COTERRA
ENVIRONMENT

Revegetation Plan

Carey Baptist College (Stage 4)

Revision 1 November 2023

CALIBRE | COMMITMENT | COLLABORATION

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1 Introduction

1.1 Background

Carey Baptist College Forrestdale campus is located at Lot 2 (540) Nicholson Road, Forrestdale. An aerial photograph of the site is provided in Plate 1-1.

Plate 1-1: Aerial Photograph

Source: Landgate, 2023

1.2 Stage 4 Clearing Area

Clearing is required to facilitate the construction and associated bushfire protection requirements for the Stage 4 portion of the Carey Baptist College Forrestdale campus. The size of the clearing area is 2.015 ha. The location of the clearing area is highlighted on Plate 1-2.

Plate 1-2: Proposed Clearing Area

1.3 Purpose of this Report

This Revegetation Plan has been prepared to outline the proposed revegetation and vegetation management works associated with the Stage 4 clearing area.

This Revegetation Plan has been designed based on previous plans prepared for other stages in the Carey Baptist College development.

2 Stage 4 Development Area Overview

A summary of the environmental features of the Stage 4 development area is provided below. A more detailed description is available within the NVCP Supporting Information report (Coterra Environment, 2023).

2.1 Topography

Topography within the proposed clearing area is flat and is approximately 25 m Australian Height Datum (m AHD).

2.2 Geology and Soils

The clearing area contains the following geology and soil types, as described by Jordan (1986):

- Thin Bassendean Sand over Guildford Formation (S10): 'very light grey at surface, yellow at depth, fine to medium-grained, sub-rounded quartz, moderately well sorted of eolian origin'
- Peaty Sands (SP1): 'greyish brown, medium-grained quartz, moderately well sorted, variable organic content, of lacustrine origin.'

The Department of Primary Industry and Regional Development (DPIRD) mapped soils within the proposed clearing area are Bassendean B1 phase (212Bs_B1) and Bassendean B4 phase (212Bs_B4). These units are described below.

Table 2-1: Land Systems

Mapping Units	Land System	Description
212Bs_B1	Bassendean B1 Phase	Extremely low to very low relief dunes, undulating sandplain and discrete sand rises with deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron-organic hardpan at depths generally greater than 2 m; banksia dominant
212Bs_B4	Bassendean B4 Phase	Broad poorly drained sandplain with deep grey siliceous sands or bleached sands, underlain at depths generally greater than 1.5 m by clay or less frequently a strong iron-organic hardpan

Source: DPIRD, 2023

2.3 Hydrology

The maximum groundwater level in this location is approximately 24 to 25 mAHD (DWER, 2023), which equates to 1 to 2 m below ground level within the proposed clearing area. Minimum groundwater levels range from 21 to 22mAHD (DWER, 2023). Groundwater flow direction is easterly toward Forrestdale Lake (located over 1 km east of the proposed clearing area).

The Department of Biodiversity, Conservation and Attractions (DBCA) geomorphic wetland dataset for the Swan Coastal Plain maps one Multiple Use Wetland (MUW) within the eastern portion of the site, including part of the proposed clearing area (Plate 2-1).

