,099 hectares). The application area represents approximately 0.016 per cent of the remaining native vegetation within the local area and the proposed clearing would reduce the extent of native vegetation within the local area to 26,094.7 hectares.

Noting that the application area contains significant foraging habitat for Carnaby's cockatoo, and is representative of TEC's and PEC's, the application area is considered to be a significant remnant, however given that the remaining vegetation extents of the mapped vegetation types, IBRA Bioregion and local area are all greater than 30 per cent, the application area is not considered to be within an extensively cleared area.

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

**Table 4. Remnant Vegetation Extents**

	Pre-European (ha)	Current Extent (ha)	Remaining (%)	Current Extent in all DBCA managed lands (ha)	Extent remaining in all DBCA managed lands (proportion of Pre-European extent) (%)
<b>IBRA Bioregion</b>					
Swan Coastal Plain	1,501,222	578,997	38.5	222,766.5	38.5
<b>Heddle vegetation complex</b>					
Quindalup Complex	54,574	32,983	60	5,992	11
Cottesloe Complex-North	43,474	25,162	58	16,431	38
Cottesloe Complex-Central and South	45,299	14,571	32	6,591	14.5

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

**Proposed clearing is not likely to be at variance to this Principle**

There are no mapped wetlands or watercourses within the application area. The closest mapped wetlands or watercourses to the application area include Beonaddy Swamp and Pippidiny Swamp, located approximately 600 and 950 metres from the application area respectively.

The Assessment did not identify any drainage lines or wetlands within the Survey Area, and none of the vegetation types identified within the application area are considered to be riparian (GHD, 2018).

Given the above, the vegetation under application is unlikely to be growing in, or in association with a watercourse or wetland environment, and the proposed clearing is not likely to be at variance to this Principle.

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

**Proposed clearing is not likely to be at variance to this Principle**

The survey area is located on the Quindalup Dunes and Spearwood Dunes landforms. The Quindalup Dunes comprises dunes and ridges generally oriented parallel to the present coast, composed of unconsolidated (calcareous) sands and shell fragments. The Spearwood Dunes lie landward of the Quindalup Dunes and consist of mainly brown and yellow sands of varying depths over limestone (Tamala Limestone) (GHD, 2018).

The landform and soil types recorded during the Assessment comprised of slopes of dunes, dune swales, dunes ridges, and undulating plains with brown sandy soils, white to brown sandy soils and yellow sandy soils. The application area comprises six mapped landform subsystems, which are shown within the table below, with the two most common subsystems Karrakatta Sand Yellow Phase (211Sp\_Ky) and Quindalup South oldest dune Phase (211Qu\_Q1).

The soils within the subsystems described below, and those soil types identified within the Survey Area during the Assessment, are generally considered to be moderately to highly permeable and at low risk of water erosion. Noting this, and that there are no wetlands or watercourses mapped within the application area, the proposed clearing is unlikely to result in land degradation via water erosion or waterlogging.

**Table 5. Landform Substems Mapped Within the Application Area**

Landform Subsystem	Approximate Percentage of Application Area
<b>Karrakatta Shallow Soils Phase (211Sp_KIs)</b> <ul style="list-style-type: none"> <li>Low hills and ridges. Bare limestone or shallow siliceous or calcareous sand over limestone. Dense low shrub dominated by <i>Dryandra sessilis</i>, <i>Melaleuca huegellii</i> and species of <i>Grevillea</i>.</li> </ul>	14
<b>Karrakatta Sand Yellow Phase (211Sp_Ky)</b>	34

