



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 4860/1
Permit Holder:	Carey Baptist College Inc
Duration of Permit:	21 June 2014– 21 June 2024

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 constructing a school site.

2. Land on which clearing is to be done

Lot 2 on Diagram 75868 (Forrestdale 6112)

3. Area of Clearing

The Permit Holder must not clear more than 4.26 hectares of native vegetation within the area hatched yellow on attached Plan 4860/1a.

4. 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.

PART II – MANAGEMENT CONDITIONS

5. Dieback and weed control

When undertaking any clearing or other activity 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*:

- clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
- ensure that no *dieback* or *weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
- restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

6. Offset - Revegetation Plan

The Permit Holder must, within the area shaded red on attached Plan 4860/1b, implement and adhere to the offset commitments as outlined in the Revegetation Plan – Lot 2 Nicholson Road, Forrestdale, Revision 1, April 2014 attached as Appendix A to this permit.

PART III - RECORD KEEPING AND REPORTING

7. Records must be kept

In relation to the Offset – Revegetation of areas pursuant to condition 6:

- (a) the location of any area of offsets recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings;
- (b) a description of the offset activities undertaken; and
- (c) the size of the offset area (in hectares).

8. Reporting

The Permit Holder must provide to the CEO on or before 30 June of each year, a written report:

- (a) of records required under condition 7 of this Permit; and concerning activities done by the Permit Holder under this Permit between 1 January to 31 December of the calendar year.
- (b) If no clearing authorised under this Permit was undertaken between 1 January to 31 December of the preceding calendar, 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 21 March 2024, the Permit Holder must provide to the CEO a written report of records required under condition 7 of this Permit where these records have not already been provided under condition 8(a) of this Permit.

DEFINITIONS

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

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

fill means material used to increase the ground level, or fill a hollow;

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;

soil disease status means soil types either infested, not infested, uninterpretable or not interpreted with a pathogen.

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 Parks and Wildlife Regional Weed Rankings Summary, regardless of ranking; or
- (c) not indigenous to the area concerned.

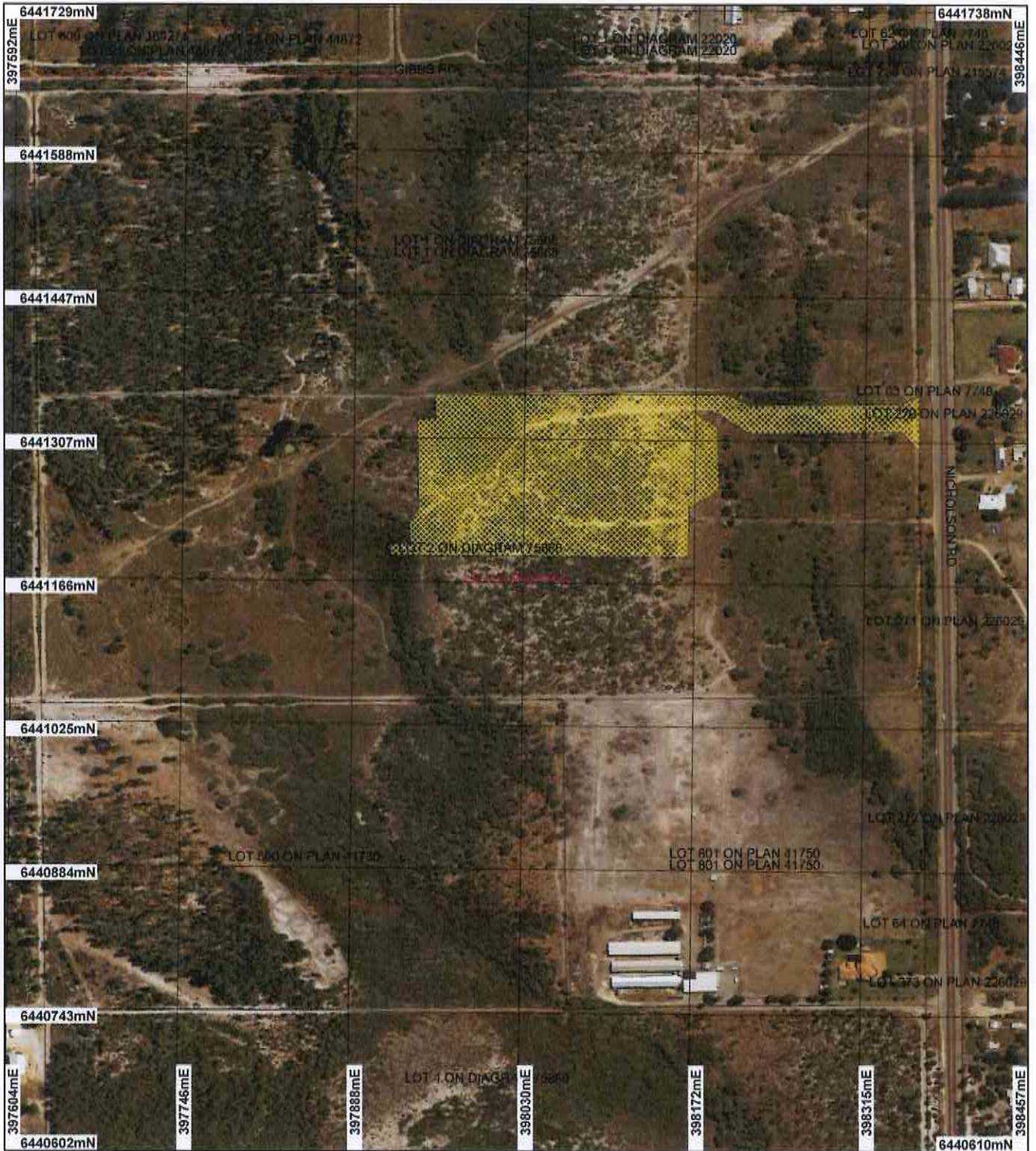


M Warnock
SENIOR MANAGER
CLEARING REGULATION

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

22 May 2014

Plan 48601/1a



LEGEND

- Road Centrelines
- Cadastre
- Local Government Authorities
- Clearing Instruments
- Areas Approved to Clear

Perth Metropolitan Area
Central 15cm Orthomosaic -
Landgate 2012

Scale 1:5000
(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

M Warnock Date 22/5/14

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

Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.

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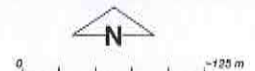
Plan 4860/1b



LEGEND

- Road Centrelines
- Cadastre
- Local Government Authorities
- Clearing Instruments
- Areas Subject to Conditions

Perth Metropolitan Area
Central 15cm Orthomosaic -
Landgate 2012



Scale 1:5000
(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

M Warnock Date 22/5/14

M Warnock

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

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COTERRA
ENVIRONMENT

Revegetation Plan

Lot 2 Nicholson Road, Forrestdale

Revision 1, April 2014



CALIBRE | COMMITMENT | COLLABORATION

Revegetation Plan

Lot 2 Nicholson Road, Forrestdale

Revision 1, April 2014

This report was prepared by:

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1.0 INTRODUCTION

1.1 General

Lot 2 Nicholson Road Forrestdale (the site) is located approximately 24 km south-east of Perth, within the City of Armadale (Figure 1). The site is approximately 22ha in size and is currently zoned 'Rural' under the Metropolitan Region Scheme (MRS) and 'General Rural' under the City of Armadale's Town Planning Scheme 4 (TPS4).

Historically, the site has been used for agricultural (stock grazing) purposes and has been predominantly cleared. The site is currently unused, with uncontrolled access and illegal rubbish dumping evident, particularly within the wetland areas.

Carey Baptist College is proposing to build a new school campus at the site. The school will ultimately provide for students from Kindergarten to Year 12. The overall development footprint of the school is approximately 11.14 ha, which is approximately 50% of the total site area. In order to progress construction, clearing of vegetation onsite will be required.

1.2 DEC Clearing Permit Application

A clearing permit application was provided to the Department of Environment and Conservation in January 2012 (CPS 4860/1). Some additional information was provided to DEC in May 2012. Additional information requested at this time was as follows:

1. *A map outlining the boundary of the above areas to be retained and vegetated.*
2. *A Revegetation Plan outlining the following:*
 - (a) *Details on how Carey Baptist College Inc will ensure the long term (10-30 years) security of the vegetation site.*
 - (b) *Details on the measureable component of the revegetation and weed removal activities to be undertaken. For example:*
 - (i) *Target density (e.g. > xx% survival rate (planting density xxxx stems/ha using xx native species present to be achieved by 20xx)*
 - (ii) *Target structure (e.g. xx% overstorey, xx% midstorey, xx% understory species, consistent with mapped vegetation type to be achieved by 20xx); and*
 - (iii) *Target composition (e.g. xx native species consistent with mapped vegetation or vegetation to be cleared, x years after establishment);*
 - (iv) *Weed coverage target (e.g. 20% weed coverage remaining after weed control etc.)*
 - (c) *A species list detailing which species will be planted.*
 - (d) *Brief details on mitigation and maintenance activities (i.e. follow up planting if target density is not reached, follow up weeding) and associated timeline.*
 - (e) *Monitoring schedule and details on the monitoring method used to establish if targets are being met (i.e. transects, quadrats, photos, plots etc)*
 - (f) *Timeline for re-vegetation and weed control should be a minimum of 5 years.*

Please also note that Carey Baptist College Inc should commit to at least 5 years of monitoring and maintenance activities due to risk of failure.

The Revegetation Plan was prepared, in part, to provide the information required to satisfy the above request.

The DEC advised in July 2013 that the Revegetation Plan (Revision 0) addressed their requirements (Appendix A). Since this time there has been a slight modification to the development footprint. As such this updated report (Revision 1) addresses these changes.

1.3 City of Armadale Development Conditions

The City of Armadale have issued a number of conditions in relation to the Development Application approval. These conditions include:

- Condition 1(b) – *A wetland management plan for the Resource Enhancement wetland and the Conservation category wetland buffer, is to be submitted for approval by the Executive Director Development Services prior to the commencement of any site works, and implemented to the satisfaction of the Executive Director Development Services (on advice from the Department of Environment and Conservation).*
- Condition 1(d) – *Submission and implementation of a Weed Control Management Plan, including what weeds are present on the subject lot, what chemicals will be utilised for which weeds and appropriate timing of weed control based on weed species, to the satisfaction of the Executive Director Development Services.*
- Condition 1(g) – *A revegetation plan being prepared, approved and implemented for the revegetation of wetland areas, wetland buffers and other areas of the site outside the development area identified on the Master Plan for the school dated 28 November 2012 with appropriate native species to the satisfaction of the Executive Director Development Services.*
- Condition 1(h) – *A seed bank is to be compiled for native plants existing on Lot 2 for the purpose of growing plants for revegetation and wetland rehabilitation to the satisfaction of the Executive Director Development Services. Collection of seed is to occur in the year prior to any clearing.*

This document also contains information to address the above conditions.

1.4 Proposed Development

1.4.1 Layout

In consultation with key stakeholders a Concept Plan has been prepared for the site (Figure 2). This plan addresses the natural attributes of the site including wetlands and their associated buffers, remnant vegetation and relevant planning easements and buffers. The Concept Plan comprises of the following:

- Primary School and associated facilities.
- High school and associated facilities.
- Two soccer ovals.

- Football oval.
- Playing courts.
- Car parking and drop-off areas.
- Northern and Southern driveway access points.

Stage One of the Concept Plan is highlighted in Figure 2, these areas coincide with the Primary School component of the development.

1.4.2 Onsite Conservation Areas

The conservation areas identified within the Concept Plan include:

- Resource Enhancement Wetland and associated buffer zone at the eastern end of the site.
- Setback to the adjacent Conservation Category wetland and Bush Forever site along the northern and western site boundaries.
- Banksia woodland in the north western corner of the site.

1.4.3 Staging and Timing

Approval for the Stage 1 development to commence was provided by the State Administrative Tribunal in March 2014 in accordance with the City of Armadale conditions.

As such the school construction is anticipated to proceed as follows:

- Construction of Stage 1 commence in mid 2014.
- Estimated School opening date: February 2015. This will comprise facilities to initially accommodate students from Kindergarten to Year 2 only. The area of this stage is approximately 3.7ha.
- The school campus is proposed to continue to be constructed in stages over the next ten to fifteen years pending separate Development Application approvals. Facilities to provide accommodation for primary school levels will be constructed first, followed by the secondary school buildings.

The extent of the Stage 1 development area is shown on Figure 2.

1.5 EPBC Act Referral

The project was referred to the Federal Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in September 2012.

SEWPaC subsequently advised that the project was 'Not a Controlled Action' and that development could proceed without further Federal assessment.

The EPBC Act referral outlined the core components of the proposed revegetation program which are also presented in this document.

2.0 SITE DESCRIPTION

2.1 Topography, Soils and Geology

Topography across the site ranges from approximately 25m AHD at the lower lying eastern and western ends, to 30m AHD within the central portion (Figure 3).

The geology of the Forrestdale area has been mapped at regional scale by Jordan (1986). Most of the site has been mapped as Bassendean Sand (S8) which is characterised as white to pale grey at the surface, yellow at depth, fine to medium-grained, moderately sorted, sub-angular to sub-rounded, minor heavy minerals of eolian origin (Figure 3). Some portions of the site are mapped as Sand (S10) which is as per S8 as a relatively thin veneer over strong, blocky, brown silts and clays.

The geology for the remainder of the site is mapped as Peaty Sand (SP1), described as peaty sand grey to black, moderately sorted quartz sand, slightly peaty, of lacustrine origin (Jordan, 1986). These soils are associated with the lower lying topography on site.

2.2 Hydrology

2.2.1 Wetlands and Surface Water

There are two wetlands mapped by the DEC within Lot 2 (Figure 4). One is a Multiple Use Wetland (UFI 7088) located within the western section of the site and the other is a Resource Enhancement Wetland (Part UFI 7233). There are no wetlands listed under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* within or immediately adjacent to the site.

The closest highly significant wetland to the site is Forrestdale Lake, which is located approximately 650m east of the site. Forrestdale Lake is a Ramsar site and is listed under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*.

The adjacent Bush Forever Site contains large areas of Conservation Category Wetlands. These wetlands extend up to the western and southern boundaries of Lot 2 (Figure 4).

An open shallow drain is present within Lot 2 which intersects the site through the eastern margin of wetland UFI 7233.

2.2.2 Groundwater

The estimated maximum water table contours across the site ranges from 23 to 24m AHD (DoW, 2010). This equates to a depth below ground level of approximately 2 to 7m.

There is one Department of Water (DoW) groundwater monitoring bore (WIN site ID 4782) located north of the site, which indicates that since 1975 groundwater has remained fairly consistent at approximately 24m AHD.