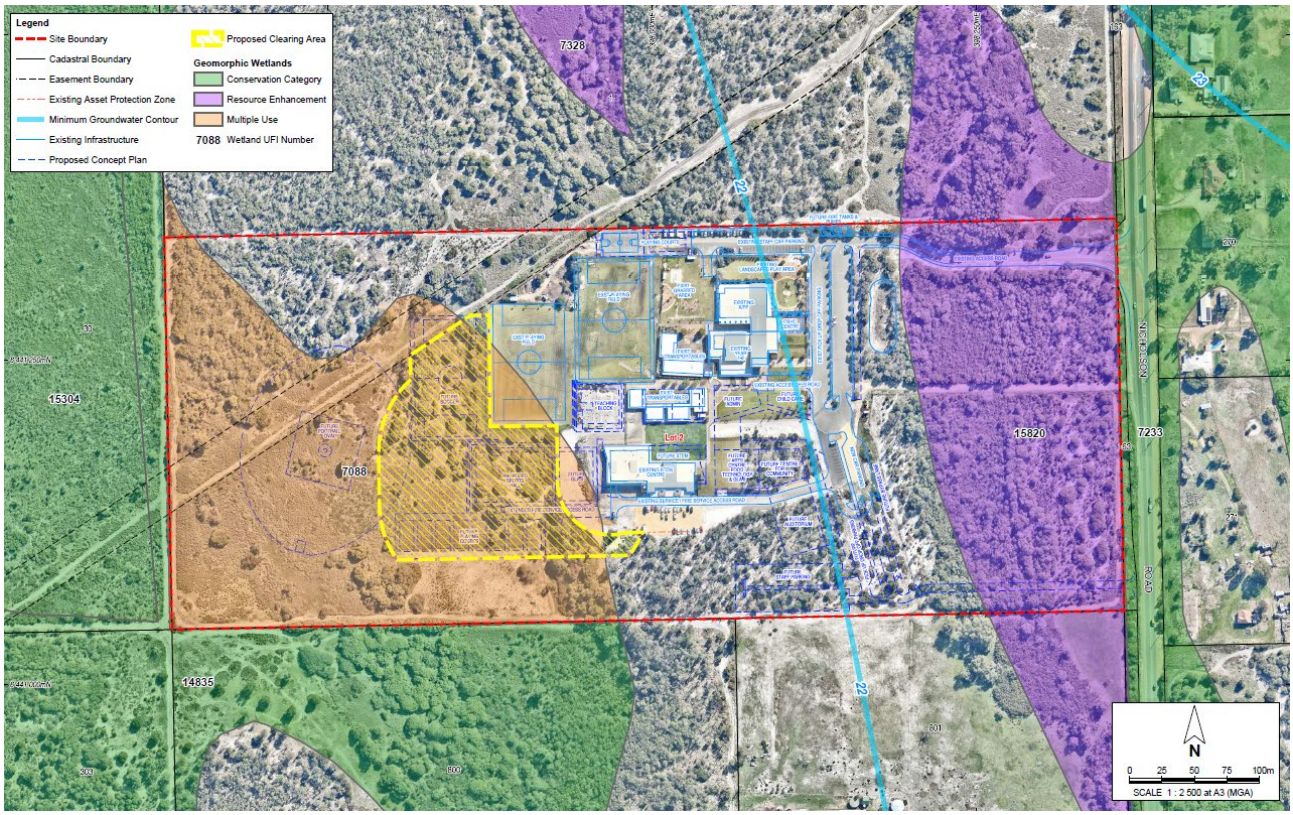


Plate 2-1: Hydrological Features

2.4 Flora and Vegetation

Vegetation at the site is identified to be part of the Southern River vegetation complex which is described as 'Open woodland of *Corymbia calophylla- Eucalyptus marginata- Banksia* spp with fringing woodland of *E. rudis – Melaleuca rhaphiophylla* along creek beds' (Heddle et al., 1980).

A Level 2 Flora and Vegetation Survey was completed by Bennett Environmental Consulting (2011) for the entire site in October 2011. This survey has been submitted to DWER with a reference number of IBSA-2023-0334. The vegetation units identified in this survey which are located within the clearing area (Plate 2-2) are as follows:

Table 2-2: Vegetation Units

Vegetation Unit	Description	Extent within Clearing Footprint
Ba	Low Woodland A of *Banksia attenuata, Banksia menziesii, Nuytsia floribunda* and Eu*calyptus todtiana* over Heath B dominated by *Acacia pulchella* var. *glaberrima* over Tall Grass dominated by **Ehrharta calycina* in grey sand	0.033 ha
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	1.078 ha
Mr	Low Forest A of *Melaleuca rhaphiophylla* over Dense Herbs dominated by **Zantedeschia aethiopicum* and **Lotus subbiflorus* in very damp grey sand	0.904 ha

The condition of vegetation within the proposed clearing footprint based on the Level 2 survey (BEC, 2011) (Plate 2-3) is as follows:

- Very Good-Good – 0.03 ha (1.6% of clearing footprint)
- Good – 0.69 ha (33.2% of clearing footprint)
- Degraded-Completely Degraded- 1.21 ha (60.2% of clearing footprint)
- Completely Degraded – 0.10 ha (5.0% of clearing footprint)

In March 2021, Focused Vision Consulting (FVC) undertook an assessment of a targeted area of Banksia woodland vegetation within Lot 2 to update the condition mapping and identify if this was likely to represent the Banksia Woodland of the Swan Coastal Plain Priority Ecological Community (PEC).This survey did not encompass the area proposed to be cleared under this application but does include the connected Banksia Woodland area to the east. This survey has previously been submitted to DWER as part of the CPS 9928/1 permit assessment with an IBSA reference number of IBSA-2022-0355. This survey identified that the condition of the banksia woodland patch to the connected to east of the clearing area was predominately in degraded condition (FVC, 2021).

