

**Wallum Estate  
Torakina Road, Brunswick Heads  
Lot 13 DP 1251383**

**Revised Vegetation Management Plan**

Client	: Clarence Property Pty Ltd
Prepared by	: Australian Wetlands Consulting Pty Ltd
Project #	: 1-211400
Date	: December 2023

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# **Wallum Estate Torakina Road, Brunswick Heads Lot 13 DP 1251383**

## **Revised Vegetation Management Plan**



## Project control

Project name: **Wallum Estate**  
**Torakina Road, Brunswick Heads**  
 Revised Vegetation Management Plan

Project #: 1-211400  
 Client: Clarence Property Pty Ltd  
 Contact: James Fletcher

Prepared by: Australian Wetlands Consulting Pty Ltd  
 25 Leslie Street  
 Bangalow NSW 2479

P | (02) 6687 1550

E | [admin@awconsult.com.au](mailto:admin@awconsult.com.au)

Date:	Revision:	Prepared by:	Reviewed by:	Distributed to:
17/08/2021	A	Ian Colvin	Damian McCann	James Fletcher
18/08/2021	B	Ian Colvin	Damian McCann	James Fletcher
20/08/2021	C	Ian Colvin	Damian McCann	James Fletcher
07/09/2021	D	Ian Colvin	Damian McCann	James Fletcher
06/09/2022	E	Ian Colvin	(Minor updates)	James Fletcher
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21/09/2022	H	Ian Colvin	Damian McCann	James Fletcher
27/10/2022	I	Ian Colvin	Damian McCann	James Fletcher
09/11/2022	J	Ian Colvin	Damian McCann	James Fletcher
13/06/2023	K	Alec Willows	Damian McCann	James Fletcher
21/11/2023	L	Damian McCann	Alec Willows	James Fletcher
06/12/2023	M	Alec Willows	Adrian Leader	James Fletcher

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AWC's management system has been certified to ISO 9001.





# Table of Contents

Project control.....	ii
Table of Contents.....	iii
<b>1 Introduction and Background .....</b>	<b>1</b>
1.1 Background Information.....	1
1.2 VMP Requirements .....	2
1.3 Property Details .....	3
1.4 Proposed Development .....	3
1.5 Bushfire Matters.....	3
<b>2 Aim and Objectives .....</b>	<b>7</b>
2.1 Aims.....	7
2.2 Objectives .....	7
<b>3 Site Attributes .....</b>	<b>8</b>
3.1 Current Land Use.....	8
3.2 Geology and Soils.....	8
3.3 Topography and Hydrology.....	8
3.4 Biodiversity Values.....	9
3.5 Vegetation Communities .....	10
3.6 Threatened Flora and Communities.....	12
3.7 Vegetation Condition.....	12
3.8 Weeds .....	12
<b>4 Potential Management Issues and Site Threats .....</b>	<b>2</b>
<b>5 Threatened Fauna Considerations.....</b>	<b>4</b>
5.1 Introduction .....	4
5.2 Compensation .....	5
5.2.1 Glossy Black-Cockatoo .....	5
5.2.2 Koala .....	5
<b>6 Restoration and Establishment Activities .....</b>	<b>6</b>
6.1 Introduction .....	6
6.2 Management Action Overview.....	8
6.3 Management Zone 1 .....	8
6.3.1 Mitchell's Rainforest Snail.....	9
6.4 Vegetation Management Zone 2a and 2b.....	9
6.5 Management Zone 3a .....	10
6.6 Management Zone 3b .....	10
6.7 Management Zone 4 .....	11
6.7.1 Mitchell's Rainforest Snail.....	12
<b>7 Hollow and Nest box Installation and Monitoring.....</b>	<b>14</b>