2.3 Vegetation and Flora

2.3.1 Overview

Lot 2 contains some remnant vegetation in patches throughout the site. On a regional scale these areas have been mapped as containing vegetation from the Southern River Complex. This complex is described as follows (Heddle et al., 1980):

Open woodland of *Corymbia. calophylla*- *Eucalyptus marginata*- *Banksia* spp with fringing woodland of *E. rudis*- *Melaleuca raphiophylla* along creek beds.

Lot 2, including the wetlands, has been predominantly cleared. The remaining vegetation is currently degraded as a result of its historical agricultural use and its location adjacent to Nicholson Road which has resulted in illegal rubbish dumping, disturbance through maintenance of the road reserve, fire damage, weed encroachment and trespassing.

There are two Bush Forever sites near the landholding. Bush Forever Site No. 344 is located adjacent to the western boundary of Lot 2. Bush Forever Site No. 345 is located further east of Nicholson Road.

The DEC's (2010) Nature Map was searched with a 1km radius from the site. The preliminary search showed no recorded significant flora within the site, however, *Drakaea micrantha* (Dwarf Hammer Orchard) has been recorded in the vicinity of the site. This species is a Declared Rare Flora under the *Wildlife Conservation Act 1950* [WA] and listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* [Cth].

2.3.2 Vegetation Units

A level 2 Flora and Vegetation Survey was completed by Bennett Environmental Consulting (2011) for the site in October 2011 in accordance with EPA Guidance Statement No 51 (EPA, 2004).

During the survey a total of eight different vegetation units were identified. These consisted of upland and wetland vegetation (Figure 5). These are:

Upland Vegetation

- Ba: Low Woodland A of *Banksia attenuata*, *Banksia menziesii*, *Nuytsia floribunda* and *Eucalyptus todtiana* over Heath B dominated by *Acacia pulchella* var. *glaberrima* over Tall Grass dominated by **Ehrharta calycina* in grey sand.
- Bi: Low Forest A of *Banksia attenuata* and *Banksia ilicifolia* over Tall Grass dominated by **Ehrharta calycina* and **Ehrharta longiflora* in grey sand.
- Et: Low Woodland A of *Eucalyptus todtiana* with occasional *Banksia ilicifolia* over Open Dense Tall Grass dominated by **Eragrostis curvula* over Herbs dominated by **Carpobrotus edulis*, **Erodium botrys*, **Lotus subbiflorus* and **Hypochaeris glabra* in pale grey sand.

Wetland Vegetation

- Mp: Open Low Woodland B of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Open Herbs dominated by *Patersonia occidentalis* and *Drosera glanduligera* in damp dark grey sand.
- Mr: Low Forest A of *Melaleuca raphiophylla* over Dense Herbs dominated by **Zantedeschia aethiopicum* and **Lotus subbiflorus* in very damp grey sand.
- EM: Open Low Woodland A of *Eucalyptus todtiana* and *Melaleuca preissiana* over Low Scrub A or Scrub of *Kunzea glabrescens* and *Pultenaea reticulata* over Herbs dominated by **Carpobrotus edulis* and **Lotus subbiflorus* in grey sand.
- Er: Low Forest A of **Eucalyptus* species (possibly **Eucalyptus robusta*), *Melaleuca preissiana* and **Populus nigra* over Dense Tall Grass dominated by **Eragrostis curvula* in grey sandy loam.
- Ec: Dense Tall Grass of **Eragrostis curvula*, **Paspalum urvillei*, and/or **Pennisetum clandestinum* or Tall Sedges of *Juncus pallidus* or Herbs dominated by **Lotus subbiflorus*, **Moraea flaccida* and **Euphorbia terracina* in damp grey sand.

2.3.3 Vegetation Condition

The condition of remnant vegetation on site varied from Very Good-Good to Completely Degraded, with over half of the site (12.5ha, 56%) being Degraded to Completely Degraded. Vegetation condition mapping is provided on Figure 6.

The areas of overall best condition vegetation (being Good to Very Good) were located in within the central margin of the site. The higher ground within these better condition areas had many *Banksia attenuata* and *Banksia menziesii* deaths, not just from recent fires but also likely as a result of the long hot summers and dry winters experienced over the previous two years (Bennett Environmental Consulting, 2011).

2.3.4 Rare and Priority Flora

No Declared Rare Flora species were found at the site.

One DEC Priority 2 flora annual sedge species *Schoenus pennisetis* was identified at one location in the north western corner (CS01) of the site (Figure 5). *Jacksonia gracillima*, a DEC Priority 3 Flora, is a shrub which was identified at two locations on site (walking transect and CS06).

2.3.5 Weed Species

A total of 66 weed species were recorded during the Level 2 flora and vegetation survey (Bennett Environmental Consulting, 2011). The weed species found onsite and their rating for ecological impacts, impact attributes and invasiveness are shown on Table 1.

Table 1 Weed Species Present Onsite

Species	Ecological Impacts		Invasiveness
	Ecological Impact L - low impact M - medium impact H - high impact U - unknown impact	Impact attributes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. (see explanation below)	Rate of dispersal R - rapid M - moderate S - slow
* <i>Acacia longifolia</i>	H	1,2,4,6,7,8,9	M
* <i>Arctotheca calendula</i>	H	8,9	R
* <i>Asparagus asparagoides</i>	H	6,7,8,9	R
* <i>Avena barbata</i>	H		R
* <i>Azolla filiculoides</i>	L		M
* <i>Briza maxima</i>	U		R
* <i>Briza minor</i>	U		R
* <i>Bromus diandrus</i>	H		R
* <i>Carpobrotus edulis</i>	H	8,9	R
* <i>Cortaderia selloana</i>	H	1,6,7,8,9	R
* <i>Cotula coronopifolia</i>	U		R
* <i>Cotula turbinata</i>	L		M
* <i>Cynodon dactylon</i>	H	9	R
* <i>Cyperus congestus</i>	U		M
* <i>Cyperus tenellus</i>	L		U
* <i>Disa bracteata</i>	U		R
* <i>Dittrichia graveolens</i>	M		R
* <i>Echium plantagineum</i>	H	Increasing	R
* <i>Ehrharta calycina</i>	H	1,2,6,8,9	R
* <i>Ehrharta longiflora</i>	H	1,2,6,8,9	R
* <i>Eragrostis curvula</i>	H		R
* <i>Erodium botrys</i>	U		M
* <i>Eucalyptus robusta</i>	Not listed		
* <i>Euphorbia terracina</i>	H	8,9	R
* <i>Ficus carica</i>	H		M
* <i>Fumaria capreolata</i>	H	7,9	R
* <i>Gladiolus caryophyllaceus</i>	H		R
* <i>Gomphocarpus fruticosus</i>	H	9	R
* <i>Holcus lanatus</i>	H		U
* <i>Hypochaeris glabra</i>	H		R
* <i>Isolepis marginata</i>	U		U
* <i>Juncus acutus</i>	H	1,3,4,7,8,9	R
* <i>Juncus bufonius</i>	U		R
* <i>Juncus capitatus</i>	U		R
* <i>Lolium multiflorum</i>	Not listed		
* <i>Lotus subbiflorus</i>	U		R
* <i>Lupinus angustifolia</i>	H		M
* <i>Lupinus cosentinii</i>	H		M
* <i>Lythrum hyssopifolia</i>	M		R
* <i>Medicago polymorpha</i>	L		
* <i>Moraea flaccida</i>	H	8,9	R
* <i>Nerium oleander</i>	L		R
* <i>Oenothera stricta</i>	L		M

Species	Ecological Impacts		Invasiveness
	Ecological impact L - low impact M - medium impact H - high impact U - unknown impact	Impact attributes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. (see explanation below)	Rate of dispersal R - rapid M - moderate S - slow
<i>*Ornithopus sativus</i>	M		R
<i>*Paspalum urvillei</i>	H		M
<i>*Pennisetum clandestinum</i>	H		S
<i>*Persicaria maculosa</i>	L		U
<i>*Populus nigra</i>	L		S
<i>*Ranunculus muricata</i>	L		U
<i>*Raphanus raphanistrum</i>	U		M
<i>*Ricinus communis</i>	M	2,8,9	R
<i>*Romulea rosea</i>	U		R
<i>*Rumex crispus</i>	U		R
<i>*Schinus terebinthifolia</i>	H	3,7,8,9	M
<i>*Solanum americanum</i>	U		R
<i>*Solanum nigrum</i>	M		R
<i>*Sonchus asper</i>	U		R
<i>*Sonchus oleraceus</i>	U	Increasing	R
<i>*Trachyandra divaricata</i>	M	1,4,9	R
<i>*Trifolium campestre</i>	U		U
<i>*Trifolium hirtum</i>	U		U
<i>*Typha orientalis</i>	H	2,3,5,6,7,9	R
<i>*Ursinia anthemoides</i>	U	Increasing	R
<i>*Vulpia bromoides</i>	H		R
<i>*Wahlenbergia capensis</i>	U		R
<i>*Zantedeschia aethiopicum</i>	H	6,7,8,9,10	R

Impact Attributes: 1 - changed fire regime; 2 - changed nutrient conditions; 3 - changed hydrological patterns; 4 - changed soil erosion patterns; 5 - changed geomorphological processes; 6 - changed biomass distribution; 7 - changed light distribution; 8 - loss of biodiversity; 9 - substantially reduces regeneration opportunities of native plants; 10 - allelopathic effects. Increasing means that the weed is increasing its distribution from original known areas.

The common weeds, which were identified as those occurring at a coverage of 5% or greater in at least one of the botanical plots surveyed, are as follows:

- *Arctotheca calendula*
- *Avena barbata*
- *Briza maxima*
- *Bromus diandrus*
- *Carpobrotus edulis*
- *Cynodon dactylon*
- *Cyperus tenellus*
- *Ehrharta calycina*
- *Ehrharta longiflora*
- *Eragrostis curvula*
- *Eucalyptus robusta*
- *Hypochaeris glabra*
- *Isolepis marginata*

- *Juncus bufonius*
- *Lotus subbiflorus*
- *Lupinus angustifolia*
- *Moraea flaccida*
- *Populus nigra*
- *Romulea rosea*
- *Vulpia bromoides*
- *Zantedeschia aethiopicum*

2.4 Fauna and Habitat

A fauna survey was undertaken on 10 August 2012 by Coterra Environment. The survey identified a number of waterbird and bushland bird species utilising and / or occurring within the site, though no conservation significant species were identified. Mammals identified at the site included the western grey kangaroo (*Macropus fuliginosus*) and the European rabbit (*Oryctolagus cuniculus*), which appears to have colonised many of the drier areas of the site. One reptile, a tiger snake (*Notechis ater*), was identified during the site visit.

A black cockatoo habitat assessment was undertaken as part of the fauna survey. Results are summarised as follows:

- The Level 2 Flora and Vegetation Survey (Bennett Environmental Consulting, 2011), identified four vegetation types within the site containing plant species that provide potential black cockatoo foraging habitat (Ba, Bi, Et, EM) (Figure 5).
- Two black cockatoo species were identified through database searches as potentially occurring within the site, or having been previously recorded in the vicinity:
 - Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*)
 - Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*)
- No potential breeding habitat trees were found within the site.
- No potential roosting habitat trees were found within the site (no trees were considered sufficiently tall or structurally complex to provide core roosting habitat).
- Three types of foraging habitat were identified within the site, and the locations of these habitat areas are mapped in Figure 7:
 - Good quality *Eucalyptus todtiana* foraging habitat
 - Good quality *Banksia* sp. foraging habitat
 - Poor quality *Banksia* sp. foraging habitat
- A thorough search was undertaken for cockatoo feeding signs, though there was no evidence of cockatoos utilising the area for feeding across the entire site.
- No signs of black cockatoos were noted during the field survey.

2.5 Land Uses

2.5.1 Dampier to Bunbury Gas Pipeline

The Dampier to Bunbury high pressure natural gas pipeline (DBNGP) traverses the site. The pipeline is located within an easement and is managed by DBP Transmission. The location of the pipeline is shown on Figure 8.

Western Australian Planning Commission (WAPC) Planning Bulletin 87 - *High Pressure Gas Transmission Pipelines in the Perth Metropolitan Region*, notes that while the corridor/easements may be used as public open space there are restrictions on the landscaping and amenities that may be installed. Line of sight should be preserved along the length of the pipeline where possible, and this typically restricts landscaping/revegetation to grasses, groundcovers and low shrubs (WAPC, 2007).

2.5.2 Jandakot Regional Park / Bush Forever

The site is located adjacent to conservation areas which form part of the Jandakot Regional Park. The adjacent bushland reserve also forms part of Bush Forever Site 344 – Denis De Young Reserve and Gibbs Road Swamp Bushland, Banjup/Forrestdale (WAPC, 2000) (Figure 8).

This conservation area is described as containing:

- Vegetation from the Southern Rivers Complex and the Bassendean Complex – Central and South (Hedde et al., 1980).
- Upland vegetation: *Banksia attenuata* and *B. menziesii* Low Woodland; *Banksia attenuata* Low Woodland with scattered *B. menziesii*, *B. ilicifolia* and *Eucalyptus todtiana*
- Wetland vegetation: *Melaleuca preissiana* Low Woodland to Forest sometimes over *Baumea juncea* Sedgeland; *Melaleuca raphiophylla* Low Open Forest; *Pericalymma ellipticum*, *Astartea aff. fascicularis*, *Aotus intermedia* and *Calothamnus lateralis* Closed Heath; *Pericalymma ellipticum* Closed Heath; *Baumea juncea* and *B. articulata* Sedgelands.
- Vegetation condition: >60% Excellent to Very Good, <40% Good to Degraded, with areas of severe localised disturbance.

3.0 REVEGETATION PROGRAM

Revegetation is proposed across approximately 10.9ha of the site by the time the full development is complete. The revegetation program is proposed to include pre-planting weed control, site preparation, seedling planting and post-installation monitoring. The program has been designed with specialist input from Tranen Revegetation Systems to ensure the species selection and the proposed revegetation methodology is appropriate for the site conditions.

The details of the proposed program are summarised below.

3.1 Areas Proposed for Revegetation

The following areas are proposed to be included within the full revegetation program:

- Approximately 5.4ha within the REW and buffer zone at the eastern end of the property. This re-vegetation will predominantly consist of wetland species, but where appropriate, species which can also be utilized by Cockatoos will also be used.
- Revegetation of approximately 5.5ha within the eastern half of the site with a mixture of upland and wetland species as appropriate.

The areas proposed for initial revegetation as part of the Stage 1 construction (which will require clearing of 4.26ha; this equates to 40% of the total clearing area) program are as follows:

- Approximately 5.4ha within the REW and buffer zone at the eastern end of the property over 5 individual 1 year stages (Stages 1A to 1E).

The location of the revegetation areas is shown on Figure 9.

3.2 Site Preparation and Initial Weed Control

Weeds are prevalent across much of the degraded areas of the site. African Lovegrass (*Eragrostis curvula*) is one of the main weeds present within the revegetation areas. Based on the difficulty of eradicating this weed, pre-planting weed control will include removal of the weeds and the upper 50mm of the topsoil in areas currently without native vegetation. This process will expose 'clean' soil and promote successful revegetation.