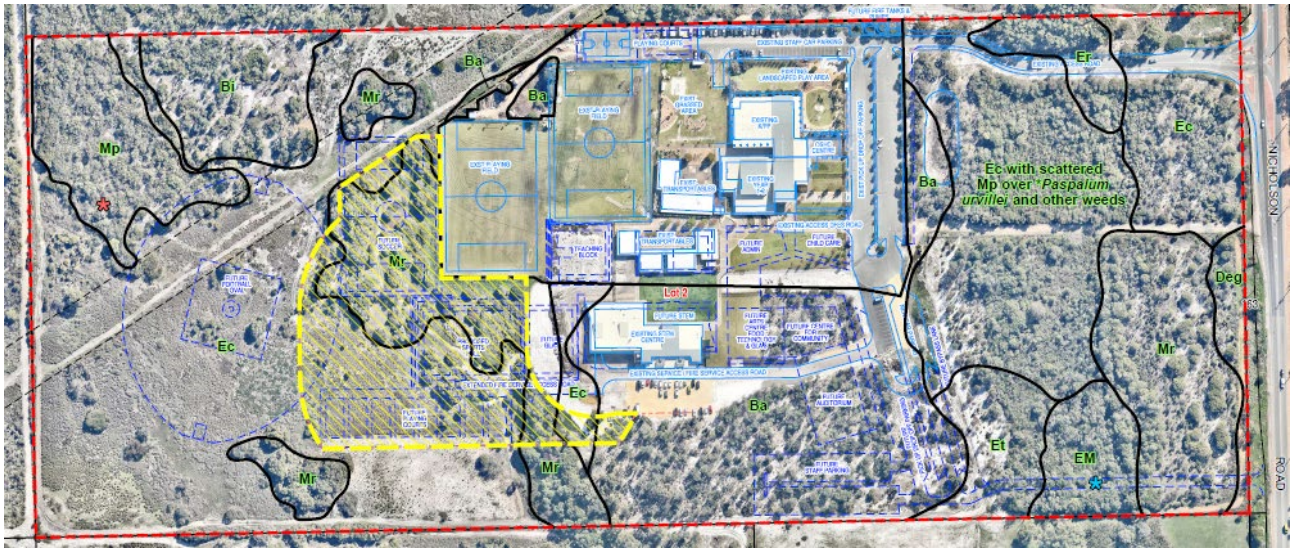


Plate 2-2: Vegetation Units

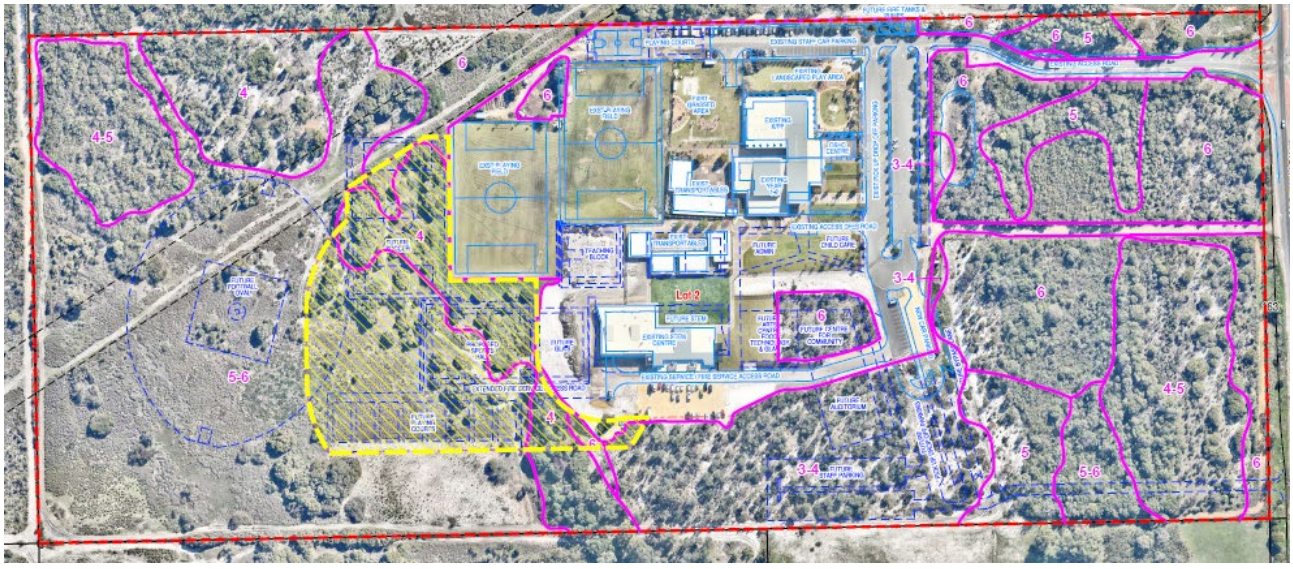


Plate 2-3: Vegetation Condition

The key features of the vegetation units within the clearing extent as identified through vegetation survey plot data is summarised on Table 2-3.

Table 2-3: Quadrat vegetation composition

Vegetation Unit	Total native Species	Native species density (species/m^2)	Opportunistic native species	Total weed species	Weed species density (species m^2)	Opportunistic weed species	Weeds with >2% cover
Mr (Quadrat 3)	9	0.09	4	15	0.15	3	9
Ec (Quadrat 4)	5	0.05	3	13	0.13	9	9
Ba (Quadrat 5)	17	0.17	20	9	0.09	2	4

Source: BEC, 2011

For the Ba vegetation unit plot data relating to black cockatoo habitat is summarised below.

- Species which provide black cockatoo habitat opportunities:
  - *Banksia attenuata* – 10% cover
  - *Banksia menziesii* – 5% cover
  - *Eucalyptus todtiana* - <1% cover
  - *Jacksonia furcellata* – opportunistic observation

A 15% coverage of species offering black cockatoo habitat species represents approximately 0.0049 ha of the Ba clearing area extent.

The total number of native species in each of the above vegetation types, including both quadrat and opportunistic occurrences, are reported by Bennett (2011) are:

- Mr (Quadrat 3 and 10) – 16 species
- Ec (Quadrat 4 and 9) – 11 species
- Ba (Quadrat 5) – 37 species

3 Clearing

Clearing will comprise 0.033 ha from the Ba vegetation unit and 1.98 ha of vegetation from the Mr and Ec vegetation units (Table 3-1).

Table 3-1: Extent of Clearing

Vegetation type	Vegetation unit	Clearing extents
Dryland vegetation	Banksia Woodland (Ba vegetation unit)	Area: 0.033 ha Existing condition: 'Very Good-Good' (BEC, 2011)
Wetland/mesic vegetation	Melaleuca Woodland (Mr vegetation unit)	Area: 0.904 ha Existing condition: 'Good' and 'Completely Degraded' (BEC, 2011)
	Dense Tall Grass dominated by weed species (Ec vegetation unit)	Area: 1.078 ha Existing condition: 'Completely Degraded-Degraded' and 'Completely Degraded' (BEC, 2011)

DWER has noted that of the 1.98 ha of vegetation growing in association with a wetland, 0.67 ha is considered to be of higher value, with the remainder providing ecological linkage and supporting the functionality of the adjoining Conservation Category Weland values (DWER correspondence dated 20/11/23, DWER Ref: CPS 10281/1)).

it is noted that cleared vegetative matter and scalped topsoil may be stored within the clearing footprint. The storage areas will remain at least 5m away from the clearing boundary and will not extend into the uncleared portions of the site.

4 Revegetation Program

Revegetation areas comprise wetland management areas and revegetation areas to compensate for impacts associated with clearing proposed for the Stage 4 development works.

4.1 Vision and Objectives

The vision for the revegetation works is to improve the ecosystem quality and the amenity of revegetation areas through:

- Revegetation areas becoming sustainable with minimal management
- Revegetation areas achieving the target vegetation type and conditions outcomes
- Wetland management to improve the quality and condition of onsite retained wetland environments

The overall objective of the revegetation and rehabilitation program is to establish and protect 2.866 ha of vegetation providing wetland values, of which 0.08 ha at a minimum also provides black cockatoo habitat opportunities.