7.1	Summary of Actions.....	15
7.2	Planting Specifications .....	16
7.2.1	Infill plantings (MZ 1, MZ 2b, MZ 4) .....	16
7.2.2	Landscape plantings (MZ 3a).....	18
7.3	Licensing and Qualifications .....	18
<b>8</b>	<b>Implementation.....</b>	<b>19</b>
8.1	Key Performance Indicators.....	19
8.2	Implementation and Funding .....	19
8.2.1	Contingency and mitigation measures .....	19
<b>9</b>	<b>Monitoring and Reporting.....</b>	<b>25</b>
9.1	Introduction .....	25
9.2	Monitoring .....	25
9.2.1	Infill Plantings .....	25
	..... - Assess mulch cover and tree guards.	
	.....	25
9.2.2	Ripping (Assisted Regeneration) .....	25
9.2.3	Informal tracks and trails.....	26
9.3	Reporting .....	26
<b>10</b>	<b>Ongoing Management Following Establishment .....</b>	<b>28</b>
<b>11</b>	<b>Compliance .....</b>	<b>30</b>
<b>12</b>	<b>References.....</b>	<b>32</b>
	<b>Appendix A: Subdivision Plans .....</b>	<b>33</b>
	<b>Appendix B: Landscape Plans and Early Ecological Works Package.....</b>	<b>34</b>
	<b>Appendix C: Management Action Summary.....</b>	<b>35</b>
	<b>Appendix D: Nest Box Management Plan .....</b>	<b>40</b>
	<b>Appendix E: Native flora species recorded on site. (refer to Table 3.2 for exotic species) .....</b>	<b>41</b>
	<b>Appendix F: NPWS Checklist For Bush Regeneration In Threatened Species Habitat or Threatened Ecological Community .....</b>	<b>46</b>

### List of Tables

Table 3.1	Plant Community Types* .....	10
Table 3.2	Exotic species at the site .....	1
Table 4.1	Vegetation Management Constraints.....	2
Table 5.1	Threatened fauna impacts and habitat protection/compensation .....	5



Table 6.1 Vegetation Management Zones .....	6
Table 7.1 Summary of management actions .....	15
Table 7.2 Infill Planting MZ4 for PCT 1230.....	17
Table 8.1 Management actions and KPIs for VMZs .....	20
Table 8.2 Implementation Schedule.....	24
Table 10.1 Summary of monitoring and management actions required .....	29
Table 11.1 Compliance with Concept Approval .....	30

### **List of Figures**

Figure 1.1 Subject Site .....	4
Figure 1.2 Concept Layout .....	5
Figure 1.3 Asset Protection Zones .....	6
Figure 3.1 Plant Community Types .....	11
Figure 3.2 Weed Mapping.....	1
Figure 5.1 Vegetation Management Zones .....	7
Figure 5.2 MRS Potential Habitat .....	13
Figure 8.1 Monitoring Plots and Photo Points.....	27



# 1 Introduction and Background

## 1.1 Background Information

Australian Wetlands Consulting (AWC) has prepared this *Revised Vegetation Management Plan* (VMP) to comply with the development application conditions of consent for DA 10.2021.575.1 (Byron Shire Council 2023) for a residential development at Lot 13 DP 1251383 15 Torakina Road, Brunswick Heads, originally known as Major Project (MP05 0091) or DA 05-0091.

Since the Concept Approval was issued, the subdivision concept has been refined with regard to layout, lot numbers etc. (refer Section 1.4).

AWC (2018) prepared a VMP for Stage 1A of Bayside Brunswick (a 12-lot subdivision on Omega Circuit) which has been approved. Stage 1A has been completed and works completed for the approved VMP. This VMP relates to Lot 13 DP1251383 Torakina Road Brunswick Heads and is guided by the requirements of DA 10.2021.575.1 and the Draft Statement of Commitments.

NOTE: AWC have prepared two other documents of relevance to vegetation works at the site:

1. *Revised Wallum Froglet Management Plan* ('WFMP'; AWC 2023h): this plan addresses various requirements for the restoration and enhancement of habitat for the threatened Wallum Froglet (*Crinia tinnula*). Areas subject to works in WFMP are not covered by this VMP.
2. Landscaping Plans (AWC 2021 Revision C): a landscaping and streetscape plan has been prepared for the site. Plantings in the landscaping plan are separate to any provisions in this VMP.

Any management activities related to landscape plantings or stormwater control (e.g. swales, detention areas) will be completed in accordance with engineering and/or landscape requirements – these are generally not subject to this VMP but are referenced where necessary.