<ul style="list-style-type: none"> <li>Low hilly to gently undulating terrain. Yellow sand over limestone at 1-2 m. <i>Banksia</i> spp. woodland with scattered emergent <i>Eucalyptus gomphocephala</i> and <i>Eucalyptus marginata</i> and a dense shrub layer.</li> </ul>	
<b>Quindalup South Oldest Dune Phase (211Qu_Q1)</b> <ul style="list-style-type: none"> <li>The oldest phase. Dunes or remnants with low relief. Calcareous sands have organic staining to about 30 cm, overlying pale brown sand with definite cementation below 1 m.</li> </ul>	37
<b>Quindalup South Second Dune Phase (211Qu_Q2)</b> <ul style="list-style-type: none"> <li>The second phase. A complex pattern of dunes with moderate relief. Calcareous sands have organic staining to about 20 cm, passing into pale brown sand; some cementation below 1 metre</li> </ul>	5
<b>Quindalup South Deep Sand Flat Phase (211Qu_Qp)</b> <ul style="list-style-type: none"> <li>Undulating landscapes with deep calcareous sands overlying limestone. Soils have dark grey-brown sand to about 50 cm and then pale brown sand. Remnants of hummocks are often present.</li> </ul>	7
<b>Quindalup South Shallow Sand Flat Phase (211Qu_Qs)</b> <ul style="list-style-type: none"> <li>Undulating landscapes with shallow calcareous sands over limestone and much rock outcrop.</li> </ul>	3

The mapped and recorded sandy soil types are considered to be at a greater risk of wind erosion. However, noting the linearity of the proposed clearing, which comprises scattered fragments over a distance of approximately 14 kilometres, largely surrounded by remnant native vegetation, the proposed clearing is unlikely to result in appreciable land degradation via wind erosion.

The applicant will be required to undertake revegetation on any temporarily cleared areas that aren't required for the larger Metronet project, which will aid in mitigating the unlikely event of long term wind erosion issues.

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

**(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.**

**Proposed clearing is at variance to this Principle**

The northern portion of the application area (eastern side) is adjacent to a portion of the Yanchep National Park and includes vegetation that is contiguous with this conservation area. This portion of Yanchep National Park is also recognised as Bush Forever site 288 which is known as Yanchep National Park and Adjacent Bushland. The centre portion of the application area dissects Bush Forever site 289, which is known as Ningana Bushland, Yanchep/Eglington.

The applicant has committed to the proposed clearing of no more than 0.72 hectares within Bush Forever site 289, which occurs as a linear area of five metres width over a distance of approximately 2.8 kilometres. The 0.72 hectares of native vegetation proposed for clearing within Bush Forever site 289 includes approximately 0.2 hectares in a good to very good condition, and 0.52 hectares in a degraded to completely degraded (Keighery, 1994) condition. The total area of Bush Forever site 289 is approximately 754 hectares.

The proposed clearing may also result in indirect impacts to the Bush Forever site and Yanchep National Park through the introduction of weeds and dieback, which may impact on the environmental values of these conservation areas. The applicant will also be required to adhere to weed and dieback management measures, which will assist in mitigating this risk.

Given the above, the proposed clearing is at variance to this Principle.

Taking into account the applicant's avoidance and minimisation measures, it is considered that a suitable offset will counterbalance the loss of 0.72 hectares of vegetation within Bush Forever site 289. Section 5 provides further information on the adequacy of the offset provided.

**(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.**

**Proposed clearing is not likely to be at variance to this Principle**

As discussed under Principle (f), the closest mapped wetlands or watercourses to the application area are Beonaddy Swamp and Pippidinny Swamp, located approximately 600 and 950 metres from the application area respectively. The Assessment did not identify any drainage lines or wetlands within the Survey Area (GHD, 2018).

Given the distance to the closest wetlands or watercourses, and the presence of largely permeable soils within the application area (based on landform mapping and the Assessment findings), the proposed clearing is not likely to impact on the water quality of the abovementioned wetlands via sedimentation or other hydrological changes.

Groundwater salinity within the application area is mapped at between 500 and 1000 milligrams per litre total dissolved solids, which is considered marginal. Noting this, and the linearity of the proposed clearing, which is proposed to comprise 6.56 hectares over a distance of approximately 14 kilometres, much of which is surrounded by remnant native vegetation, the proposed clearing is not likely to deteriorate the quality of surface and/or groundwater via increased salinity.