4.2 Proposed Offset/Revegetation Areas

DWER has advised that the departments preliminary offset calculation has identified that by improving the condition of the vegetation within the adjacent wetland mapped as the Gibbs Road Swamp System from Completely Degraded-Degraded to a Good condition using on-ground management measures including fencing, weed control and infill planting of riparian species, an area of 2.75 hectares would be required to address the environmental values being impacted (DWER correspondence dated 20/11/23, DWER Ref: CPS 10281/1)). An offset area is identified which extends over 2.866 ha which exceeds the DWER requirement.

Based on analyse if the DWER offset calculator, the requirements for offsetting impacts to black cockatoo habitat include 0.08 ha which would mitigate 133% of the impacts. The vegetation which forms part of this offset must provide black cockatoo habitat opportunities.

Further DWER has noted that the offset for black cockatoos can be delivered within the offset for the wetland area, provided the wetland area will constitute areas that contain species similar to the values being cleared (i.e. Banksia species) (DWER correspondence dated 20/11/23, DWER Ref: CPS 10281/1)).

The location of the proposed onsite offset/revegetation areas are shown on Figure 1.

4.3 Suitability to address Clearing Impacts

4.3.1 Clearing of Ba vegetation unit

The clearing proposal will result in removal of 0.033 ha of ‘good’ to ‘very-good’ condition Banksia woodland which may provide foraging opportunities for black cockatoos. The revegetation proposed will create/protect 0.08 ha of additional good to very good quality vegetation including species which will provide both foraging and roosting opportunities.

Based on the banksia cover within the onsite Ba vegetation unit (15%) this would equate to a potential habitat extent of 0.0049 ha (i.e. 15% of 0.033 ha) which is to be removed. In order to ensure no net loss of potential habitat the revegetation area would need to ensure a minimum of 0.0049 ha cover for potential foraging species which equates to approximately 6% cover within this area (i.e. 0.0049 ha out of 0.08 ha).

It is proposed to increase the cover to 10% (0.008 ha) of black cockatoo foraging species within the revegetation area rather than just replacing what will be removed. In addition, the species proposed will also provide roosting opportunities once mature which the Banksia woodland does not currently provide.

The tree species which have been identified to assist to increase canopy coverage within the revegetation area with potential Carnaby's Black Cockatoo foraging value include:

- *Corymbia calophylla* (Marri) – Canopy spread of 8 m (50 m^2)
- *Eucalyptus marginata* (Jarrah) – Canopy spread of up to 35 m (960 m^2)
- *Eucalyptus todtiana* (Coastal Blackbutt) – Canopy spread of 5-10 m (20 – 80 m^2)
- *Eucalyptus rudis (Flooded Gum) – Canopy spread 12m (113m^2)*
- *Banksia mericanu* (Candlestick banksia) – Canopy spread of 8 m (50 m^2)
- *Banksia ilicifolia* (Holly-Leaf Banksia) – canopy Spread of 8 m (50 m^2)
- *Banksia menziesii* (Firewood banksia) – canopy spread of up to 8 m (50 m^2)
- *Banksia littoralis – tree is approximately 3-10m width when mature (assume an average canopy coverage of 33m^2)*

Width information sourced from:

- City of Wanneroo Tree species list (https://www.wanneroo.wa.gov.au/consultations/downloads/586c8c54dfd44.pdf)

To achieve 10% coverage within the revegetation area, the required density of the above species has been calculated and outlined on Table 4-1.

Table 4-1: Stem Density to achieve 10% coverage

Species	Canopy Radius (m)	Canopy Area (m^2)	Stem Density to achieve 10% canopy coverage (stems/ha)
Corymbia calophylla	4	50.27	19.89
Eucalyptus marginata	17.5	962.11	1.04
Eucalyptus todtiana	2.5	19.63	50.93
Eucalyptus rudis	6	113.10	8.84
Average of the Corymbia & Eucalypt species above			**20.2**
Banksia mericanu *Banksia ilicifolia* *Banksia menziesii*	4	50.27	19.89
Banksia littoralis	3 – 10 (use 6.5)	33	30.14

Based on the above, the planting numbers within the 0.08ha revegetation area which would be required to achieve or exceed the necessary coverage (0.008 ha) are:

- Marri – 2 trees (i.e. 2 x 50m^2 = 0.010 ha); or
- Flooded Gum – 1 tree (i.e. 1 x 113m^2 = 0.011 ha); or
- *B. mericanu* / *B ilicifolia* / *B menziesii*– 2 trees (i.e. 2 x 50m^2 = 0.0010 ha); or
- *B littoralis* – 3 trees (i.e. 3 x 33m^2 = 0.0099 ha)

4.3.2 Clearing of Ec and Mp vegetation units

The clearing of 1.98 ha of wetland/mesic vegetation (Mr and Ec vegetation units) will be mitigated through the undertaking of revegetation works within a 2.866 ha onsite location.

The proposed 2.866 ha revegetation area is located within the of Ec, Mp and Mr vegetation units are shown on Figure 1. The mapped condition of these areas varies from 'Good' to 'Degraded-Completely Degraded'.

4.4 Revegetation Methodology

Similar to approved revegetation plans for previous stages of the Carey Baptist College development, the following methodology outlines works to be undertaken for the Stage 4 development.

4.4.1 Access Management

Targeted fencing will be installed to prevent unauthorised or inadvertent access to revegetation areas, using similar fencing to that provided in Stage 1 (Plate 4-1). Access points will be provided within the fencing to facilitate vehicle entry into the revegetation area for management and maintenance purposes.