## 1.2 VMP Requirements

Consent Condition C6 of the **Concept Approval** states:

*The proponent is to submit with the first development application, a Vegetation Management Plan to apply to the land that comprises public reserve on the site. The plan shall be prepared in consultation with OEH and council and shall include, but not be limited to:*

- a) dimensions of the reserves*
- b) details of how any rehabilitation within the reserve is to occur*
- c) actions required to protect and improve habitat for threatened species including Koala, Glossy Black-Cockatoo and Wallum Froglet as well as actions to re-establish habitat for threatened species on cleared lands*
- d) measures to control weeds*
- e) details of any fencing to protect the reserves*
- f) identification of timeframes and responsibilities for each action*
- g) bushfire management*
- h) measures to control public access within the reserves to minimise damage*
- i) details of future management and funding arrangements for the areas and measures to be implemented for the long-term protection of the areas, for example, through dedication.*

Objective B2 in the Statement of Commitments states:

*A Vegetation Management Plan will be prepared. The plan will outline both mitigation and compensatory strategies. The plan will set out a strategy for the rehabilitation and management of the Environmental Protection Zones (i.e. the areas covering approximately 11.5 ha between the development footprint and Simpson's creek) and outline a compensatory replacement planting strategy to offset the loss of the ecologically significant trees. All Koala and Glossy black cockatoo food trees impacted by the development will be replaced at a ratio of 2:1.*

Objective P6 in the Statement of Commitments states:

*The VMP is to include restoration plan of existing track.*

As noted, these requirements were addressed in the approved Stage 1A VMP and will now be addressed in this VMP for Lot 13. Further to this, this VMP will address Byron Shires Council's conditions of consent for DA 10.2021.575.1 (BSC 2023).

## 1.3 Property Details

The subject site (Lot 13 DP1251383) is located immediately south of the township of Brunswick Heads and has an area of approximately 30.5 ha. The majority of the site is dominated by slashed low heath. The site is bound by residential development to the north with areas of undisturbed forest to the west and south of the site. The eastern boundary is bound by Simpsons Creek. The property is bisected north-south by a constructed drainage line ('the central drain') which flows into Everitts Creek to the south which in turn connects to Simpsons Creek.

A 20 metre wide road reserve runs through the eastern portion of the site and continues into adjacent land to the south (Lot 4 DP576360). Coastal Wetlands gazetted under State Environmental Planning Policy (Resilience and Hazards) 2021 occur in the east of the site flanking Simpsons Creek. Refer to Figure 1.1 for the property's layout.

## 1.4 Proposed Development

Development consent is sought to undertake a staged subdivision to create 131 lots upon land described as 15 Torakina Road, Brunswick Heads (Lot 13 in DP 1251383). The application proposes the subdivision of the land in seven stages comprising, 123 residential lots, three (3) medium density lots, and four (4) public reserves together with associated public roads and infrastructure services (water, sewer, drainage and stormwater management works), bulk earthworks, tree removal and vegetation management works (refer concept plan at Figure 1.2).