Revegetation planting areas without existing native vegetation will be ripped to a depth of 400mm prior to planting to enhance water infiltration and promote faster plant establishment. In low lying areas ripping and mounding to 200mm above the natural soil profile will be undertaken to raise the planting beds to assist to avoid seedlings being inundated and drowned.

It is noted that ripping may not be permitted within the DBNGP corridor. This will be discussed with the pipeline operator prior to works commencing onsite.

In areas where native vegetation is present and proposed for retention, targeted weed control will be undertaken rather than topsoil removal. Broad scale ripping will not be undertaken in these areas.

3.3 Species Selection

The following species have been selected for use in the rehabilitation based on their natural presence in the local area, and their habitat suitability in relation to the onsite conditions.

Table 2 Revegetation Species List

Species	Growth Form	Upland Habitat	Lowland / Wetland Habitat	Used by Carnaby's Black Cockatoo
<i>Acacia huegelii</i>	Shrub	Y		
<i>Acacia pulchella</i> var. <i>glaberrima</i>	Shrub	Y		
<i>Adenanthos cygnorum</i>	Shrub	Y		
<i>Allocasuarina fraseriana</i>	Tree	Y		
<i>Anigozanthos humilis</i>	Herb	Y		
<i>Anigozanthos manglesii</i>	Herb	Y		
<i>Aotus procumbens</i>	Shrub		Y	
<i>Astartea scoparia</i>	Shrub		Y	
<i>Banksia attenuata</i>	Tree	Y		Y
<i>Banksia ilicifolia</i>	Tree	Y	Y	Y
<i>Banksia menziesii</i>	Tree	Y		Y
<i>Conostylis aculeata</i>	Herb	Y	Y	
<i>Conostylis juncea</i>	Herb	Y		
<i>Daviesia preissii</i>	Shrub	Y		
<i>Dianella divaricata</i>	Herb	Y	Y	
<i>Eucalyptus rudis</i> subsp. <i>rudis</i>	Tree		Y	Y
<i>Eucalyptus totiana</i>	Tree	Y		Y
<i>Gompholobium tomentosum</i>	Shrub	Y		
<i>Haemodorum laxum</i>	Herb	Y		
<i>Haemodorum spicatum</i>	Herb	Y		
<i>Hibbertia racemosa</i>	Shrub	Y	Y	
<i>Hypocalymma angustifolium</i>	Shrub	Y	Y	
<i>Isolepis cernua</i>	Rush / sedge		Y	
<i>Jacksonia furcellata</i>	Shrub	Y		Y
<i>Jacksonia sternbergiana</i>	Shrub	Y		
<i>Juncus pallidus</i>	Rush / sedge		Y	
<i>Kennedia prostrata</i>	Shrub	Y		
<i>Kunzea glabrescens</i>	Shrub		Y	
<i>Lechenaultia floribunda</i>	Shrub	Y	Y	
<i>Melaleuca preissiana</i>	Tree		Y	
<i>Melaleuca raphiophylla</i>	Tree		Y	
<i>Melaleuca teretifolia</i>	Shrub		Y	
<i>Melaleuca viminea</i>	Shrub		Y	
<i>Patersonia occidentalis</i>	Herb	Y	Y	
<i>Pultenaea reticulata</i>	Shrub		Y	
<i>Stirlingia latifolia</i>	Shrub	Y		
<i>Xanthorrhoea brunonis</i>	Shrub	Y		

3.4 Seed Collection

Seed collection will be one of the methods utilised to gain stock for use in the revegetation program. Seeds will be collected from suitable species included on the list above by qualified revegetation personnel and stored in a seed bank system for later usage onsite.

Seed collection is generally undertaken in between October and February. As such, the first seed collection event is proposed to commence in October 2014. It is noted that some clearing will occur prior to this time but the clearing will be restricted to the Stage 1 construction area only and opportunities will continue to exist outside of this area for seed collection.

In areas where vegetation is proposed to be cleared in the future seed collection may utilise up to 100% of the available seeds. In areas where vegetation retention is proposed, seed collection will still be permitted but restricted to a maximum of 20% from any one plant.

Seeds collected from the site will be utilised in the revegetation (either through direct seeding or propagation and planting), but will also be supplemented with purchased tubestock. This will ensure adequate numbers of revegetation stock are available and will allow for purchase of plant which have proved difficult to grow from onsite seeds, or which are propagated by other methods.

The seed collection program is proposed to be undertaken for two years to develop the seed bank for future use at the site.

3.5 Plant Density

Revegetation Stage 1A to 1E (as discussed in Section 3.7) will have a target density of 4 plants/m². The target structure will comprise 30% over-storey, 30% middle-storey and 40% understorey species.

Revegetation Stages 2C to 2E will have a target density of 1 mature tree and 1 shrub/5m².

Revegetation stages 2A and 2B are primarily supplementary planting areas. As such the goal of the revegetation program will be to remove weeds and allow natural regrowth to occur. Target outcomes are further discussed in Section 4.2.

Revegetation areas within the DBNGP easement will only be planted with low height middle storey and understorey species to address pipeline safety requirements. The final selection of species and planting plans for this corridor will be discussed with the pipeline operators prior to commencing works.

Planting will also not be undertaken in designated firebreak areas. These areas are generally identified as a 3m wide track along the property boundary. Full details are provided in the Lot 2 Nicholson Road Fire Management Plan.

Tubestock planting may be reduced if direct seeding is used, but the above density targets will still be used to assess success of the program once the seed stock has germinated.

3.6 Post-planting Weed Control

Following planting of the seedlings in autumn/spring, follow-up weed control within the planting stage extent will be undertaken over the subsequent 12 months as required. The annual weed control program will be planned in detail following receipt of the annual monitoring report which will identify weed species and coverage in the revegetation zones.

The need for additional weed control in each revegetation stage would be assessed during the annual monitoring event. Recommendations would be outlined in the summary monitoring report.

Recommended weed control techniques for the common species present at the site are summarised below:

Table 3 Recommended Weed Control Methods

Species	Common Name	Recommended Control Method
<i>Arctotheca calendula</i>	Cape Weed	Spray with Lonrel in early growth stages and Glyphosate at any growth stage.
<i>Avena barbata</i>	Bearded Oat	Spray at 3-5 leaf stage with Fusilade 10mL/10L (500mL/ha).
<i>Briza maxima</i>	Blowfly grass	Prevent seed set - hand pull or spray at 3-5 leaf stage with Fusilade.
<i>Bromus diandrus</i>	Great Brome	Hand pull or Spray at 3-5 leaf stage with Fusilade 10mL/10L (500mL/ha).
<i>Carpobrotus edulis</i>	Pigface	Roll up large mats removing all root and stem fragments; spray with glyphosate.
<i>Cynodon dactylon</i>	Couch	Shade out; spray with Fusilade or glyphosate. Undertake works in late spring/summer then in autumn.
<i>Cyperus tenellus</i>	Tiny Flat-sedge	Glyphosate 1% plus pulse (Roundup Biactive in wet areas)
<i>Ehrharta calycina</i>	Perennial Veldgrass	Cut out; spray with Fusilade. Do not slash.
<i>Ehrharta longiflora</i>	Annual Veldgrass	Hand pull; spray with Fusilade.
<i>Eragrostis curvula</i>	African Lovegrass	Cut out small plants; spray with glyphosate.
<i>Eucalyptus robusta</i>	Swamp Mahogany	Young saplings - hand pull isolated plants, or basal bark (spray stem with mix of 16 mL triclopyr per 1 L diesel). Larger trees - cut and paint stump with 16 mL triclopyr per 1 L diesel. Regrowth - foliar spray 1.5% glyphosate.
<i>Hypochaeris glabra</i>	Flat weed	Wipe rosettes with glyphosate. For dense infestations use Lontrel.
<i>Isolepis marginata</i>	Tiny or Coarse Club-rush	Glyphosate 1% plus pulse (Roundup Biactive in wet areas)
<i>Juncus bufonius</i>	Toad Rush	Glyphosate 1% plus pulse (Roundup Biactive in wet areas)
<i>Lotus subbiflorus</i>	Hairy bird's-foot trefoil	Lontrel 4 g / 10 L plus wetting agent, or glyphosate 2% plus pulse.
<i>Lupinus angustifolia</i>	Narrowleaf Lupin	Hand remove scattered plants. Spray dense infestations with metsulfuron-methyl or Lontrel.
<i>Moraea flaccida</i>	One Leaf Cape Tulip	Spot spray with metsulfuron methyl or chorsulfuron. Spray just on flowering - Sept/Nov.

Species	Common Name	Recommended Control Method
<i>Populus nigra</i>	Lombardy Poplar	Basal bark - 25% trichlor; injection - 70% glyphosate, foliar spray regrowth.
<i>Romulea rosea</i>	Guildford Grass	Spot spray with metsulfuron methyl. Spray just on flowering - Aug/Oct.
<i>Vulpia bromoides</i>	Squirrel's Tail Fescue	Prevent seed set; hand pull; spray with Select prior to boot stage.
<i>Zantedeschia aethiopicum</i>	Arum Lily	Spot spray with metsulfuron or chlorsulfuron. Apply spray anytime between June and September.

Sources: Brown & Brooks, 2002; D Grose (Tranen Revegetation Systems) *pers comm.*, March 2013

3.7 Timing and Staging

The revegetation program will be staged over approximately 10 years to coincide with progressive development of the campus. As such approximately 1ha/year will undergo revegetation works for the Stage 1 area, with the Stage 2 area timing divided according to the existing characteristics of the site. Stage boundary locations are shown on Figure 9.

Based on the above, the timing of the stages in relation to timing of the campus development is summarised as follows:

Stage 1 campus development (commence in 2014)

- Stage 1A revegetation (commence in Year 1; 2015) - 1 ha
- Stage 1B revegetation (commence in Year 2; 2016) - 1 ha
- Stage 1C revegetation (commence in Year 3; 2017) - 1 ha
- Stage 1D revegetation (commence in Year 4; 2018) - 1 ha
- Stage 1E revegetation (commence in Year 5; 2019) - 1.4ha

Remaining extent of campus development, assuming approval for the remaining area is provided all at one time

- Stage 2A revegetation - 1.79ha
- Stage 2B revegetation - 0.63ha
- Stage 2C revegetation - 0.90ha
- Stage 2D revegetation - 0.93ha
- Stage 2E revegetation - 1.22ha

The following timing is proposed for the revegetation stages of the project:

Table 4 Proposed Timing

Activity	Timing
Revegetation area fence installation	Prior to site works commencing
Removal of existing weeds and 50mm topsoil in selected areas	Summer/autumn prior to revegetation works in each revegetation stage
Ripping of planting zone	Autumn prior to planting in each revegetation stage
Install seedlings	Autumn/winter in each revegetation stage

Activity	Timing
Ongoing weed control	Autumn and spring (as required) in each revegetation stage
Monitoring	Spring throughout the revegetation program duration and for three years post-program i.e. spring in the year of planting plus 2 additional years (see Section 4.0 and 6.2)

Should Carey Baptist College wish to combine some of the revegetation stages to compress the overall timeframe, the above list of actions will still be undertaken for each of the combined stage areas.

3.8 Delineation and Access Control

Revegetation areas will be fenced using rural style fencing with a rabbit proof skirt attached to the bottom to prevent damage to the planted vegetation from rabbits. The fence will be aligned along the DBNGP corridor boundary in the northern end of the site to avoid multiple crossing points over the corridor. Within this part of the revegetation area, and any other areas where fencing is not practical, individual tree guards will be used to protect seedlings from predation.

Proposed fencing locations are outlined on Figure 9.

4.0 MONITORING AND ASSESSMENT

4.1 Monitoring

At the end of each annual installation period, a report will be produced detailing the quantities of seedlings planted. This can then be used as the baseline data for future assessments.

Assessments into planting success will be undertaken each spring during the establishment period, and for three years after this phase is complete. The following indicators will be assessed:

- Range of species present in revegetation zones and health of planted vegetation
- Presence of weeds in the revegetation zone (including an estimated density / percentage cover)
- Comments on estimated mortality for planted vegetation to allow for survival rate to be estimated
- Collection of photography from designated locations to build up a photographic record of progress for the site.

The monitoring methodology will utilise establishment of permanent monitoring quadrats within each revegetation stage, as well as establishment of photo point monitoring locations.

A summary monitoring report will be produced annually and submitted to DEC which outlines the findings of the above program.

4.2 Performance Targets

The following performance targets have been set for the revegetation program.

Table 5 Performance Targets

Characteristic	Minimum Target / KPI
Plant density and Structure	<u>Stage 1A to 1E</u>
	4 plants / m ²
	30% over-storey, 30% middle-storey, 40% understorey
	<u>Stages 2C to 2E</u>
	1 mature tree and 1 shrub / 5m ²
	<u>Stages 2A and 2B</u>
	Vegetation condition to achieve Very Good-Good in accordance with the Keighley scale
Species composition	75% of revegetation species list
Weed cover	<20% in all areas

Adherence to these performance targets will be assessed during each annual monitoring event. Should the performance targets not be met in revegetation stages at the end of the first 12 months maintenance period after planting, remedial works which may be implemented include:

- Additional revegetation works to increase plant densities and species representation
- Weed management
- Rubbish removal
- Fauna control
- Continuing/maintaining plant protection measures (e.g. tree guards) and removing when no longer required.

If remedial works are implemented, performance targets would be further assessed for these areas in next annual monitoring event.

5.0 WETLAND MANAGEMENT

The following section identifies wetland management actions, in addition to revegetation works and weed control, which will be undertaken for the onsite Resource Enhancement Wetland (REW) and buffer and Conservation Category Wetland (CCW) buffers zone.

5.1 Access Management

Access to the wetland and buffer areas onsite will be controlled through fencing and signage. The CCW buffer areas will be fenced, as shown on Figure 9, to prevent access which may disturb the revegetation works. Access to this area will generally be restricted to those undertaking revegetation works or general site maintenance.

The timing for installation of the CCW buffer area fence will coincide with commencement of the Stage 2 school construction works, as the Stage 1 works will not occur within the vicinity of this area.

A firebreak will be maintained around the boundary of the site for safety purposes. This firebreak will be accessible to vehicles for maintenance works as required.

The REW wetland is located at the front of the school site. Access to the wetland will be managed through signage and provision of information/directions to students and parents which will identify that this is a revegetation area and not to be traversed.

5.2 Drainage Management

Drainage is not proposed to be directly towards any of the CCW buffer area. The REW buffer zone will incorporate an infiltration area for stormwater for flows up to the 1 in 5 year ARI capacity. Stormwater from events of greater intensity, which result in overtopping of the infiltration area, would then follow the natural flow paths within the REW area. This will allow for maintenance of natural hydraulic functioning via allowing a controlled flow of water to the lower lying areas of the landscape.