Plate 4-1: Stage 1 Revegetation Area fencing

4.4.2 Weed Control

Weed presence has been recorded within the vegetation units which are proposed for management onsite. Weed presence in these areas is summarised on Table 4-2.

Table 4-2: Weed Species

Species	Vegetation Type (% cover)				Ecological Impacts		Invasiveness
	Mp (Quadrat CS01)	Mr (Quadrat CS03)	Mr (Quadrat CS04)	Ba (Quadrat CS05)	Level of Impact	Impact Attributes	Rate of Dispersal
**Arctotheca calendula*	<1		1		H	8,9	R
**Avena barbata*	<1				H		R
**Briza maxima*	<1			<1	U		R
**Briza minor*	Op				U		R

Species	Vegetation Type (% cover)				Ecological Impacts		Invasiveness
	Mp (Quadrat CS01)	Mr (Quadrat CS03)	Mr (Quadrat CS04)	Ba (Quadrat CS05)	Level of Impact	Impact Attributes	Rate of Dispersal
**Bromus diandrus*		<1	Op	Op	H		R
**Carpobrotus edulis*	<1	2	25	1	H	8,9	R
**Cortaderia selloana*			Op		H	1,6,7,8,9	R
**Cotula coronopifolia*		3			U		R
**Cotula mericanu*					L		M
**Cynodon dactylon*		1			H	9	R
**Cyperus tenellus*		3	40		L		U
**Disa mericanu*	<1				U		R
**Dittrichia graveolens*			<1		M		R
**Echium plantagineum*			Op		H	Increasing	R
**Ehrharta calycina*	Op			50	H	1,2,6,8,9	R
**Ehrharta longiflora*	Op	3		5	H	1,2,6,8,9	R
**Eragrostis curvula*	Op		10-90		H		R
**Erodium botrys*	Op				U		M
**Euphorbia terracina*				Op	H	8,9	R
**Gladiolus caryophyllaceus*	Op			1	H		R
**Gomphocarpus fruticosus*			Op		H	9	R
**Hypochaeris glabra*		<1	Op	1	H		R
**Isolepis marginata*		3	25		U		U
**Juncus bufonius*	Op		15		U		R
**Juncus capitatus*	Op				U		R
**Lolium multiflorum*			1		Not listed		
**Lotus subbiflorus*	1	60	40		U		R
**Lythrum hyssopifolia*			Op		M		R
**Medicago polymorpha*	Op				L		
**Moraea flaccida*		Op	2-10		H	8,9	R
**Paspalum urvillei*			Op		H		M
**Pennisetum clandestinum*		2	<1		H		S
**Ranunculus muricata*		<1			L		U
**Romulea rosea*		<1	10	1	U		R

Species	Vegetation Type (% cover)				Ecological Impacts		Invasiveness
	Mp (Quadrat CS01)	Mr (Quadrat CS03)	Mr (Quadrat CS04)	Ba (Quadrat CS05)	Level of Impact	Impact Attributes	Rate of Dispersal
**Rumex crispus*		<1	Op		U		R
**Solanum mericanum*	Op				U		R
**Solanum nigrum*	Op				M		R
**Sonchus asper*			Op		U		R
**Ursinia anthemoides*	<1			2	U	Increasing	R
**Vulpia bromoides*	1	10	25	<1	H		R
**Zantedeschia aethiopicum*	Op	35			H	6,7,8,9,10	R

As can be seen from the above table the **Eragrostis curvula* (African Lovegrass) and **Lotus subbiflorus* (Hairy Bird's-Foot Trefoil) are the most dominant weeds present within the revegetation areas.

Targeted weed control will be undertaken within the revegetation areas. Weed control within these areas will be undertaken via spot-spraying with a grass selective herbicide such as fusillade, or other method as suitable to the target species identified at the site. A dye will be added to any herbicide mixture applied at the site to enable areas of application to be clearly identified (Plate 4-1).

Weed control will be ongoing at least twice annually for three years (i.e. 2025 to 2028), or until the performance criteria have been achieved within the revegetation areas identified Table 4-4.

4.4.3 Species Selection and Sourcing

Revegetation species will include a selection of species that occur naturally on site and species that provide use for Carnaby's Black Cockatoo including species listed Table 4-3. Stock of these species for use in the planting program will either be from onsite seed resources previously collected from the site or purchased from an accredited dieback-free commercial supplier.

Table 4-3: Revegetation Species List

Species	Growth Form	Upland Habitat	Lowland / Wetland Habitat	Used by Carnaby's Black Cockatoo
Acacia huegelii	Shrub	Y		
Acacia pulchella	Shrub	Y		
Acacia salinga	Tree/Shrub	Y	Y	Y
Adenanthos cygnorum	Shrub	Y		
Allocasuarina fraseriana	Tree	Y		
Anigozanthos humilis	Herb	Y		
Anigozanthos manglesii	Herb	Y		
Aotus procumbens	Shrub		Y	