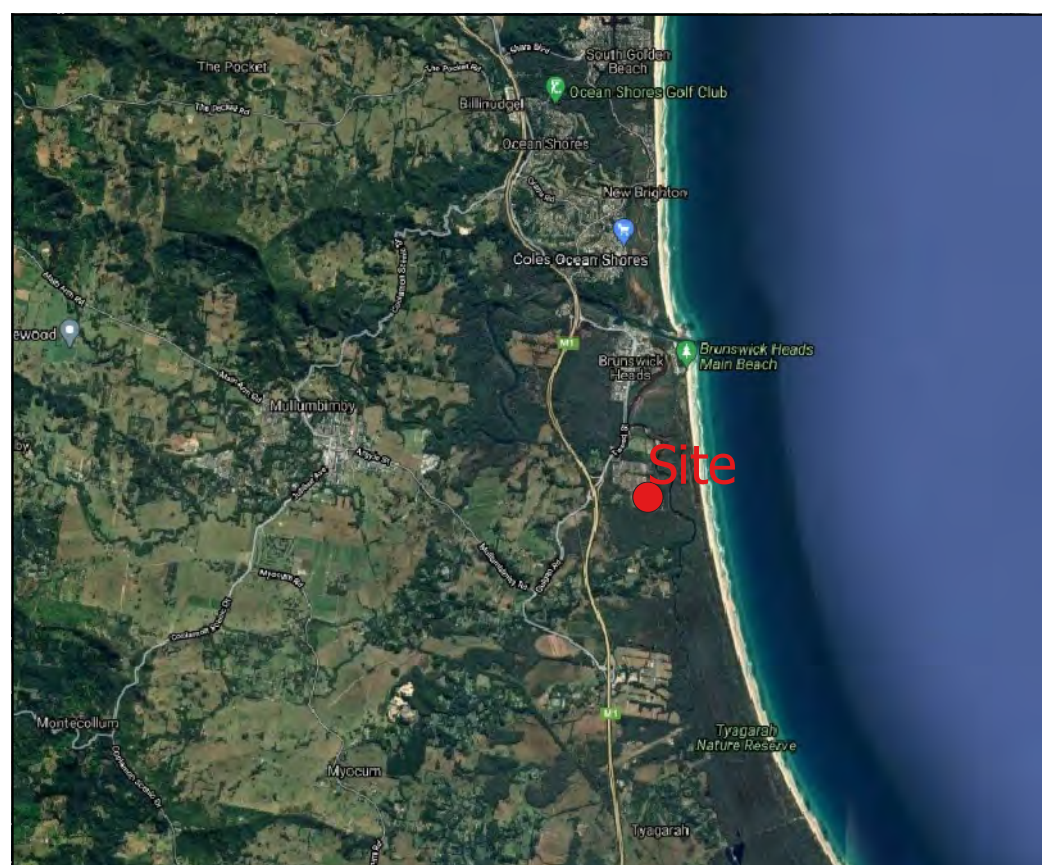
The development occupies approximately 13.33 ha (43.7 %) of the site. Residual land outside of the development footprint (~17.2 ha) will be managed for biodiversity and comprises reserves P1, P2, and P3. Reserve P2 will be dedicated to Council. The majority of residue land in the east and west of the site is addressed via this VMP via designated Management Zones.

Subdivision plans are provided in Appendix A.

## 1.5 Bushfire Matters

A Bush Fire Safety Authority (BFSA) was issued for the development by NSW Rural Fire Service (RFS) on 23/12/2021. The BFSA included general terms of approval with which this VMP is compliant. Asset Protection Zones (APZs) for the development are shown at Figure 1.3. Vegetation management required for biodiversity management (refer Section 5.1) is consistent with APZ requirements.











Figure:	1.1 Subject Site
File:	1-211400-BaysideBrunswick_ClarenceProperty
Source:	Aerial Image - Near Maps 2021



0 50 100 150 200 250 m



**Legend**

 Site Boundary

Care was taken in the creation of this map. AWC should be consulted as to the suitability of the information shown herein prior to the commencement of any works based on the information provided. AWC cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties expressed or implied as to the suitability of this map for a particular purpose. However, notification of any errors will be appreciated.

A3 Scale 1:4000  
Coordinate System: MGA 56 Projection: Transverse Mercator  
Date: 17-8-21





REV.	ISSUE / AMENDMENTS	DATE
A	FOR APPROVAL	21.09.22

ADDRESS:  
**LOT 13 DP 1251383, TORAKINA DR  
BRUNSWICK HEADS**

SCALE			REV. <b>A</b>
0	50	100m	
DESIGNED	IC/SS	CAD FILE No. <b>1-211400_WALLUM.DWG</b>	
DRAWN	SS	DWG No. <b>1-211400_WALLUM_</b>	
CHECKED	DMc		





## 2 Aim and Objectives

### 2.1 Aims

The aim of this VMP is to retain consolidated vegetation communities, re-establish degraded areas of vegetation outside of the development footprint within designated Management Zones and thereby improve threatened species habitat.

### 2.2 Objectives

To achieve the aim of the VMP the following management objectives apply:

- Protect and maintain existing vegetation outside of the development footprint
- Undertake rehabilitation works in areas of degraded native vegetation
- Restore degraded/disturbed native vegetation to a level that reflects the cover, diversity and density of existing intact native vegetation
- Introduce measures to control human impacts to areas of retained and restored vegetation
- Manage and maintain vegetation to provide suitable habitat for fauna, particularly where habitat for acid frogs requires intervention to maintain biodiversity values.