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

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

**Proposed clearing is not likely to be at variance to this Principle**

As discussed under Principles (g) and (i), the soils mapped and recorded within the application area are largely sandy soils and considered to be highly permeable. Noting this, the moderate annual rainfall experienced by the region, the lack of wetlands or watercourses within the application area, and its linearity, the proposed clearing is not likely to result or exacerbate the incidence or intensity of flooding.

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

**Planning instruments and other relevant matters.**

The applicant (the Public Transport Authority (PTA)) has advised that the state government as part of its Metronet plan has committed to extending the existing Joondalup railway line from Butler to Yanchep, to provide essential transportation services to Perth's expanding northern suburbs (PTA, 2018). The applicant advised that the Yanchep Rail Extension project is planned for the significant planned urban growth in the region, and to help mitigate against congestion on the road network (PTA, 2018). The PTA is the responsible agency for implementing the project.

As part of the planning and design for the project, the applicant has advised that additional investigations are required to define the geotechnical conditions and determine the risk of unexploded ordnance (UXO) presence along the entire alignment (PTA, 2018). These investigations are separate to the implementation of the actual rail proposal, and involve targeted investigations works with clearing of native vegetation at scattered locations within the proposal footprint. With regard to the proposed geotechnical investigations, a number of boreholes will be drilled and cone penetration tests undertaken, as well as clearing to provide temporary access to the test locations (PTA, 2018).

The applicant has referred Part 1 of the Yanchep Rail Extension project to the Environmental Protection Authority (EPA) for assessment under Part IV of the *Environmental Protection Act 1986* (EP Act). Part 1 involves the extension of the existing Joondalup railway line by 7.3 kilometres from Butler Station to the suburb of Eglinton in the City of Wanneroo. The proposal is to construct and operate the rail extension and includes two new intermodal (rail, bus, 'park and ride', 'kiss and ride', walk and cycle) transit stations at Alkimos and Eglinton.

The EPA has examined the proponent's referral information, considered the comments received on the referral, and determined that the potential impacts are significant enough to warrant formal environmental impact assessment under the EP Act. Having regard to the significance considerations in the EPA's Statement of Environmental Principles, Factors and Objectives, the EPA has identified the key environmental issues to be:

- clearing of native vegetation, including up to 1.1 hectares of TEC 26a (*Melaleuca* TEC);
- loss of threatened fauna habitat;
- fragmentation of a small reserve that provides an east-west linkage; and
- localised impacts to neighbouring residential areas from noise and vibration.

The EPA noted that under the Metropolitan Region Scheme the proposal is located in an area primarily designated for urban development. The railway and stations will be located within commercial and residential areas once surrounding land is fully developed.

The EPA provided comment on the clearing permit application and advised that "the works as set out in the clearing permit application supporting documentation are investigation works for the purpose of informing the EPA's assessment of a proposal, or to inform design or planning that does not involve implementing the proposal. This is opposed to minor and preliminary work which is associated with the implementation of the proposal, and would require the consent of the EPA. As outlined in Section 3.4.1 of the Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016 and Procedures Manual 2016, EPA consent is not required for investigation work that does not involve the implementation of the proposal, and may be approved by Decision-Making Authorities" (EPA, 2018). Noting this advice, DWER is not constrained from making a decision on this application.

The clearing permit application was advertised on the DWER website on 17 January 2018 for a 21 day submission period and again on 27 July 2018 for a further seven day submission period. One submission was received in relation to the application.

The submission (2018) noted that one Threatened Ecological Community (TEC) and two Priority Ecological Communities (PECs) are located within the 105 ha clearing boundary footprint which includes the clearing of 0.88 hectares of the *Banksia* woodlands of the Swan Coastal Plain TEC and 1.26 hectares of the Northern Spearwood shrublands, for geotechnical investigations. The submission advised that it "strongly opposes this proposal. Given the extremely limited extant of these vegetation associations even the loss of these relatively small areas is unacceptable". The submission noted the potential for the proposed clearing to avoid PEC's and TECs'. The submission also noted its concern at the potential removal of 2.14 hectares of black cockatoo habitat, noting that "the cumulative impacts of this and so many other development proposals on the [swan coastal plain] that are currently likely to impact the foraging and roosting habitat of black cockatoos are highly likely to have a significant impact..." (Submission, 2018). These concerns have been considered through the assessment of the application and it is considered that the avoidance and minimisation measures applied by the applicant have reduced the potential impacts to TEC's and PEC's to acceptable levels. Impacts to fauna habitat are considered to have been addressed through the avoidance of potential habitat trees and the imposition of an offset.