5.3 Educational Opportunities

The wetland areas onsite are viewed by Carey Baptist College as providing key opportunities for environmental education at the school. It is proposed to allow students the opportunity to view and potentially participate in the revegetation and management works to facilitate a greater awareness of the local environmental values of the area. Inclusion of specific items in the school curriculum will be reviewed as the school grows and develops.

6.0 IMPLEMENTATION

6.1 Roles and Responsibilities

Roles and responsibilities for implementation of the Revegetation Plan are summarised on Table 6.

Table 6 Implementation Summary

Issue	Action	Timing	Responsibility
Site Preparation	Removal of topsoil in areas devoid of native vegetation. Targeted weed control in areas with vegetation to be retained.	Prior to planting of each stage.	Carey Baptist College
Access Control	Installation of fencing and signage to wetland and revegetation areas	Prior to revegetation works commencing within these areas	Carey Baptist College
Seed Collection	Harvesting of seeds onsite for future planting	October to February in Year 1 (2014/2015) and Year 2 (2015/2016)	Carey Baptist College
Revegetation Planting	Planting of seedlings	Autumn/spring at the commencement of each revegetation stage	Carey Baptist College
Weed Control	Ongoing weed control	Autumn/spring (as required) for 3 years post planting of each stage	Carey Baptist College
Assessment of Success	Onsite monitoring Reporting of monitoring results	Monitoring to be undertaken annually in spring for 3 years post planting of each stage. Summary report to be produced annually (by the end of summer and covering the previous January - December time period) outlining: <ul style="list-style-type: none"> • planting undertaken in the previous 12 months; • monitoring results; • assessment of progress against KPIs; and • any remedial actions implemented. 	Monitoring and Reporting - Carey Baptist College Review of Monitoring Report - DEC
Remedial Actions	Assess need for remedial actions annually. Implement if required.	Assessment undertaken when summary report is being produced. Implementation action undertaken when seasonally appropriate.	Carey Baptist College

6.2 Timing

The Revegetation Project staging and timing is summarised on Chart 1. The timing is based on the anticipated 10 stage program.

Should Carey Baptist College wish to combine some of the stages to compress the overall timeframe this can be achieved with a modification to the program. The DEC will be advised of any such modifications in the annual summary report, which will be issued at the conclusion of each annual monitoring period.

Chart 1 Staging and Timing Summary

Stage	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
STAGE 1 - WORK TO BE COMMENCED IN 2015													
Preliminary	Seed Collection												
Stage 1A (1ha)	Removal of Topsoil (50mm) in areas without Native Vegetation & Soil Ripping												
	Planting												
	Weed Control (as required) Remedial Works (if required)												
Stage 1B (1ha)	Removal of Topsoil (50mm) in areas without Native Vegetation & Soil Ripping												
	Planting												
	Weed Control (as required) Remedial Works (if required)												
Stage 1C (1ha)	Removal of Topsoil (50mm) in areas without Native Vegetation & Soil Ripping												
	Planting												
	Weed Control (as required) Remedial Works (if required)												
Stage 1D (1ha)	Removal of Topsoil (50mm) in areas without Native Vegetation & Soil Ripping												
	Planting												
	Weed Control (as required) Remedial Works (if required)												
Stage 1E (1.4ha)	Removal of Topsoil (50mm) in areas without Native Vegetation & Soil Ripping												
	Planting												
	Weed Control (as required) Remedial Works (if required)												
Monitoring													
Reporting													
STAGE 2 - WORK TO BE UNDERTAKEN ONCE THE REMAINING STAGE OF THE SCHOOL IS APPROVED (ASSUMING THIS IS APPROVED ALL IN ONE APPROVAL)													
Preliminary	Seed Collection												
	Revegetation Fencing												
Stage 2A (Xha)	Removal of Topsoil (50mm) in areas without Native Vegetation & Soil Ripping												
	Planting												
	Weed Control (as required) Remedial Works (if required)												
Stage 2B (Xha)	Removal of Topsoil (50mm) in areas without Native Vegetation & Soil Ripping												
	Planting												
	Weed Control (as required) Remedial Works (if required)												
Stage 2C (Xha)	Removal of Topsoil (50mm) in areas without Native Vegetation & Soil Ripping												
	Planting												
	Weed Control (as required) Remedial Works (if required)												
Stage 2D (Xha)	Removal of Topsoil (50mm) in areas without Native Vegetation & Soil Ripping												
	Planting												
	Weed Control (as required) Remedial Works (if required)												
Stage 2E (Xha)	Removal of Topsoil (50mm) in areas without Native Vegetation & Soil Ripping												
	Planting												
	Weed Control (as required) Remedial Works (if required)												
Monitoring													
Reporting													

6.3 Long-Term Security of Revegetation Areas

The revegetation areas will remain under the ownership of Carey Baptist College. The fencing installed prior to revegetation works being undertaken will be maintained as required to prevent unauthorised access into these areas.

Passive surveillance of the revegetation areas will be undertaken by maintenance staff at the college, as well as students and teachers utilising adjacent college facilities.

It is proposed to have students of the college participate in the revegetation program. This would involve student participation in:

- Seedling planting (including education regarding native plants of this area (e.g. typical wetland plants, typical banksia woodland plants etc.)
- Identifying the presence of weeds and factors which contribute to their spread
- Discussion of program outcomes

This is envisaged to not only benefit protection of revegetation areas onsite, but also contribute to greater environmental awareness and responsibility within the school catchment and associated local community.

Once revegetation is concluded in each stage, these areas would be available as a continued teaching resource for the school. As they will remain in private ownership, they can be protected from unauthorised usage such as 4WD access.

6.4 Term of the Plan

This plan will be implemented from the year site work commences (anticipated to be 2014) to two years after the last revegetation area plantings are undertaken.

7.0 SUMMARY

This Revegetation Plan addresses the requirements of the DEC (as outlined in correspondence dated May 2012) and the City of Armadale (as outlined within the Development Services Committee minutes dated 25 March 2013). The actions proposed in this plan to address these requirements are summarised below.

Table 7 Summary of DEC Requirements and Actions

DEC Requirement	Action
<i>A map outlining the boundary of the above areas to be retained and vegetated</i>	Figure 9
<i>A Revegetation Plan outlining the following:</i>	
<i>(a) Details on how Carey Baptist College Inc will ensure the long term (10-30 years) security of the vegetation site</i>	<p>Revegetation site security will include:</p> <ul style="list-style-type: none"> • Ownership control • Fencing provision and maintenance • Ongoing surveillance during and post-program • Prevention of unauthorised access during and post-program <p>(Section 6.3)</p>
<i>(b) Details on the measureable component of the revegetation and weed removal activities to be undertaken. For example:</i>	<p>Target Density and Structure</p> <p><i>Stage 1A to 1E</i></p> <ul style="list-style-type: none"> • 4 plants / m² • 30% over-storey, 30% middle-storey, 40% understorey <p><i>Stages 2C to 2E</i></p> <ul style="list-style-type: none"> • 1 mature tree and 1 shrub / 5m² <p><i>Stages 2A and 2B</i></p> <ul style="list-style-type: none"> • Vegetation condition to achieve Very Good-Good in accordance with the Keighery scale <p>Target Composition</p> <ul style="list-style-type: none"> • 75% of species listed on Revegetation Species List (Table 2) <p>Weed Coverage Target</p> <ul style="list-style-type: none"> • <20% weeds <p>Timing</p> <ul style="list-style-type: none"> • Revegetation to be undertaken in approximately 10 x 1ha stages • Aim for KPI to be achieved for each stage 12 months after planting was undertaken. • Additional monitoring and maintenance to be undertaken in each stage for a further 2 years from this date. <p>(See Section 4.2)</p>
<i>(c) A species list detailing which species will be planted</i>	Table 2, Section 3.3

DEC Requirement	Action
<p>(d) <i>Brief details on mitigation and maintenance activities (i.e. follow up planting if target density is not reached, follow up weeding) and associated timeline</i></p>	<p>Remedial works which may be implemented include:</p> <ul style="list-style-type: none"> • Additional revegetation works to increase plant densities and species representation • Weed management • Rubbish removal • Fauna control • Continuing/maintaining plant protection measures (e.g. tree guards) and removing when no longer required. <p>To be undertaken 12 months after planting if required.</p> <p>(See Section 4.2)</p>
<p>(e) <i>Monitoring schedule and details on the monitoring method used to establish if targets are being met (i.e. transects, quadrats, photos, plots etc)</i></p>	<p>Annual monitoring of revegetation areas for the following:</p> <ul style="list-style-type: none"> • Range of species present in revegetation zones and health of planted vegetation • Presence of weeds in the revegetation zone (including an estimated density / percentage cover) • Comments on estimated mortality for planted vegetation to allow for survival rate to be estimated • Collection of photography from designated located to build up a photographic record of progress for the site. <p>Monitoring to include establishment of plots and collection of photographs.</p> <p>(See Section 4.1)</p>
<p>(f) <i>Timeline for re-vegetation and weed control should be a minimum of 5 years.</i></p>	<p>Revegetation and weed control program for the site to be undertaken for a minimum of 12 years to account for timing of the different stages.</p> <p>(See Chart 1, Section 6.2)</p>
<p><i>Please also note that Carey Baptist College Inc should commit to at least 5 years of monitoring and maintenance activities due to risk of failure.</i></p>	<p>Monitoring and maintenance program is anticipated to be undertaken for a minimum of 12 years to account for timing of the different stages.</p> <p>(See Chart 1, Section 6.2)</p>

Table 8 Summary of City of Armadale Requirements and Actions

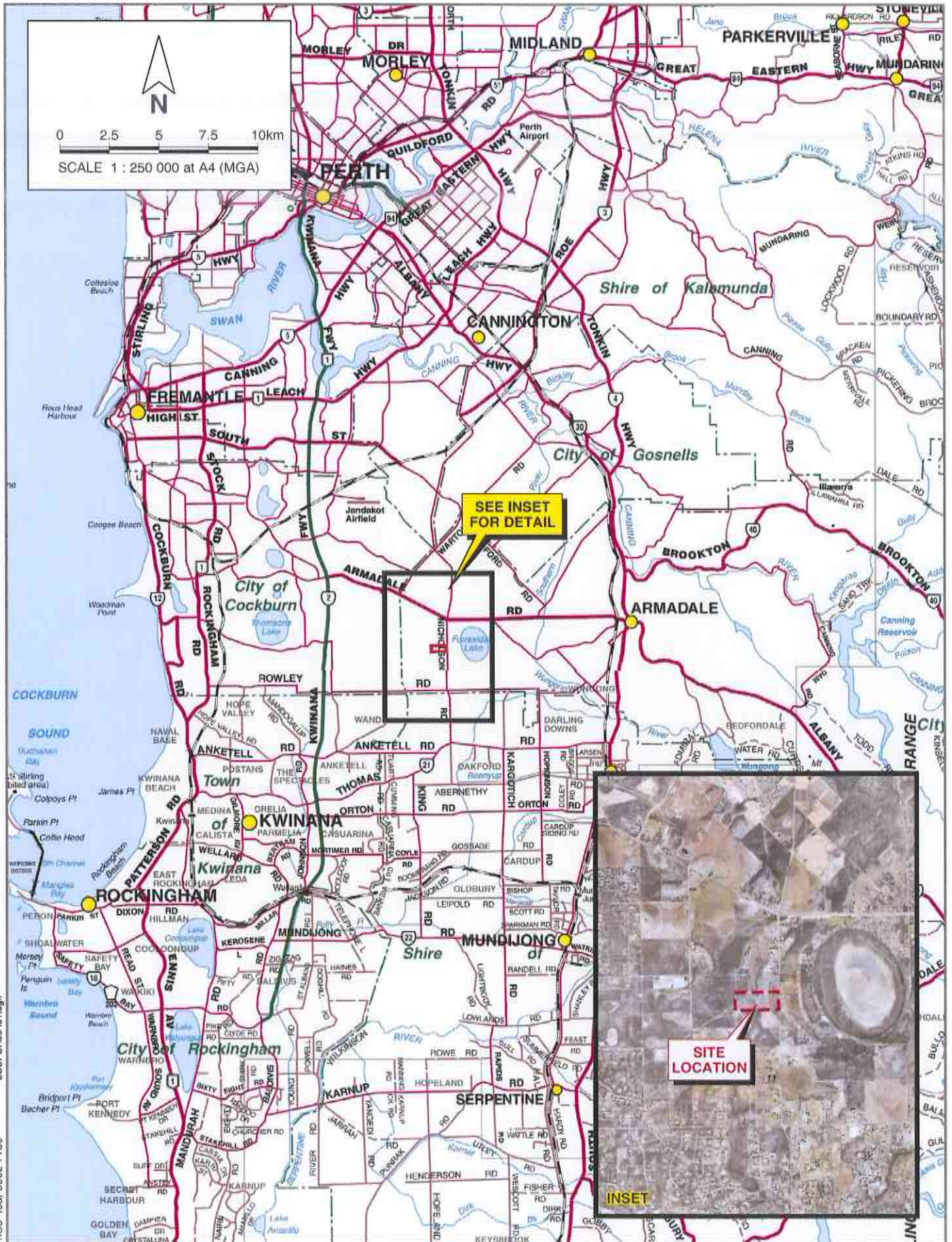
CoA Requirement	Action
<p>Condition 1(b) – <i>A wetland management plan for the Resource Enhancement wetland and the Conservation category wetland buffer, is to be submitted for approval by the Executive Director Development Services prior to the commencement of any site works, and implemented to the satisfaction of the Executive Director Development Services (on advice from the Department of Environment and Conservation)</i></p>	<p>Wetland Management is included as follows:</p> <ul style="list-style-type: none"> • Revegetation and weed control program (Section 3.0) • Access management (Section 5.1) • Drainage management (Section 5.2) • Education (Section 5.3) • Success targets and monitoring (Section 4.0) • Responsibilities (Section 6.1)
<p>Condition 1(d) – <i>Submission and implementation of a Weed Control Management Plan, including what weeds are present on the subject lot, what chemicals will be utilised for which weeds and appropriate timing of weed control based on weed species, to the satisfaction of the Executive Director Development Services</i></p>	<p>Information is provided as follows:</p> <ul style="list-style-type: none"> • Weeds present onsite summarised in Table 1. • Timing and chemical proposed for use in the weed control program provided in Table 3. <p>(See Sections 2.3.5, 3.2 and 3.4)</p>
<p>Condition 1(g) – <i>A revegetation plan being prepared, approved and implemented for the revegetation of wetland areas, wetland buffers and other areas of the site outside the development area identified on the Master Plan for the school dated 28 November 2012 with appropriate native species to the satisfaction of the Executive Director Development Services</i></p>	<p>The revegetation program includes:</p> <ul style="list-style-type: none"> • Identification of revegetation areas • Site preparation and weed control • Species selection • Seed collection • Planting density • Post planting weed control • Timing and staging • Delineation and access control <p>(See Section 3.0)</p> <p>Assessment and monitoring is discussed in Section 4.0</p>
<p>Condition 1(h) – <i>A seed bank is to be compiled for native plants existing on Lot 2 for the purpose of growing plants for revegetation and wetland rehabilitation to the satisfaction of the Executive Director Development Services. Collection of seed is to occur in the year prior to any clearing</i></p>	<p>Seed harvesting is proposed to occur in October – February in Year 1 (2013/2014) and Year 2 (2014/2015).</p> <p>(See Section 3.4)</p>

8.0 REFERENCES

- Bennett Environmental Consulting. 2011. *Botanical Assessment of Lot 2 Nicholson Road Forrestdale*. Prepared for Coterra Environment.
- Department of Environment and Conservation. 2010. *NatureMap*. Available: <http://naturemap.dec.wa.gov.au/default.aspx>
- Department of Water. 2010. *Perth Groundwater Atlas* [online]. DoW, Perth. Available: <http://www.water.wa.gov.au/Tools/Maps+and+atlases/Perth+groundwater+atlas/default.aspx#1>
- Environmental Protection Authority. 2004. *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*. EPA Guidance Statement No. 51. EPA, Perth.
- Hedde, E.M. Loneragan, O.W, Havel, J.J. 1980. Vegetation Complexes of the Darling System Western Australia, In. *Atlas of Natural Resources, Darling System, Western Australia*.
- Jordan J.E. 1986. *Armadale, part sheets 2033 1 and 2133 IV, Perth Metropolitan Region*. Environmental Geology Aeries. Geological Survey of Western Australia.
- Western Australian Planning Commission. 2000. *Bush Forever*. WAPC, Perth.
- Western Australian Planning Commission. 2007. *High Pressure Gas Transmission Pipelines in the Perth Metropolitan Region*. Planning Bulletin No. 87. WAPC, Perth.