## 3 Site Attributes

### 3.1 Current Land Use

The site does not have any notable current land use and is predominantly used by the public for passive recreational purposes such as nature appreciation. The site is privately owned and managed by Clarence Property on behalf of the owners.

### 3.2 Geology and Soils

Soil landscapes (Morand 1994) at the site include:

#### Tyagarah Aeolian

- Landscape— sediment basins of mixed estuarine and aeolian origin forming level to gently undulating plains. Relief is <3 m, elevation <5 m and slopes <1%. Extensively cleared open- and closed-forest.
- Soils— deep (>150 cm), moderately well-drained minimal Prairie Soils near basaltic areas. Deep (>150 cm), well-drained Podzols and Acid Peats near barrier systems.
- Limitations— very strongly acid, permeable, often waterlogged soils of low fertility and low water holding capacity with localised salinity. Permanently high watertables and moderate wind erosion hazard.

#### Black Rock Aeolian

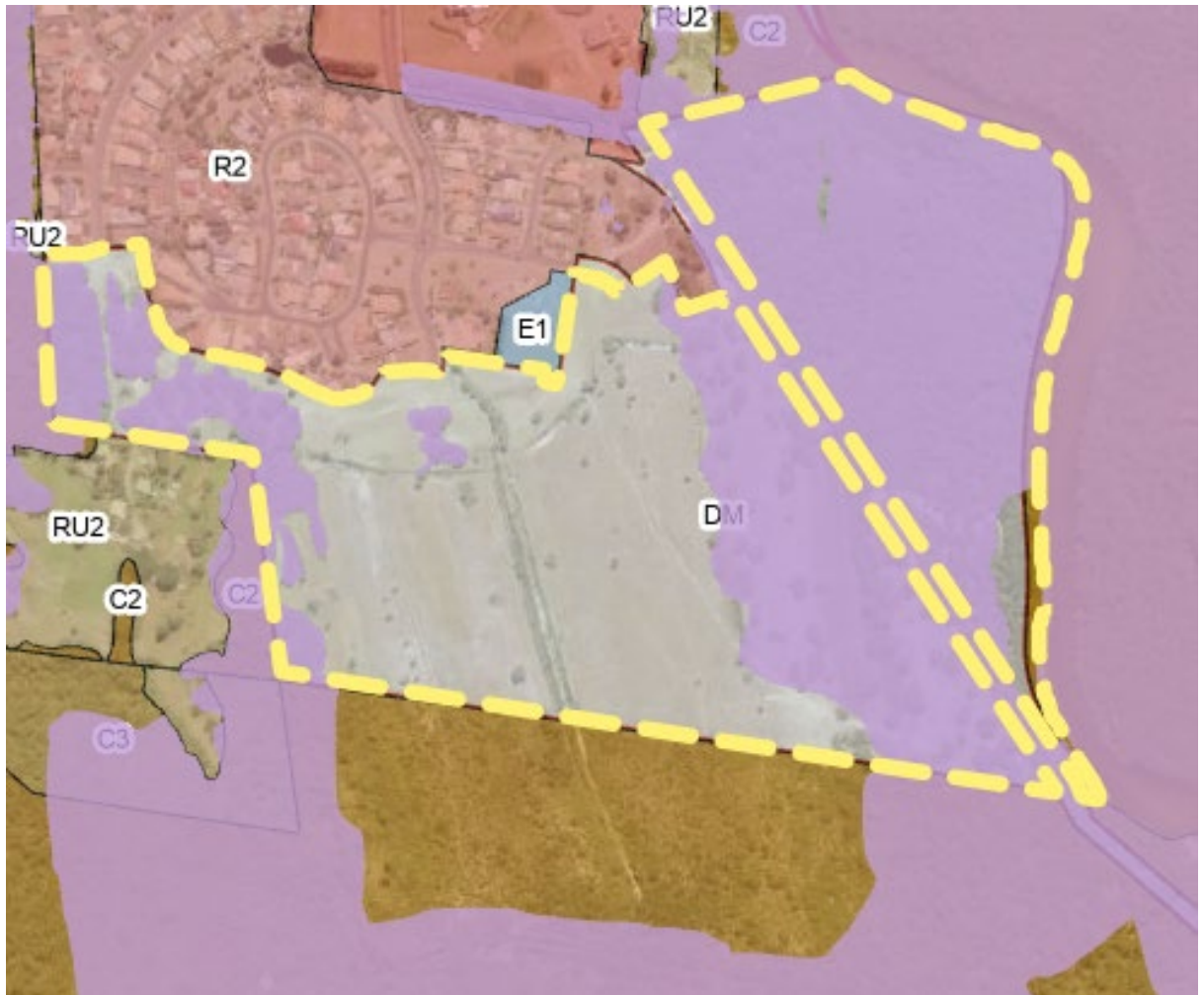
- Landscape—extremely low level to gently undulating beach ridge plains on Pleistocene beaches and dune sand. Elevation and relief are 1–2 m, slopes <5%. The topography is characterised by dune/swale systems aligned parallel to the coast. Dunes are very low (<3 m) and narrow to moderately broad (20–500 m), swales narrow to moderately broad (100–500 m). Dry and wet heathland occurs in dunes and swales respectively.
- Soils—deep (>300 cm), well-drained Podzols on dunes. Deep (>300 cm), imperfectly drained Humus Podzols and Peaty Podzols in depressions and deep (>200 cm), waterlogged Acid Peats (O) in swales. Deep (>300 cm), rapidly drained Siliceous Sands on newer, seaward dunes.
- Limitations—non-cohesive, highly permeable, highly acid soils of very low fertility. Organic soils in swales with permanently high watertables. High wind erosion hazard.