Species	Growth Form	Upland Habitat	Lowland / Wetland Habitat	Used by Carnaby's Black Cockatoo
Astartea scoparia	Shrub		Y	
Banksia attenuata	Tree	Y		Y
Banksia grandis	Tree	Y		Y
Banksia ilicifolia	Tree	Y	Y	Y
Banksia littoralis	Tree		Y	Y
Banksia menziesii	Tree	Y		Y
Banksia sessilis	Shrub	Y		Y
Baumea juncea	Sedge		Y	
Bolboschoenus caldwellii	Sedge		Y	
Callistemon phoeniceus	Shrub	Y	Y	Y
Conostylis aculeata	Herb	Y	Y	
Conostylis juncea	Herb	Y		
Corymbia calophylla	Tree	Y	Y	Y
Daviesia preissii	Shrub	Y		
Dianella divaricata	Herb	Y	Y	
Eucalyptus marginata	Tree	Y		Y
Eucalyptus rudis	Tree		Y	Y
Eucalyptus todtiana	Tree	Y		Y
Gahnia trifida	Sedge		Y	
Gompholobium tomentosum	Shrub	Y		
Haemodorum laxum	Herb	Y		
Haemodorum spicatum	Herb	Y		
Hakea prostrata	Shrub	Y		Y
Hakea ruscifolia	Shrub	Y		Y
Hakea varia	Shrub		Y	Y
Hibbertia racemosa	Shrub	Y	Y	
Hypocalymma angustifolium	Shrub	Y	Y	
Isolepis cernua	Rush / sedge		Y	
Jacksonia furcellata	Shrub	Y		Y
Jacksonia sternbergiana	Shrub	Y		
Juncus pallidus	Rush / sedge		Y	
Kennedia prostrata	Shrub	Y		
Kunzea glabrescens	Shrub		Y	
Lechenaultia floribunda	Shrub	Y	Y	

Species	Growth Form	Upland Habitat	Lowland / Wetland Habitat	Used by Carnaby's Black Cockatoo
Leptocarpus canus	Rush / sedge		Y	
Melaleuca preissiana	Tree		Y	
Melaleuca rhaphiophylla	Tree		Y	
Melaleuca teretifolia	Shrub		Y	
Melaleuca thymoides	Shrub		Y	
Melaleuca viminea	Shrub		Y	
Patersonia occidentalis	Herb	Y	Y	
Pericalymma ellipticum	Shrub		Y	
Pultenaea reticulata	Shrub		Y	
Regelia ciliata	Shrub		Y	
Regelia inops	Shrub	Y	Y	
Stirlingia latifolia	Shrub	Y		
Xanthorrhoea brunonis	Shrub	Y		
Xanthorrhoea preissii	Tree/Shrub	Y	Y	Y

4.4.4 Plant Densities and Establishment

Planting is proposed to commence in the 2025 planting season (optimal planting timing is May-June).

The aim of the planting program will be to achieve an average plant density of between 1 to 2 stems/m^2 based on the existing vegetation and any additional supplementary planting undertaken. The planting mix will include a minimum number of black cockatoo habitat trees as identified in Section 4.3).

Where direct seeding is undertaken, methodology involves:

- seeding would occur during the optimal seeding timeframe of April-June
- seeds would be prepared and installed to meet the requirements of each specific species
- direct seeding rates may be up to 3 kg/ha, depending upon the presence of existing vegetation and the species mix.

It is noted that firebreaks will be maintained around the permitter of the site as required by the City of Armadale Fire Break and Hazard Reduction Notice.

4.5 Staging of Works

The revegetation program is proposed to be undertaken in up to 4 stages to provide for a more manageable annual work extent as well as allowing for staged budget expenditure. DWER will be advised of the specific stage boundaries within the annual reports. A new stage will be commenced every one to two years until the full revegetation extent as outlined within this plan is achieved.

4.6 Performance Targets

The program will achieve a 'Good-Very Good' (DWER level 5) condition level within the revegetation and rehabilitation areas.

The following quantitative completion criteria have been identified for revegetation works, which are consistent with SMART principles (specific, measurable, achievable, relevant, time-bound) to confirm this level has been achieved.

Table 4-4: Completion Criteria

Characteristic	Measure	Baseline floristic data	Completion Target	Completion Criteria
			Vegetation in Good to Very Good condition as per Keighery (1994)	
A. Species richness	i. Total species richness (site)	11 to 37 species (trees, shrubs and herbs) have been recorded in the vegetation types proposed to be cleared. The average species richness is 21.3.	Minimum of 60% native species, based on baseline data, including any existing vegetation	Minimum of 13 species (trees, shrubs and herbs) to be present in the revegetation areas, including any existing vegetation
B. Species density	i. Total	Information not previously recorded. An average plant density of 2 plants/m^2 in Banksia woodland environments is used as the baseline measure.	Minimum of 60% stems/ha, based on baseline data, including any existing vegetation	Minimum of 1.2 stem/m^2 on average across the revegetation areas, including any existing vegetation
C. Black Cockatoo habitat	i. Species Diversity	4 of the 37 native species recorded in the Banksia vegetation are identified to provide black cockatoo habitat opportunities.	Equal or exceed species richness of reference site providing black cockatoo foraging habitat, including any existing vegetation.	A minimum of 4 species which provide Black Cockatoo habitat opportunities are present across the revegetation areas, including any existing vegetation
	ii. Species Density	The percentage cover of species providing black cockatoo habitat opportunities recorded in the Banksia vegetation was 15% which equates to 0.0049 ha potential habitat to be cleared.	Replace greater than 0.0049 ha black cockatoo foraging habitat when plans are mature. In order to achieve this minimum cover of 0.008 ha black cockatoo foraging habitat to be set as the target. DWER have indicated a preference for the revegetation species to be Banksia. As such	A minimum of 3 *Banksia littoralis* plants to be established within the revegetation area.