FIGURES



COTERRA
ENVIRONMENT

Carey Baptist College
REVEGETATION PLAN
LOT 2 NICHOLSON ROAD, FORRESTDAL

Drawn: K. Bennetts Date: 14 Mar 2013
Job: CBCFOR08 Revision: A

SITE LOCATION

Figure 1

CBCFOR06-01.dgn PINPOINT CARTOGRAPHICS 1081 9562 7136



0 20 40 60 80 100m
SCALE 1 : 2 000 at A3 (MGA1)



		Carey Baptist College REVEGETATION PLAN LOT 2 NICHOLSON ROAD, FORRESTDALE	
Design: K. Bennett Job: OBCSC008	Date: 2 Aug 2014 Revision: A	PROPOSED SCHOOL LAYOUT	

Figure 2

Job: CBCF0R06	Revision: A
Drawn: K. Bennetts	Date: 14 Mar 2013

TOPOGRAPHY AND GEOLOGY

Carey Baptist College
REVEGETATION PLAN
LOT 2 NICHOLSON ROAD, FORRESTDALE

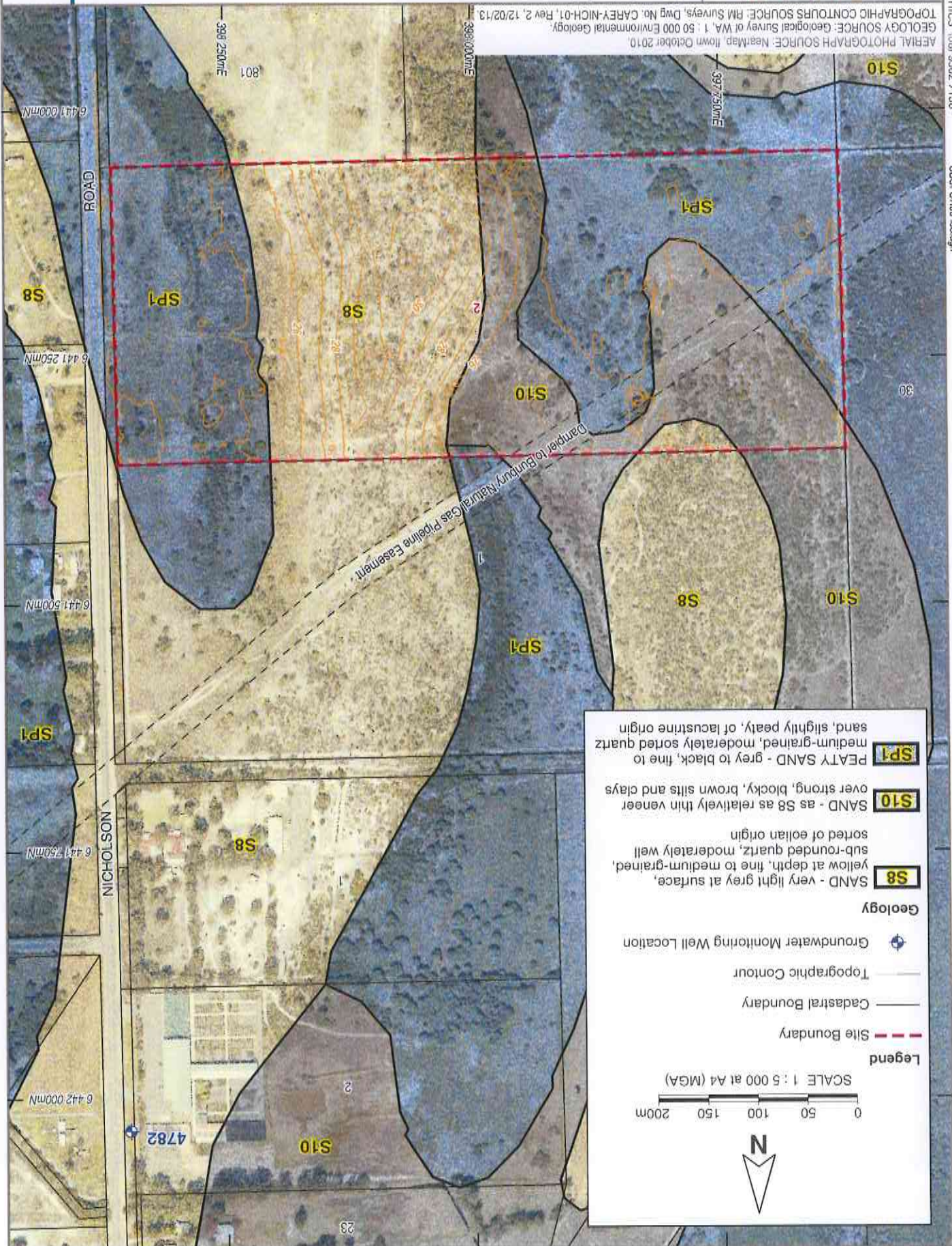
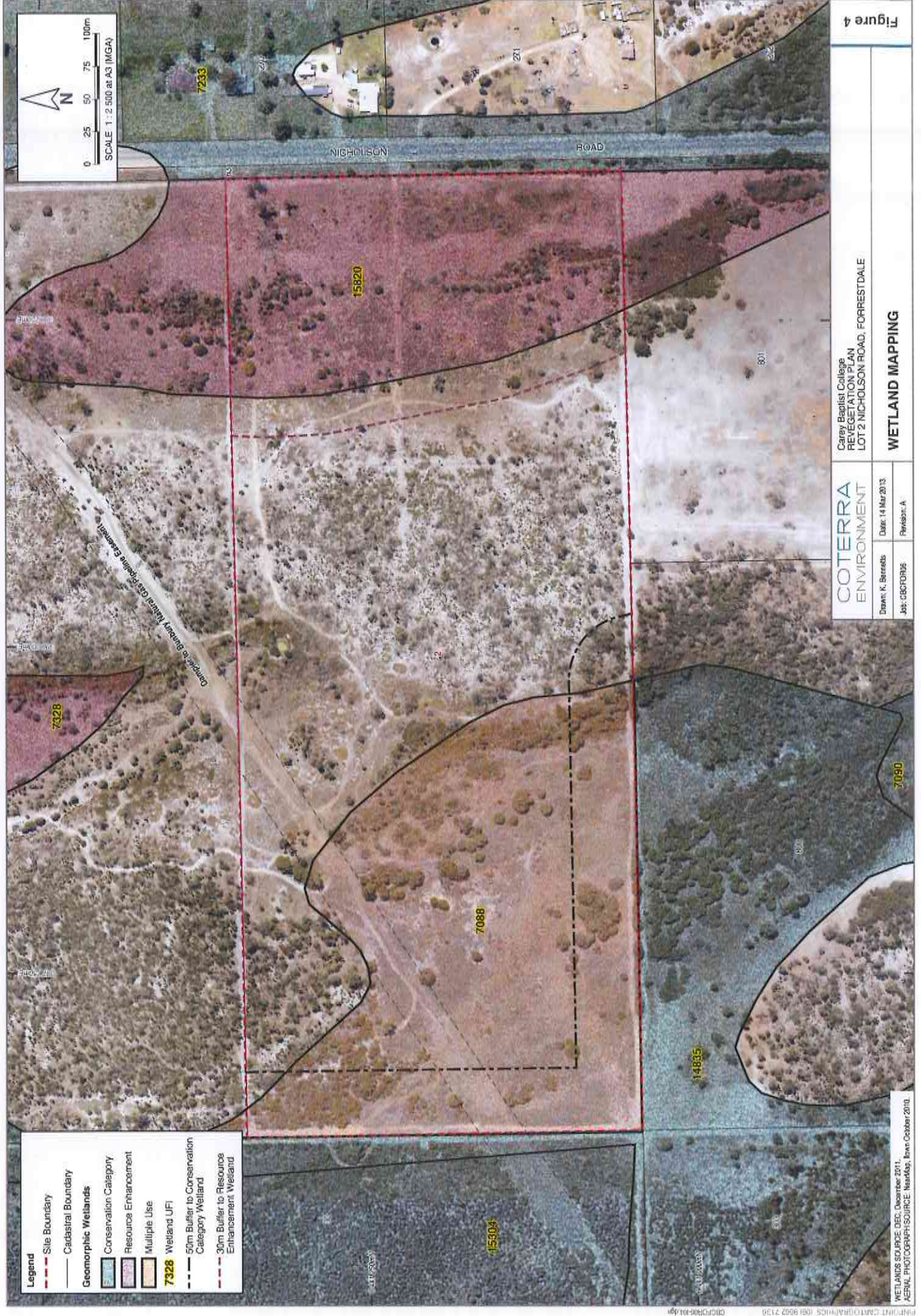


Figure 3

AERIAL PHOTOGRAPH SOURCE: Nearmap, flown October 2010.
GEOLOGY SOURCE: Geological Survey of WA, 1 : 50 000 Environmental Geology.
TOPOGRAPHIC CONTOURS SOURCE: RM Surveys, Dwg No. CAREY-NICH-01, Rev 2, 12/02/13.
398'000mE 397'250mE 396'500mE 396'000mE
6 441 000mN 6 441 250mN 6 441 500mN 6 441 750mN 6 442 000mN
801 2 28 30



- Legend**
- Site Boundary
 - Cadastral Boundary
 - Geomorphic Wetlands**
 - Conservation Category**
 - Resource Enhancement**
 - Multiple Use**
 - Wetland LFI**
 - 50m Buffer to Conservation Category Wetland
 - 30m Buffer to Resource Enhancement Wetland

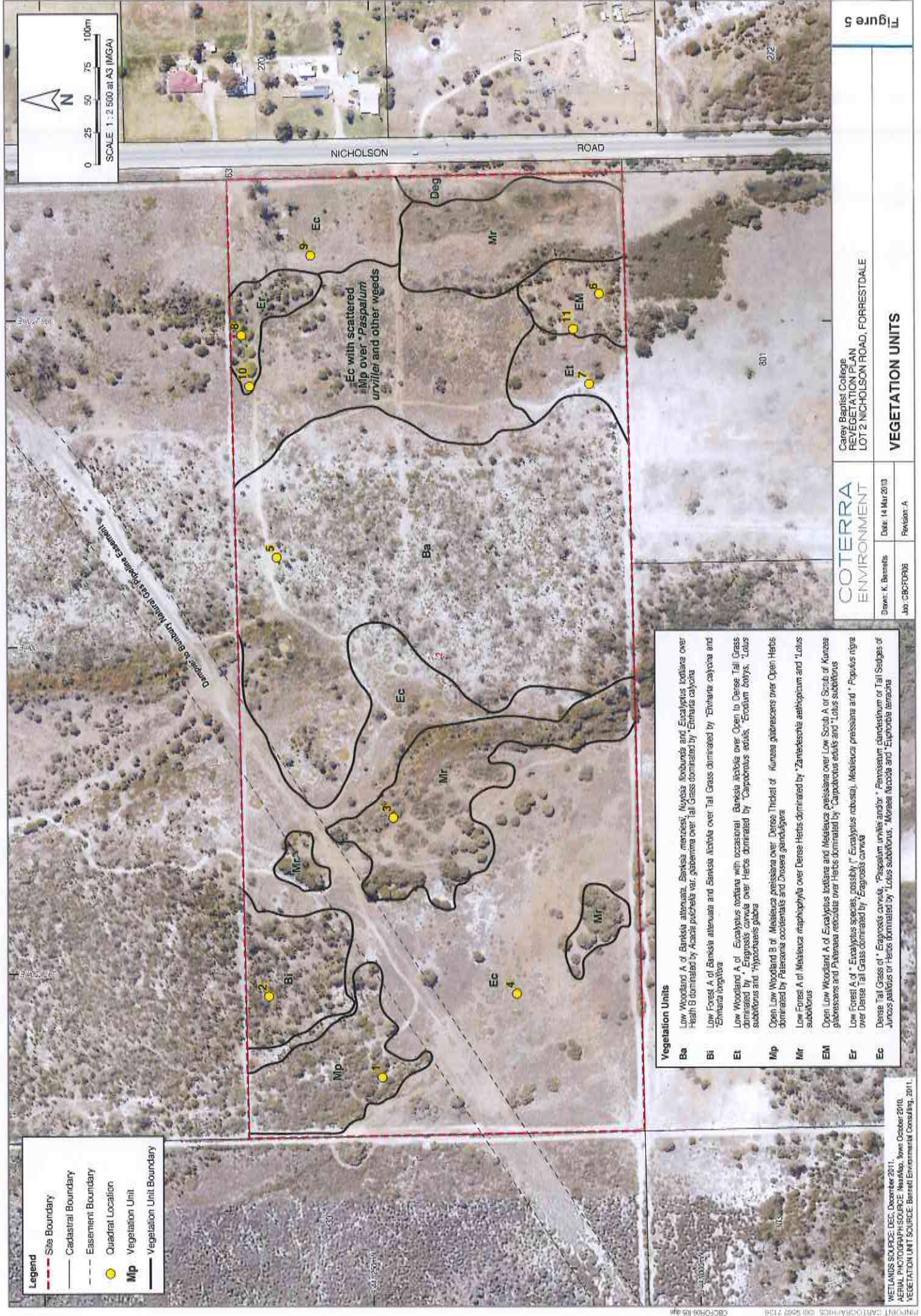
0 25 50 75 100m
 SCALE 1:2 500 at A3 (MGA)

COTERRA ENVIRONMENT
 Carey Baptist College
 REVEGETATION PLAN
 LOT 2 NICHOLSON ROAD, FORRESTDALE
WETLAND MAPPING

Drawn: K. Bennett
 Date: 14 Mar 2013
 Job: CBCFDR06
 Revision: A

Figure 4

WETLANDS SOURCE: DEC, December 2011.
 AERIAL PHOTOGRAPH SOURCE: NearMap, Ikon, October 2010.