### 3.3 Topography and Hydrology

The site comprises low lying relatively flat land defined by two low, flat ridges (old dune systems) running north-south on the eastern and western side of the site. A central excavated drain runs from the north to the south of the site and eventually flows into Simpson Creek via Everitts Creek. The area east of the site drains towards the coastal zone and into the existing drain to the north. Land west of the site on the western ridge generally drains south into the adjacent low-lying areas. Ground water at shallow depths is typically between 0.3 - 0.8m in lower lying areas.

### 3.4 Biodiversity Values

The eastern and western extents of the site are mapped under the Biodiversity Values Mapping (BV). The site is outlined in yellow, and the BV mapping extents are in purple below.



### 3.5 Vegetation Communities

The BDAR (AWC 2022c) confirmed and mapped a number of vegetation communities at the site. Vegetation types are identified as plant community types (PCTs) as per the BioNet Vegetation Classification) at Table 3-1. Figure 3.1 shows PCT mapping within the development footprint, with Council vegetation mapping adopted for undeveloped land in the east of the site.

Table 3.1 Plant Community Types\*

PCT ID	Formation	Class	Plant Community Type (PCT)
<b>Development footprint</b>			
1230	Forested Wetlands	Coastal Swamp Forest	Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion.
1064	Forested Wetlands	Coastal Swamp Forests	Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion
1135	Dry Sclerophyll Forests (Shrubby sub-formation)	North Coast Dry Sclerophyll Forests	Scribbly Gum - Needlebark Stringybark heathy open forest of coastal lowlands of the northern NSW North Coast Bioregion
785	Heathlands	Northern Montane Heaths	Coastal heath on sands of the NSW North Coast Bioregion
1290	Freshwater Wetlands	Coastal Heath Swamps	Soft Twig-rush Sedgeland of North Coast Wallum Swamps
1297	Freshwater Wetlands	Coastal Heath Swamps	Wet heathland and shrubland of coastal lowlands of the NSW North Coast Bioregion
<b>Residual land (eastern conservation land)</b>			
916	Saline Wetlands	Mangrove Swamps	Mangrove – Grey Mangrove low closed forest of the NSW Coastal Bioregion
1297	Freshwater Wetlands	Coastal Heath Swamps	Wet heathland and shrubland of coastal lowlands of the NSW North Coast Bioregion
1125	Saline Wetlands	Saltmarshes	Saltmarsh complex of the NSW North Coast Bioregion
1235	Forested Wetlands	Coastal Swamp Forests	Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion
663	Heathlands	Coastal Heath Swamps	Banksia dry shrubland on coastal sands of the NSW North Coast Bioregion

\* PCT identification numbers and labels have been updated since this report was prepared.