Characteristic	Measure	Baseline floristic data	Completion Target	Completion Criteria
			Vegetation in Good to Very Good condition as per Keighery (1994)	
			Banksia littorialis is proposed due to its greater suitability for lower lying areas.	
D. Weed Cover	i. General weed species	Weeds observed in the clearing area reference site were generally competitive species. The highest weed cover recoded was: • *Ehrharta calycina* (50% cover) • *Ehrharta longiflora* (5% cover) • *Ursinia anthemoides* (2% cover). Total coverage of all weed was 61%.	Reduction in weed cover lower than reference site	Maximum of 15% weed cover
	ii. Declared weeds	No declared weeds were present onsite.	No declared weeds to be present within revegetation area.	0% cover

Achievement of these performance targets will result in:

- Improvement in condition and therefore ecological value of the revegetation sites to 'Good-Very Good'
- Provision of a higher quality buffer zone to the offsite conservation category wetland located to the south and west
- increase in the extent of Carnaby's Black Cockatoo habitat currently in the clearing and revegetation areas from approximately 0.0049 ha to approximately at least 0.008 ha (increase by approximately 63%).

4.7 Monitoring and Reporting

Assessments into weed control and planting success will be undertaken for three years in autumn and spring commencing in the year following planting (see Section 4.10.1). The following indicators will be assessed against performance targets (Table 4-4):

- 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 stem density counts to be estimated
- collection of photography from designated locations to build up a photographic record of progress for the site.

Monitoring methodology will utilise establishment of permanent monitoring quadrats (5 m x 5 m) within each revegetation state, as well as establishment of photo point monitoring locations.

Monitoring locations will be selected to best reflect the works areas.

A summary monitoring report will be produced annually and submitted to DWER by 30 June, which outlines the findings of the Revegetation Plan. Each report will cover the previous 1 June to 31 May period.

4.8 Contingency Actions

Should the performance targets not be met in revegetation stages remedial works which may be implemented include:

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

Performance targets would then be re-checked for these areas in next annual monitoring event.

4.9 Conservation Covenant

In order to ensure the long-term protection offset site a conservation covenant will be put in place over this area. This will extend the existing conservation covenants which are to be finalised for the site as required by clearing permits CPS 8768/1 and CPS 9928/1.

4.10 Implementation

4.10.1 Actions and Timing

Works onsite are proposed to be commenced in the 12 months following clearing commencement and will be undertaken in up to 4 stages. The timeline outlined below assumes that clearing will be undertaken in early 2024.

The proposed components of the revegetation and rehabilitation program will be the responsibility of Carey Baptist College.

The Implementation Schedule (Table 4-5) assumes the necessary planning and environmental approvals to commence Stage 4 construction are achieved to allow construction to commence by early-2024. If this is not achievable, the annual dates may need to be moved back. DWER will be advised of any necessary changes in this regard.

Table 4-5: Implementation Schedule

Matter	Action	Timing
Fencing	Install targeted fencing to prevent inadvertent damage to the revegetation areas	Prior to planting
	Inspect fencing and repair as needed	As required
Site preparation	Pre-planting weed control within the revegetation area	Autumn 2025 (First revegetation stage) Autumn prior to planting for subsequent revegetation stages
Weed Control	Undertake targeted weed control in the revegetation areas	First revegetation stage: • Spring 2025 • Autumn and Spring 2026 • Autumn and Spring 2027 • Autumn 2028 Target seasonal timing to be repeated for subsequent revegetation stages.
Planting	Install additional planting via direct seeding or tubestock installation within the revegetation zone to meet the plant density target.	Autumn to Spring 2025 (First revegetation stage) Autumn to spring post initial weed control event for subsequent revegetation stages
Monitoring and Reporting	Advise DWER of specific monitoring locations	First annual report
	Advise DWER of specific stage boundaries	First annual report for first revegetation stage Subsequent annual report for future stages, as they are planned/progressed.
	Undertake monitoring of weed presence and planting success until three years post planting.	First revegetation stage: • Spring 2025 • Autumn and Spring 2026 • Autumn and Spring 2027 • Autumn 2028 Target seasonal timing to be repeated for subsequent revegetation stages.
	Annual summary report to be provided to DWER. The annual report is to cover the previous 1 June to 31 May period.	Frist revegetation stage: • Annually by 30th June in the following years: ▪ 2026 ▪ 2027 ▪ 2028 Annual reporting to commence in the year following planting for subsequent stages and continue for 3 years.
Contingency Actions	Assess need for remedial actions annually. Implement if required.	As required

4.10.2 Long Term Security of Revegetation Areas

The revegetation areas will remain under the ownership of Carey Baptist College.

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.

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

The conservation covenant prosed for the Ba unit offset area will also provide further protection of this revegetation area.

4.10.3 Term of the Plan

This plan will be implemented by Carey Baptist College from the year development of Stage 4 commences, anticipated to be in 2024 (Table 4-5). The plan will continue to have effect until the revegetation works have been completed.