- Legend**
- Site Boundary
 - Cadastral Boundary
 - Easement Boundary
 - Quadrat Location
 - Mp Vegetation Unit
 - Vegetation Unit Boundary

Vegetation Units

Ba	Low Woodland A of <i>Banksia attenuata</i> , <i>Banksia menziesii</i> , <i>Nyctea lewinoides</i> and <i>Eucalyptus todtiana</i> over Heath B dominated by <i>Acacia pulchella</i> var. <i>gabermana</i> over Tall Grass dominated by <i>Enriata calycina</i>
Bi	Low Forest A of <i>Banksia attenuata</i> and <i>Banksia lehmannii</i> over Tall Grass dominated by <i>Elivwara calycina</i> and <i>Enriata lewinoides</i>
Ec	Low Woodland A of <i>Eucalyptus todtiana</i> with occasional <i>Banksia lehmannii</i> over Open to Dense Tall Grass dominated by <i>Eragrostis curvula</i> over Herbs dominated by <i>Carpentaria acuta</i> , <i>Erodium corymbosum</i> , <i>Lolium subulatum</i> and <i>Hydrocotyle gibbera</i>
EM	Open Low Woodland B of <i>Mesoleuca prostrata</i> over Dense Thicket of <i>Kunzea gabermana</i> over Open Herbs dominated by <i>Palaemonia occidentalis</i> and <i>Drosera glanduligera</i>
Er	Low Forest A of <i>Eucalyptus todtiana</i> over Dense Herbs dominated by <i>Zantedissia aethiopicum</i> and <i>Lolium subulatum</i>
Mp	Open Low Woodland A of <i>Eucalyptus todtiana</i> and <i>Mesoleuca prostrata</i> over Low Scrub A or Scrub of <i>Kunzea gabermana</i> and <i>Palaemonia occidentalis</i> over Herbs dominated by <i>Carpentaria acuta</i> and <i>Lolium subulatum</i>
Mir	Low Forest A of <i>Eucalyptus todtiana</i> over Dense Herbs dominated by <i>Zantedissia aethiopicum</i> and <i>Lolium subulatum</i>
Deg	Dense Tall Grass of <i>Eragrostis curvula</i> , <i>Paspalum univittatum</i> and <i>Pennisetum clandestinum</i> or Tall Sedges of <i>Juncus pallidus</i> or Herbs dominated by <i>Lolium subulatum</i> , <i>Mesoleuca prostrata</i> and <i>Euphorbia terracina</i>

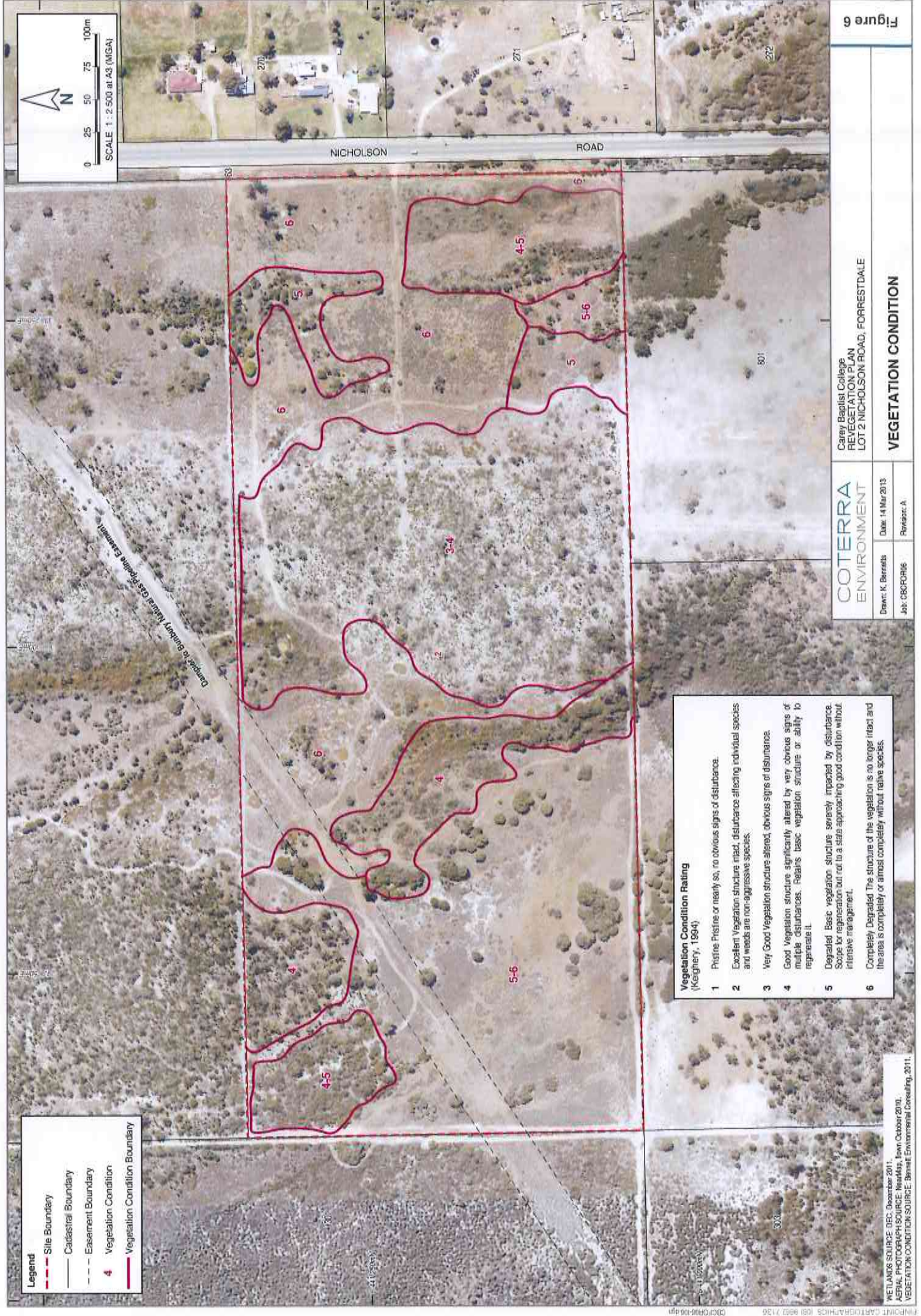
COTERRA ENVIRONMENT

Carey Baptist College
REVEGETATION PLAN
LOT 2 NICHOLSON ROAD, FORRESTDALE

Drawn: K. Bennett Date: 14 Mar 2013
Job: 208CF0065 Revision: A

VEGETATION UNITS

WETLANDS SOURCE: DEC, December 2011.
AERIAL PHOTOGRAPH SOURCE: NearMap, June October 2010.
VEGETATION UNIT SOURCE: Bennett Environmental Consulting, 2011.



Legend

- - - Site Boundary
- - - Cadastral Boundary
- - - Easement Boundary
- 4 Vegetation Condition
- 5-6 Vegetation Condition Boundary

Vegetation Condition Rating
(Keighery, 1994)

- 1 Pristine. Pristine or nearly so, no obvious signs of disturbance.
- 2 Excellent. Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
- 3 Very Good. Vegetation structure altered, obvious signs of disturbance.
- 4 Good. Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.
- 5 Degraded. Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.
- 6 Completely Degraded. The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

0 25 50 75 100m
SCALE 1 : 2 500 at A3 (MGA)

Figure 6

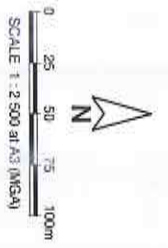
Carey Baptist College
REVEGETATION PLAN
LOT 2 NICHOLSON ROAD, FORRESTDALE

COTERRA ENVIRONMENT

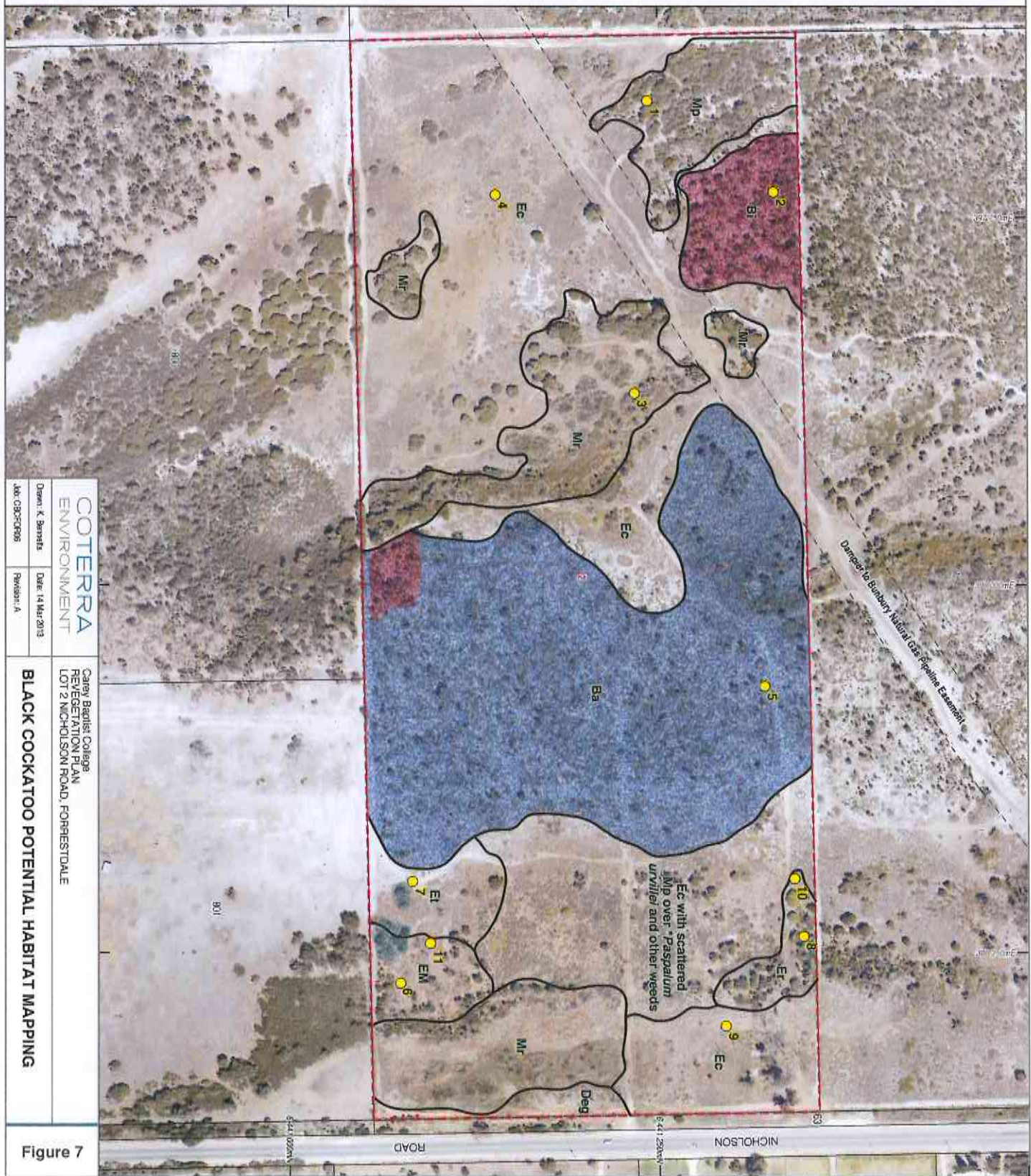
Drawn: K. Bennett
Date: 14 Mar 2013
Job: 086P046
Revision: A

VEGETATION CONDITION

WELANDS SOURCE DEC. December 2011.
AERIAL PHOTOGRAPH SOURCE: NearMap, Town October 2011.
VEGETATION CONDITION SOURCE: Bennett Environmental Consulting, 2011.