## BSC Vegetation Mapping (2021)

- Mangrove
- Paperbark
- PL
- Saltmarsh
- Scribbly Gum
- Scribbly Gum-Swamp Mahogany-Wallum Banksia
- Swamp Mahogany-Paperbark
- Swamp Oak+Paperbark
- Wallum Banksia-Black She-oak



## AWC Vegetation Mapping 2022

- PCT 1297-Wet heathland and shrubland of coastal lowlands of the NSW North Coast Bioregion
- PCT 1135-Scribbly Gum - Needlebark Stringybark heathy open forest of coastal lowlands of the northern NSW North Coast Bioregion
- PCT 1230-Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion

- PCT 1064-Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion
- PCT 785-Coastal heath on sands of the NSW North Coast Bioregion
- PCT 1290-Soft Twig-rush Sedgeland of North Coast Wallum Swamps



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### Legend

- Site
- Layout
- Side Swale
- Drainage Lines
- Pink Nodding Orchids

0 100 200 300 m

A4 Scale 1:6,000

Coordinate System: MGA 56 Projection: Transverse Mercator

## Figure 3.1 Plant Community Types

Data source:  
Aerial - Near Maps 2022  
Plant Community Types: AWC and BSC 2021

Date: 20-09-22  
Job No: 211400  
Drawn: ED  
Checked: IC



### 3.6 Threatened Flora and Communities

#### Threatened flora

One threatened flora species has been identified at the site; a small population (~100 plants) of Pink Nodding Orchid (*Geodorum densiflorum*) occurs within residual land in the south-east corner of the property. The location of these plants is shown at Figure 3.1, with protection measures detailed in Section 5.3. Refer to Appendix E for a list of native flora species identified on site and Table 3.2 for a list of Weeds and exotic species.

#### Threatened communities

Three Threatened Ecological Communities (TECs) occur at the site:

- Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions (consistent with PCT 1064 and PCT 1230)
- Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions (consistent with PCT 1235)
- Coastal Saltmarsh in the North Coast, Sydney Basin and South East Corner Bioregions (consistent with PCT 1125).

### 3.7 Vegetation Condition

With the exception of the highly modified (slashed) heathland in the central portion of the site (much of the development footprint), vegetation communities are generally in good condition, are relatively undisturbed and environmental weeds occur very infrequently. A network of informal tracks and open sandy areas occur in the east of the site where vegetation has been removed and vehicles have accessed Simpsons Creek. These areas are highly degraded from disturbance by unauthorised motorbike riders.

### 3.8 Weeds

Vegetation at the site is generally in excellent condition, showing high resilience and weeds occur at very low incidences. This is primarily due to the sites occurrence on low fertility soils which do not provide suitable conditions for broadscale establishment of common woody weeds such as Camphor Laurel, Privet or Lantana). Weed species outside of the development footprint are largely limited to the west of the site and include Umbrella Tree, Coral Tree and an infestation of Kahili Ginger. A vehicle track along the powerline in this area is dominated by pasture grass. The eastern portion of the site is very clean and woody weeds are absent; Whiskey Grass occurs very infrequently along tracks and disturbed areas. In the north of the site adjacent to the pre-school, two small patches of PCT 1230 support occasional woody weeds (Camphor Laurel, Umbrella Tree); Fishbone Fern is also present.

Weed mapping is shown at Figure 3.2. Within the development footprint in the west of the site disturbed areas supports Umbrella Tree, Lantana and Camphor Laurel. These are not depicted and will be removed mechanically as the site is developed. Weed and exotic flora species identified within the site, landholders' biosecurity and listing within the North Coast Regional Strategic Weed Management Plan 2023-2027 (NCRSSWMP) (Local Land Services 2022) are outlined Table 3.2.