The City of Wanneroo provided comment on the proposed clearing and advised that "given that the purpose of vegetation clearing is for geotechnical investigations and UXO surveys, it is considered to be public works conducted by a Public Authority, as defined within the *Planning and Development Act 2005*. [The applicant is] therefore exempt from requiring Development

Approval under the City's District Planning Scheme No. 2...The City does not object to the removal of five hectares of native vegetation for the purposes discussed above" (City of Wanneroo, 2018).

There are no Aboriginal Sites of Significance mapped within the application area.

The Whadjuk People and Swan River People 2 Native Title Claimants were notified of the proposed clearing on 15 January 2018.

A representative of the Swan River People 2 Native Title Claimants provided comment on the proposed clearing and advised that they "don't believe the Swan River People Native Title Holders have been consulted properly...[and] this application should be refused until representatives from [the Swan River People 2 Native Title Claimant group] are consulted on site and given a clear explanation of why somebody thinks they need to clear 5 hectares of native vegetation on [the claimants] land" (Submission, 2018).

With regard to the Native Title Claimant's concerns regarding land access, it is noted that the PTA has authority to access all land parcels referred to in this application under Section 82 of the *Public Works Act 1902* for the purposes of conducting surveys and investigations as part of the proposal. This legislation also authorises PTA to access these land parcels for the purpose of the proposed clearing. Notwithstanding, it is the applicant's responsibility to comply with all *Aboriginal Heritage Act 1972* and *Native Title Act 1993* obligations.

The Department of Planning, Lands and Heritage (DPLH) provided comment on the proposed clearing within Bush Forever site 289 and advised that "the subject site is reserved as Parks and Recreation in the Metropolitan Region Scheme (MRS) and has the Bush Forever implementation category of Bush Forever Reserves (existing or proposed). *State Planning Policy 2.8 – Bushland Policy for the Perth Metropolitan Region* (SPP 2.8), section 5.1.2.1 outlines specific policy measures for Bush Forever Reserves, namely that there is a general presumption against the clearing of regionally significant bushland, except where a proposal (e) *is consistent with the overall purpose.... or can be reasonably justified with regard to wider environmental, social, economic or recreation needs,... and reasonable offset strategies are secured to offset any loss of regionally significant bushland, where appropriate and practical*. As the proposed clearing is associated with essential works, Policy and Priority Initiatives has no objections to the proposal or clearing" (DPLH, 2018). The DPLH did however recommend the following conditions (DPLH, 2018):

- "An offset package is prepared and approved by DWER prior to the clearing of any native vegetation, in accordance with the WA Environmental Offsets Policy (2011) and Appendix 4 of SPP 2.8. It would be recommended that there is a net environmental gain for any clearing undertaken...
- Other than the native vegetation proposed to be cleared for the geotechnical investigations, no other disturbance or clearing of any other native vegetation within Bush Forever area 289 is to occur.
- No building materials, rubbish or other matter is to be deposited into Bush Forever Area 289 during or after construction works.

It is considered that the offset referred to under Section 5 below will adequately address the residual impacts of clearing 0.72 hectares of native vegetation within Bush Forever site 289.

## 5. Suitability of Proposed offset

Principle 1 of the *WA Environmental Offsets Policy September 2011* outlines that environmental offsets will only be considered after avoidance and mitigation options have been pursued. The WA Environmental Offsets Guidelines August 2014 outlines a four step mitigation hierarchy; avoid, minimise, rehabilitate and offset. The avoidance and mitigation measures assessed within section 3 of this report are deemed to be adequate in addressing this requirement.