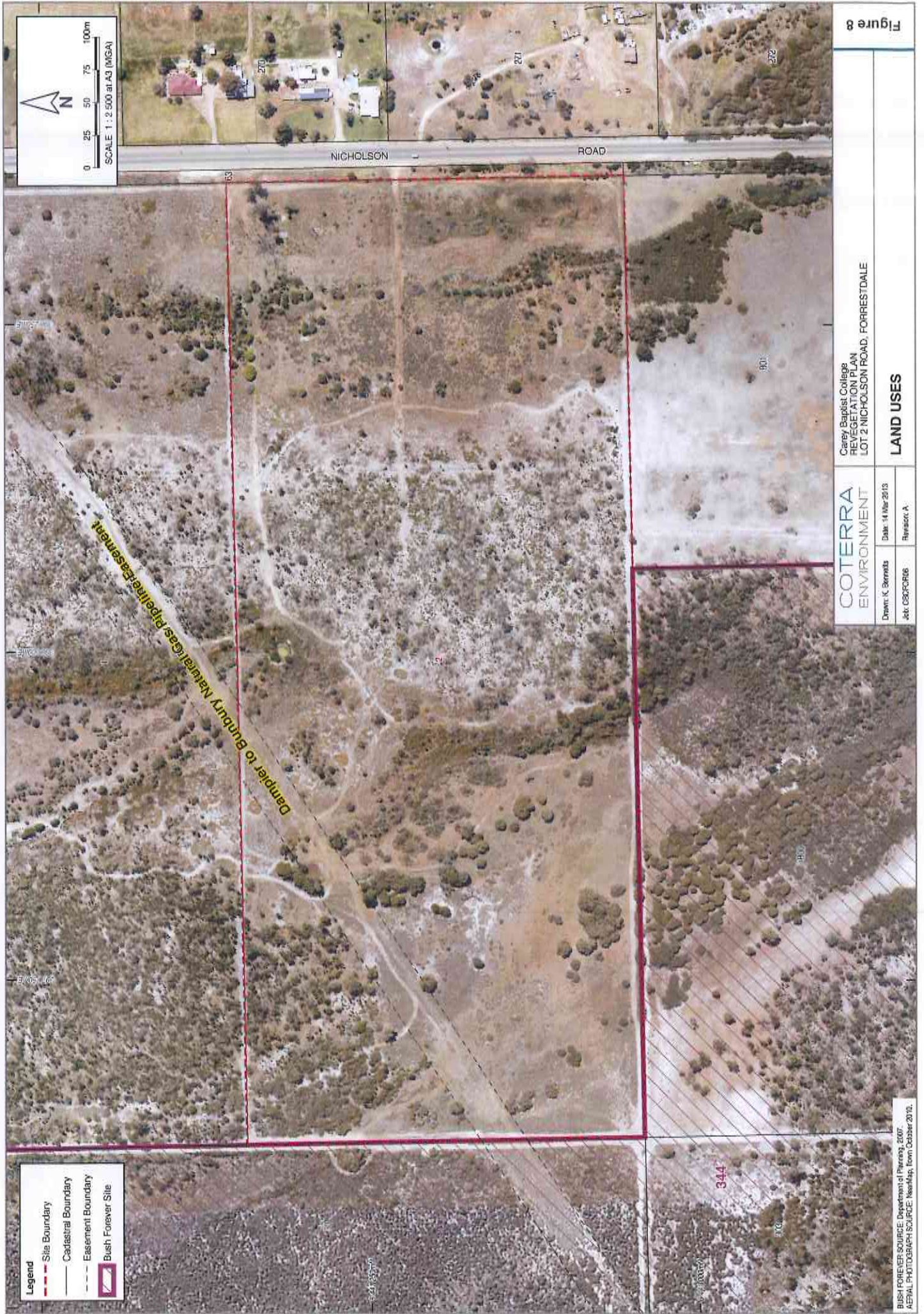
- Legend**
- State Boundary
 - Cadastral Boundary
 - Easement Boundary
 - Quadrat Location
 - Vegetation Unit
 - Vegetation Unit Boundary
- Habitat Mapping**
- Good quality *Eucalyptus* *totiana* foraging habitat
 - Good quality *Banksia* sp. foraging habitat
 - Poor quality *Banksia* sp. foraging habitat
- Vegetation Units**
- Ba** Low Woodland A of *Banksia alternata*, *Banksia menziesii*, *Myrica hutchinsii* and *Eucalyptus* *totiana* over Tall Grass dominated by *Koeleria parviflora* var. *gabrielae* over Tall Grass dominated by *Erharta caryocarpa*
 - Bi** Low Forest A of *Banksia alternata* and *Banksia totiana* over Tall Grass dominated by *Erharta caryocarpa* and *Erharta longiflora*
 - Ei** Low Woodland A of *Eucalyptus totiana* with occasional *Banksia* *totiana* over Open T₂ Dense Tall Grass dominated by *Digitaria* *arvula* over Herbs dominated by *Convolvulus edulis*, *Erodium* *biorys*, *Lolium subulatum* and *Hypochaeris glabra*
 - Mp** Open Low Woodland B of *Melaleuca prostrata* over Dense Thicket of *Koeleria glaberrima* over Open Herbs dominated by *Parosoma occidentale* and *Dioscorea glaucolegna*
 - Mf** Low Forest A of *Melaleuca macrophylla* over Dense Herbs dominated by *Zantedaenia subulatum* and *Lolium subulatum*
 - Em** Open Low Woodland A of *Eucalyptus totiana* and *Melaleuca prostrata* over Low Scrub A or Scrub of *Koeleria glaberrima* and *Ptilotheca reticulata* over Herbs dominated by *Convolvulus edulis* and *Lolium subulatum*
 - Ec** Low Forest A of *Eucalyptus* species, possibly *Eucalyptus robusta*, *Melaleuca prostrata* and *Populus nigra* over Dense Tall Grass dominated by *Erharta caryocarpa*
 - Ed** Dense Tall Grass of *Paspalum distachyon* or Tall Scrub of *Juncea sp.* or Herbs dominated by *Lolium subulatum*, *Melaleuca prostrata* and *Euphorbia temera*



COTERRA ENVIRONMENT
 Owen K Bennett
 Date: 14 Mar 2013
 Job: C3C5C998 Parcel: A

Carry Beattie College
 REVEGETATION PLAN
 LOT 2 NICHOLSON ROAD, FORESTSTALE
BLACK COCKATOO POTENTIAL HABITAT MAPPING

Figure 7



Legend

- Site Boundary
- Cadastral Boundary
- Easement Boundary
- Bush Forever Site

SCALE 1 : 2 500 at A3 (MSA)

0 25 50 75 100m

N

COTERRA ENVIRONMENT

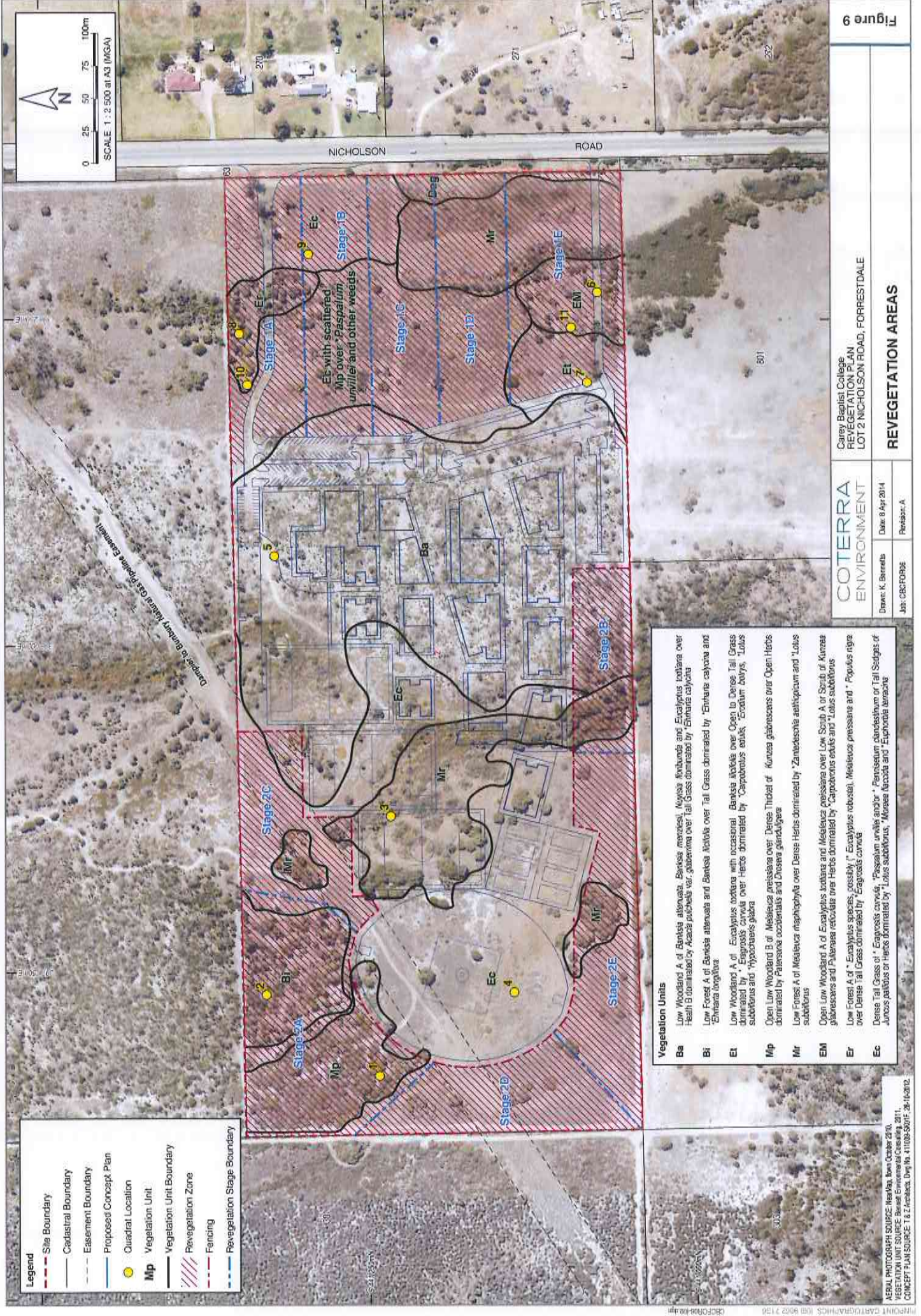
Carey Baptist College
 REVEGETATION PLAN
 LOT 2 NICHOLSON ROAD, FORRESTDALE

Drawn: K. Skene
 Date: 14 Mar 2013
 Job: CBRP016
 Revision: A

LAND USES

Figure 8

BUSH FOREVER SOURCE: Department of Planning, 2007.
 AERIAL PHOTOGRAPH SOURCE: Knowledge, from October 2010.



- Legend**
- - - Site Boundary
 - - - Cadastral Boundary
 - - - Easement Boundary
 - - - Proposed Concept Plan
 - Quadrant Location
 - Mp Vegetation Unit
 - - - Vegetation Unit Boundary
 - /// Vegetation Zone
 - - - Fencing
 - - - Revegetation Stage Boundary

Vegetation Units

Ba	Low Woodland A of <i>Banksia attenuata</i> , <i>Banksia menziesii</i> , <i>Myrica leucomela</i> and <i>Eucalyptus todtiana</i> over Heath B dominated by <i>Acacia pulchella</i> var. <i>glaberrima</i> over Tall Grass dominated by <i>Schizanthus calycina</i> and <i>Emmenanthe lanigera</i>
Bi	Low Forest A of <i>Banksia attenuata</i> and <i>Banksia nitida</i> over Tall Grass dominated by <i>Emmenanthe calycina</i> and <i>Emmenanthe lanigera</i>
Et	Low Woodland A of <i>Eucalyptus todtiana</i> with occasional <i>Banksia nitida</i> over Open to Dense Tall Grass dominated by <i>Eragrostis curvula</i> over Herbs dominated by <i>Carpobrotus edulis</i> , <i>Erodium cicutarium</i> , <i>Lolium subulatum</i> and <i>Hypochaeris glabra</i>
Mp	Open Low Woodland B of <i>Mesoleuca preissiana</i> over Dense Thicket of <i>Kunzea glabrescens</i> over Open Herbs dominated by <i>Palaemonia occidentalis</i> and <i>Drosera glanduligera</i>
Mir	Low Forest A of <i>Mesoleuca maphiphylla</i> over Dense Herbs dominated by <i>Zantedeschia aethiopica</i> and <i>Lolium subulatum</i>
EM	Open Low Woodland A of <i>Eucalyptus todtiana</i> and <i>Mesoleuca preissiana</i> over Low Scrub A or Scrub of <i>Kunzea glabrescens</i> and <i>Pultanea reticulata</i> over Herbs dominated by <i>Carpobrotus edulis</i> and <i>Lolium subulatum</i>
Er	Low Forest A of <i>Eucalyptus todtiana</i> over Dense Tall Grass dominated by <i>Eragrostis curvula</i>
Ec	Dense Tall Grass of <i>Eragrostis curvula</i> , <i>Paspalum univittis</i> and <i>Peristichia phaeodactylon</i> or Tall Sedges of <i>Juncus palustris</i> or Herbs dominated by <i>Lolium subulatum</i> , <i>Mosses</i> <i>terrestris</i> and <i>Ephedra terrens</i>

COTERRA ENVIRONMENT

Carey Baptist College
REVEGETATION PLAN
LOT 2 NICHOLSON ROAD, FORRESTDALE

Drawn: K. Bennett Date: 8 Apr 2014
Job: CBF0906 Revison: A

Figure 9

REVEGETATION AREAS

AERIAL PHOTOGRAPH SOURCE: MapInfo, 10th October 2010.
VEGETATION UNIT SOURCE: Boreal Environmental Consulting, 2011.
CONCEPT PLAN SOURCE: T & Z Forestry, Dig No. 11103-5601F-28-14-2012.



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 4860/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Carey Baptist College Inc

1.3. Property details

Property: LOT 2 ON DIAGRAM 75868 (FORRESTDALE 6112)
Local Government Area: City of Rockingham
Colloquial name:

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
4.26		Mechanical Removal	Building or Structure

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 22 May 2014

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description	Clearing Description	Vegetation Condition	Comment
The vegetation under application has been mapped as Beard vegetation association 1001, which Shepherd et al (2001) describes as 'Medium very sparse woodland; jarrah, with low woodland; banksia & casuarinas'.	The clearing of 4.26 hectares of native vegetation within Lot 2 on Diagram 75868, Forrestdale is for the purpose of constructing a school.	Very Good: Vegetation structure altered; obvious signs of disturbance (Keighery 1994)	The description and condition of the vegetation was determined by supporting information supplied by Coterra Environment (2012) and via a site inspection (DEC 2012a)
	Historically, the application area has been used for stock grazing and as a result has been previously cleared. Currently the site is unused with uncontrolled access and illegal rubbish dumping evident. Approximately 4.86 ha of Degraded to Completely Degraded vegetation and 5.37 ha of Very Good to Good vegetation is proposed to be cleared (Coterra Environment 2012).	to Completely Degraded: No longer intact; completely/almost completely without native species (Keighery 1994)	Historically, the application area has been used for stock grazing and as a result has been previously cleared. Currently the site is unused with uncontrolled access and illegal rubbish dumping evident

3. Assessment of application against clearing principles

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

Comments **Proposal is at variance to this Principle**
The application is to clear 4.26 hectares of native vegetation within Lot 2 on Diagram 75868, Forrestdale for the purpose of constructing stage 1 of a school.

A botanical assessment conducted by Bennett Environmental (2011) within Lot 2 including the application area recorded a total of 148 plant taxa including 82 native species and 66 introduced species within the survey area.

During the botanical assessment no rare flora species were found on site (Bennett Environmental 2011). A Priority 2 and a Priority 3 flora species were found within Lot 2 however they were recorded outside of the application area (Bennett Environmental (2011). Therefore no impacts to priority flora are expected.

The condition of vegetation under application ranges from Completely Degraded to Very Good (Keighery, 1994). The majority of vegetation is in a Very Good to Good (Keighery 1994) condition.

Numerous fauna species have been recorded within a 10 kilometre radius (DEC 2007-). Foraging evidence of Carnaby's cockatoo was observed within the application area (DEC, 2012a). Approximately 3.1 hectares of Banksia Woodland is proposed to be cleared, the majority of this vegetation in a Very Good to Good (Keighery 1994) condition (Coterra 2012). Given the Very Good to Good (Keighery 1994) condition of the Banksia woodland and that the Carnaby's cockatoo and Forest Red-tailed black-cockatoo are known to inhabit the local area (10 kilometre radius) the clearing of 3.1 hectares of Banksia Woodland will have a significant impact on the feeding habitat for these species.

The application area comprises of wetland vegetation. A Resource Enhancement wetland is mapped within, and a Multiple Use wetland is mapped adjacent to the application area. The majority of the Resource Enhancement wetland vegetation is in a Degraded to Completely Degraded (Keighery 1994) condition.