5 References

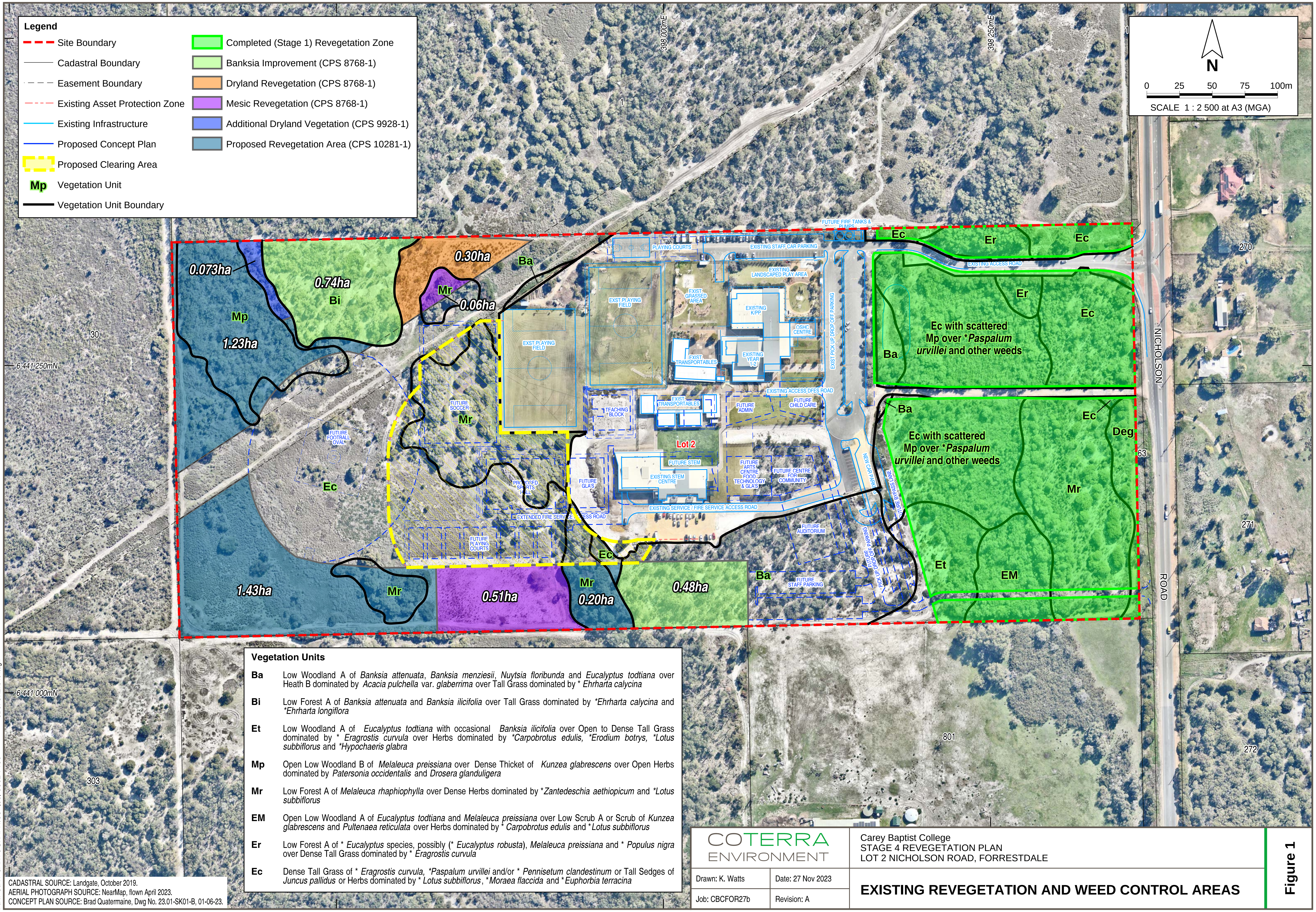
Bennett Environmental Consulting (2011). *Botanical Assessment of Lot 2 Nicholson Road, Forrestdale*. Unpublished report prepared for Coterra Environment, Perth, Western Australia.

Coterra Environment (2014). *Stage 1 Revegetation Plan – Lot 2 Nicholson Road, Forrestdale (Revision 1)*. Unpublished report prepared for Carey Baptist College, Perth, Western Australia.

Coterra Environment (2020). *Revegetation Plan Addendum (Stage 2) – Carey Baptist College, Forrestdale (Revision 2)*. Unpublished report prepared for Carey Baptist College, Perth, Western Australia.

Tranen Revegetation Systems (2021). *Carey Group Stage 2 Monitoring Report – Spring 2019.* Unpublished report prepared for Carey Baptist College, Perth, Western Australia.

Figures



Legend

- Site Boundary
- Cadastral Boundary
- Easement Boundary
- Existing Asset Protection Zone
- Existing Infrastructure
- Proposed Concept Plan
- Proposed Clearing Area
- Mp Vegetation Unit
- Vegetation Unit Boundary
- Completed (Stage 1) Revegetation Zone
- Banksia Improvement (CPS 8768-1)
- Dryland Revegetation (CPS 8768-1)
- Mesic Revegetation (CPS 8768-1)
- Additional Dryland Vegetation (CPS 9928-1)
- Proposed Revegetation Area (CPS 10281-1)

Vegetation Units

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*
Bi	Low Forest A of *Banksia attenuata* and *Banksia ilicifolia* over Tall Grass dominated by **Ehrharta calycina* and **Ehrharta longiflora*
Et	Low Woodland A of *Eucalyptus todtiana* with occasional *Banksia ilicifolia* over Open to Dense Tall Grass dominated by * *Eragrostis curvula* over Herbs dominated by **Carpobrotus edulis, *Erodium botrys, *Lotus subbiflorus* and **Hypochaeris glabra*
Mp	Open Low Woodland B of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Open Herbs dominated by *Patersonia occidentalis* and *Drosera glanduligera*
Mr	Low Forest A of *Melaleuca rhaphiophylla* over Dense Herbs dominated by **Zantedeschia aethiopicum* and **Lotus subbiflorus*
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*
Er	Low Forest A of * *Eucalyptus* species, possibly (* *Eucalyptus robusta*), *Melaleuca preissiana* and * *Populus nigra* over Dense Tall Grass dominated by * *Eragrostis curvula*
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*

CADASTRAL SOURCE: Landgate, October 2019.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown April 2023.
CONCEPT PLAN SOURCE: Brad Quatermaine, Dwg No. 23.01-SK01-B, 01-06-23.

COTERRA ENVIRONMENT

Carey Baptist College
STAGE 4 REVEGETATION PLAN
LOT 2 NICHOLSON ROAD, FORRESTDALE

Drawn: K. Watts | Date: 27 Nov 2023
Job: CBCFOR27b | Revision: A

EXISTING REVEGETATION AND WEED CONTROL AREAS

Figure 1

COTERRA
ENVIRONMENT

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