The Delegated Officer determined that the proposed clearing will impact on 5.74 hectares of vegetation containing significant foraging habitat for Carnaby's cockatoo, 0.75 hectares of vegetation that is representative of the Banksia woodland TEC and 0.72 hectares of native vegetation within Bush Forever site 289.

To offset the abovementioned significant residual impacts the applicant proposed a monetary contribution for the acquisition of 35 hectares of remnant native vegetation for conservation within the Swan Coastal Plain that provides environmental values commensurate with those being impacted by the proposed clearing.

In assessing whether the proposed offset is adequately proportionate to the significance of the habitat values being impacted, DWER undertook a calculation using the Commonwealth Offsets Assessment Guide. The calculation indicated that the allocation of 35 hectares is considered adequate to counterbalance the significant residual impacts. This equates to a monetary contribution of \$131,950, determined based on the estimated value per hectare of a vegetated parcel of land in the Shire of Gingin.

Given the above, a monetary contribution of \$131,950 for the acquisition of 35 hectares of native vegetation for conservation is considered adequate to counterbalance the remaining significant residual impacts of the proposed clearing consistent with the *WA Environmental Offsets Policy September 2011*.



## 6. References

- City of Wanneroo (2018) Direct Interest Advice Received 7 February 2018 for Clearing Permit Application CPS 8743/1. DWER Ref A1609726.
- Commonwealth of Australia (2001) National Objectives and Targets for Biodiversity Conservation 2001-2005, Canberra.
- Department of Planning, Lands and Heritage (DPLH) (2018) Direct Interest Advice for Clearing Permit Application CPS 7843/1. DWER Ref A1614330).
- Environmental Protection Authority (EPA) (2018) Additional Information provided for Clearing Permit Application CPS 7843/1/1 (DWER ref 1708161)
- Department of Biodiversity, Conservation and Attractions (DBCA) (2018a) Flora Advice for Clearing Permit Application CPS 7843/1 received 19 February 2018 (DWER Ref A1639825).
- Department of Biodiversity, Conservation and Attractions (DBCA) (2018b) TEC and PEC Advice for Clearing Permit Application CPS 7843/1 received 19 February 2018 (DWER Ref A1639831).
- Department of Parks and Wildlife (Parks and Wildlife) (2013) Carnaby's cockatoo (*Calyptorhynchus latirostris*) Recovery Plan. Department of Parks and Wildlife, Perth, Western Australia.
- Government of Western Australia. (2018). 2017 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of December 2017. WA Department of Biodiversity, Conservation and Attractions.
- Government of Western Australia. (2018). 2017 South West Vegetation Complex Statistics. Current as of October 2017. WA Department of Biodiversity, Conservation and Attractions, Perth, <https://catalogue.data.wa.gov.au/dataset/dbca>.
- GHD (2018) Public Transport Authority, Yanchep Rail Extension, Biological Assessment. January 2018. Additional Information for Clearing Permit Application CPS 7843/1 (DWER Ref A1639835).
- Hedde, E. M., Loneragan, O. W., and Havel, J. J. (1980) Vegetation Complexes of the Darling System, Western Australia. In Department of Conservation and Environment, Atlas of Natural Resources, Darling System, Western Australia.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- PTA (2018) Additional Information provided to support Clearing Permit Application CPS 7843/1. (DWER Ref A1705134).
- Submission (2018) Direct Interest Submission received on 3 August 2018 in response to Clearing Permit Application CPS 7843/1 (DWER Ref 1708519).
- Threatened Species Scientific Committee (2016). Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands 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/131-conservation-advice.pdf>

### GIS Databases:

- Hydrography, linear
- Hydrography, hierarchy
- Wetlands, Swan Coastal Plain
- Parks and Wildlife tenure
- Hedde Vegetation Complexes
- Pre-European vegetation
- SAC bio datasets accessed July 2018
- Virtual mosaic
- Aboriginal sites register system
- Town Planning Scheme Zones