Bush Forever site 344 is located adjacent to the eastern and southern boundary of Lot 2 located approximately 145 metres from the proposed clearing.

Native vegetation is located adjacent to the property to the north, therefore the clearing as proposed may increase the spread of weed and dieback into this area. Weed and Dieback management practices will help mitigate this risk.

Given the majority of the vegetation under application is in a Very Good to Good (Keighery 1994) condition, the application area is mapped within an Resource Enhancement wetland and contains significant habitat for fauna indigenous to Western Australia, the proposed clearing is at variance to this principle.

To address the residual significant impacts identified in this assessment the applicant has advised they are willing to revegetate approximately 5.4 hectares within the Resource Enhancement Wetland and associated buffer zone, at the eastern end of the property. This revegetation will predominately consist of wetland species but where appropriate, species which can also be utilised by black cockatoo species will be planted (Coterra Environment 2014).

Methodology

Reference:

- Bennett Environmental (2011)
- Coterra Environment (2012)
- Coterra Environment (2014)
- DEC (2012a)
- Keighery (1994)

GIS Databases:

- Bush Forever
- Sac Bio datasets - accessed 2 April 2012

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments

Proposal is at variance to this Principle

Numerous fauna species listed as rare or likely to become extinct under the Wildlife Conservation Act 1950 have been recorded within the local area (10 kilometre radius). Significant fauna habitat has been identified within the proposed clearing area for *Calyptorhynchus banksii* subsp. *naso* (Forest Red-tailed black-cockatoo) and *Calyptorhynchus latirostris* (Carnaby's cockatoo) (DEC, 2007-), species of state and commonwealth conservation significance.

Approximately 3.1 hectares of the proposed clearing area is Banksia woodland with the majority of this vegetation in a Good to Very good (Keighery 1994) condition (Coterra Environment 2012). Foraging evidence of Carnaby's cockatoo was observed during a site inspection undertaken by the former Department of Environment and Conservation (DEC, 2012a).

Carnaby's cockatoos (*Calyptorhynchus latirostris*) are listed as endangered under the Environment Protection and Biodiversity Act 1999. Carnaby's cockatoo nests in large hollows of eucalyptus trees and forages on the seeds, nuts and flowers of a large variety of plants including Proteaceous species (*Banksia*, *Hakea*, *Grevillea*), as well as *Allocasuarina* and *Eucalyptus* species, *Corymbia calophylla* and a range of introduced species, especially seeds from cones of *Pinus* species (Shah, 2006; Valentine and Stock, 2008).

The Carnaby's cockatoo was once abundant in Western Australia. Since the late 1940s the species has suffered a 30 per cent contraction in range, a 50 per cent decline in population, and between 1968 and 1990 disappeared from more than a third of its breeding range (Saunders 1990; Johnstone and Storr 1998; Saunders and Ingram 1998; Garnett et al. 2011). Basic ecological theory, expert opinion and recent evidence, suggests that the remaining native and pine plantation foraging habitat on the Swan Coastal Plain is just sufficient to support the current population of Carnaby's cockatoo. Therefore any reduction in the amount of food source will result in a reduction in the carrying capacity of the region and therefore a decline in the population of Carnaby's cockatoo.

Given the Very Good to Good (Keighery 1994) condition of the Banksia Woodland within the proposed clearing area and that Carnaby's cockatoo and Forest Red-tailed black cockatoo are known to inhabit the area, the proposed clearing of 3.1 hectares of Banksia Woodland will have a significant impact on feeding habitat for these species.

Therefore, the clearing as proposed is at variance to this principle.

To address the residual significant impacts identified in this assessment the applicant has advised they are willing to revegetate approximately 5.4 hectares within the Resource Enhancement Wetland and associated buffer zone at the eastern end of the property. This revegetation will predominately consist of wetland species but where appropriate, species which can also be utilised by black cockatoo species. Seven flora species utilised by black cockatoos are proposed to be planted within the areas proposed to be revegetated (Coterra Environment 2014).

Methodology Reference:
-Coterra (2012)
-DEC (2007-)
-DEC (2012a)
- Garnett et al. 2011
- Johnstone and Storr 1998
-Keighery (1994)
- Saunders 1990
- Saunders and Ingram 1998
-Shah (2006)
- Valentine and Stock, 2008

GIS Databases:
-Sac Bio datasets - accessed 2 April 2012

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

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

Five species of rare flora have been recorded within the local area (10 kilometre radius). The closest being located approximately 460 metres north west of the application area on the same vegetation and soil type. A second rare flora species is located approximately three kilometres north of the application area also on the same vegetation and soil type.

A botanical assessment (Bennett Environmental, 2011) was conducted on 4 October 2011 and did not identify any rare flora species.

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

Methodology Reference:
Bennett Environmental (2011)

GIS Databases:
SAC Biodata sets - accessed 2 April 2012

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

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

There are numerous Threatened Ecological Communities (TEC) located within the local area (10 kilometre radius). The closest being 'herb rich shrublands in clay' located approximately two kilometres east of the application area.

Given the condition of the vegetation under application and the distance to the nearest TEC it is unlikely that the vegetation under application will be necessary for the maintenance of this community. Therefore, the clearing as proposed is not likely to be at variance to this principle.

Methodology GIS Databases:
SAC Biodata sets - accessed 2 April 2012

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Comments Proposal may be at variance to this Principle

The area under application is located within the Swan Coastal Plain Interim Biogeographic Regionalisation of Australia (IBRA) bioregion. This IBRA bioregion has approximately 39 per cent of its Pre European vegetation extent remaining (Government of Western Australia 2013).

The vegetation under application is mapped as Beard Vegetation Association 1001 which has approximately 25 per cent of its Pre European extent remaining in the Swan Coastal Plain bioregion (Government of Western Australia 2013).

Digital imagery (Perth Metropolitan Central - 15cm Orthomosaic - Landgate 2011) indicates that the local area (10 kilometres radius) surrounding the area under application retains approximately 20 per cent vegetation cover.

The National Objectives and Targets for Biodiversity Conservation include a target that prevents the clearance of ecological communities with an extent below 30 per cent of that present pre-European settlement, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia, 2001).

Beard vegetation association 1001 retains below the 30 per cent threshold. However, the Environmental Protection Authority (EPA) recognises the Perth Metropolitan Region as a constrained area, which provides for the reduction of vegetation complexes to a minimum of 10 per cent of the pre-European extent (EPA, 2006).

The vegetation under application is a significant remnant as it contains vegetation in a Very Good to Good (Keighery 1994), comprises a high biological diversity and significant habitat for fauna indigenous to Western Australia.

Given the above the vegetation proposed to be cleared is a significant remnant, however the vegetation associations retain more than the minimum 10 per cent threshold. Therefore clearing as proposed may be at variance to this principle.

	Pre-European (ha)	Current Extent Remaining (ha)	Remaining (%)	Extent in DEC Managed Lands (%)
IBRA Bioregion*				
Swan Coastal Plain	1,501,221.92	587,708.08	39.15	35.08
Shire*				
City of Armadale	55,949.00	43,054.99	76.95	75.71
Beard Vegetation Association in Bioregion*				
1001	57,410.23	14,151.90	24.65	5.66
Hedde Vegetation Complex **				
Southern River Complex	87,318.09	24,610.06	28.18	3.45
Bassendean Complex Central and South	57,170.63	12,058.97	21.09	1.65

* Government of Western Australia (2013)

**Hedde et al 1980

Methodology

Reference:

- Commonwealth of Australia (2001)
- EPA (2006)
- Government of Western Australia (2013)
- Hedde 1980

GIS Databases:

- IBRA
- Perth Metropolitan Area Central 15cm Orthomosaic - Landgate 2011
- Pre European Vegetation
- SAC Biodatasets - accessed July 2011

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

Comments Proposal is at variance to this Principle

The eastern section of the application area is mapped as a Resource Enhancement Category wetland. The Water and Rivers Commission (2001) considers Resource Enhancement Category wetlands to be priority wetlands which may have been partially modified but still retain substantial ecological attributes and functions.

This wetland is part of an extensive sumpland adjacent to, but outside the boundary to Forrestdale Lake RAMSAR site and retains vegetation structure and hydrological function of a functioning wetland ecosystem (DEC 2012b). The proposed clearing for the road entry within this wetland may potentially impact on the function of this wetland. Minimal clearing for access roads is proposed within this mapped wetland. The applicant has advised a 30 metre buffer has been provided for this wetland in order to sustain the long term viability of the wetland (Coterra Environment 2012).

The western portion of the application area is mapped adjacent to a Multiple Use Category wetland, approximately 0.007 hectares of the application area is mapped within this wetland. The Water and Rivers Commission (2001) considers Multiple Use Category wetlands as having few important attributes and functions remaining. This area was assessed as being in a Degraded to Good (Keighery, 1994) condition (DEC, 2012a). The Multiple Use wetland lies directly adjacent to a Conservation Category wetland. Conservation Category wetlands support a high level of attributes and functions (Water and Rivers Commission 2001).

Coterra Environment (2012) has advised that a 50 metre buffer around the Conservation Category wetland has been incorporated within the Concept Master Plan. No development or clearing has been proposed within this buffer area.

An ANCA wetland 'Gibbs Road Swamp System' is also mapped within the application area. This wetland area falls within the area mapped as the Multiple Use Category wetland. The application area is located approximately one kilometre from RAMSAR Wetland, 'Forrestdale and Thompsons Lakes'.

Given the above the clearing as proposed is at variance to this principle.

To address the residual significant impacts identified in this assessment the applicant has advised they are willing to revegetate approximately 5.4 hectares within the Resource Enhancement Wetland and associated buffer zone at the eastern end of the property. This revegetation will predominately consist of wetland species (Coterra Environment 2014).

Methodology

References:

- Coterra Environment (2012)
- Coterra Environment (2014)
- DEC (2012a)
- DEC (2012b)
- Keighery (1994)
- Water and Rivers Commission (2001)

GIS Database:

- Anca Wetlands
- Geomorphic Wetlands (Mgt Categories), Swan Coastal Plain
- Hydrography linear

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

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

The area under application has been mapped as soil type Cb36 which Northcote et al (1960 - 1968) describes as: Moderately or occasionally gently undulating lands with some low eroded sandstone mesas: dominant soils are deep bleached sands with associated leached sands.

As discussed in principle (f) the application area lies within a Resource Enhancement Wetland and adjacent to a Multiple Use Wetland. The proposed clearing of vegetation within the wetland areas may increase water logging. Although water logging may occur it is not likely to cause appreciable land degradation.

The proposed clearing of 4.26 hectares of native vegetation is not likely cause appreciable land degradation.

Therefore, the clearing as proposed is not likely to be at variance to this principle.

Methodology

References:

- Northcote (1960-68)

GIS database:
-Anca Wetlands
-Geomorphic Wetlands (Mgt Categories), Swan Coastal Plain
-Soils, Statewide

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

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

Bush Forever site 344 is located adjacent to the eastern and southern boundary of Lot 2 located approximately 145 metres from the proposed clearing.

The proposed clearing is part of a concept master plan proposing to clear a total of 11.76 hectares for the construction of a school. The applicant is not proposing to clear within 50 metres of this Bush Forever site. This buffer will ensure the environmental values of this conservation area are not compromised.

Given the distance to the Bush Forever site, the clearing as proposed is not likely to be at variance to this principle.

Methodology GIS Database:
-Bush Forever

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

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

A Resource Enhancement wetland is mapped within and a Multiple Use wetland is mapped adjacent to the application area. Approximately 0.007 hectares of the application area is mapped within the Multiple Use Wetland. Both wetlands are in a Completely Degraded to Degraded (Keighery 1994) condition (DEC 2012a). These wetlands are seasonally dry through summer and damp within the wetter winter months (Coterra Environment 2012). Given there is no surface water flow the clearing is unlikely to affect surface water.

The groundwater salinity within the application area is less than 500 milligrams per litre of Total Dissolved Solids. This level of groundwater salinity is considered to be marginal. The clearing of 4.26 hectares of vegetation is not likely to have a significant impact on the quality of groundwater in the local area.

Therefore, the proposed clearing is not likely to be at variance to this clearing principle.

Methodology GIS Database:
- Geomorphic Wetlands (Mgt Categories), Swan Coastal Plain
- Groundwater Salinity Statewide

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

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

Clearing is proposed within a Multiple Use and Resource Enhancement Category wetlands and therefore it is likely that some short term water logging may occur, however given the Completely Degraded to Degraded (Keighery 1994) condition of both wetlands it is not expected to increase the incidence or intensity of flooding.

The proposed clearing is not likely to be at variance to this principle.

Methodology GIS Database:
-Geomorphic Wetlands (Mgt Categories), Swan Coastal Plain

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

Comments

The application area was amended from 11.76 hectares to 4.26 hectares to exclude the area of the school that had not received development approval yet. The proposed clearing of 4.26 hectares is part of a large concept plan for the construction of a school proposing to clear a total of 11.76 hectares.

Lot 2 on Diagram 75868 is zoned as Rural Living X under the City of Armadale Town Planning Scheme No.4. The use of Lot 2 as an Educational Establishment is not permitted unless the City has exercised its discretion by granting planning approval after giving special notice in accordance with clause 9.4 (City of Armadale 2005).

On 7 March 2014 the State Administrative Tribunal (2014) granted planning approval for the proposed education established within the area proposed for Stage 1 developments only, subject to conditions set out by the State Administrative Tribunal.

To address the residual significant impacts identified in this assessment the applicant has advised they are willing to revegetate approximately 5.4 hectares within the Resource Enhancement Wetland and associated buffer zone at the eastern end of the property. This revegetation will predominately consist of wetland species but where appropriate, species which can also be utilised by black cockatoo species. The revegetation program includes pre-planting weed control, site preparation, seedling planting and post-installation monitoring (Coterra Environment 2014).

The proposed revegetation of 5.4 hectares is part of a larger revegetation program to address the residual significant impacts of the proposed clearing required for the entire construction of the school (Stages 1 and 2). The revegetation program includes revegetating 10.7 hectares of native vegetation. Approximately 5.4 hectares will be revegetation within the Resource Enhancement Category wetland at the eastern end of the property and will consist of wetland species and where appropriate species to be utilised by the black cockatoos. Up to 5.3 hectares will be revegetated within the western half of the site with a mixture of upland and wetland species as appropriate (Coterra Environment 2014).

The Department of Water (2013) has advised that Carey Baptist College Inc have a water licence pending approval. A decision has been deferred until a clearing permit is issued.

The project was referred to the former Department of Sustainability, Environment, Water, Population and Communities (SEWPac) under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) in September 2012. SEWPac advised that the project was 'Not a Controlled Action' and that development could proceed without further Federal assessment (Coterra Environment 2014).

Methodology

References:

- City of Armadale (2005)
- City of Armadale (2012)
- Coterra Environment (2013)

4. References

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- Water and Rivers Commission (2001) Position Statement: Wetlands, Water and Rivers Commission, Perth.
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