*Table 3.2 Exotic species at the site*

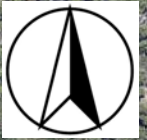


Common Name	Scientific Name	Biosecurity management tool	NCRSSWMP listing	Weed Control Methods
Agapanthus	<i>Agapanthus praecox</i>	-	-	Hand pull or spot spray using Glyphosate 360 g/L Biactive
Billygoat Weed	<i>Ageratum houstonianum</i>	-	Additional species of concern	Spot spray using Glyphosate 360 g/L Biactive
Bird of Paradise	<i>Strelitzia sp.</i>	-	-	Hand pull or spot spray using Glyphosate 360 g/L Biactive
Broad-leaved Paspalum	<i>Paspalum mandiocanum</i>	-	-	Spot spray using Glyphosate 360 g/L Biactive
Camphor Laurel	<i>Cinnamomum camphora</i>	General Biosecurity Duty	Additional species of concern	Hand pull or cut and paint/drill and fill using Glyphosate 360 g/L Biactive
Cocos Palm	<i>Syagrus romanzoffiana</i>	General Biosecurity Duty	Additional species of concern	Hand pull or cut and paint/drill and fill using Glyphosate 360 g/L Biactive
Coral Tree	<i>Erythrina x sykesii</i>	Regional Recommended Measure* <i>Exclusion (eradication) zone: Bellingen Shire LGA, Clarence Valley LGA, Coffs Harbour City LGA, Kempsey Shire LGA, Lord Howe Island, Nambucca Valley LGA, Port Macquarie-Hastings LGA. Core infestation (containment) zone: Ballina Shire LGA, Byron Shire LGA, Kyogle Shire LGA, Lismore City LGA, Richmond Valley LGA, Tweed Shire LGA.</i>	Additional species of concern	Hand pull or cut and paint/drill and fill using Glyphosate 360 g/L Biactive
Fishbone Fern	<i>Nephrolepis cordifolia</i>	General Biosecurity Duty	-	Spot spray using Glyphosate 360 g/L Biactive



Common Name	Scientific Name	Biosecurity management tool	NCRSSWMP listing	Weed Control Methods
Kahili Ginger	<i>Hedychium gardnerianum</i>	General Biosecurity Duty	Additional species of concern	Hand pull or spot spray using Glyphosate 360 g/L Biactive
Kikuyu	<i>Cenchrus clandestinum</i>	-	-	Spot spray using Glyphosate 360 g/L Biactive
Setaria	<i>Setaria sphacelata</i>	-	-	Spot spray using Glyphosate 360 g/L Biactive
Umbrella Tree	<i>Schefflera actinophylla</i>	General Biosecurity Duty	Additional species of concern	Hand pull or cut and paint/drill and fill using Glyphosate 360 g/L Biactive
Whiskey Grass	<i>Andropogon virginicus</i>	-	-	Spot spray using Glyphosate 360 g/L Biactive
White Passionfruit	<i>Passiflora subpeltata</i>	-	-	Spot spray using Glyphosate 360 g/L Biactive or skirt and paint using Glyphosate 360 g/L Biactive
Winter Senna	<i>Senna pendula</i> var. <i>glabrata</i>	General Biosecurity Duty	Additional species of concern	Hand pull or cut and paint/using Glyphosate 360 g/L Biactive





### Weeds

- Agapanthus
- Bird of Paradise
- Camphor Laurel
- Coral Tree
- Fishbone Fern
- Kahili Ginger
- Umbrella Tree
- White Passionfruit
- Winter Senna

### Legend

- Site
- Layout
- Side Swale

0 100 200 300 m

A4 Scale 1:5,000

Coordinate System: MGA 56 Projection: Transverse Mercator

### Figure 3.2 Weed Mapping

Data source:  
Aerial - Nearmaps 2022  
Layout - Civiltech  
Weeds - AWC

Date: 5-09-22  
Job No: 211400  
Drawn: ED  
Checked: IC



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## 4 Potential Management Issues and Site Threats

A number of constraining factors have been outlined that have the potential to affect the successful implementation of this VMP and protection of the immediately surrounding vegetation. Outlined in Table 4.1.

Table 4.1 Vegetation Management Constraints

Site Management Issue	Mitigation	Outcome
Bushfire and APZs	A Bush Fire Safety Authority (BFSA) was issued for the development by NSW Rural Fire Service (RFS) on 23/12/2021. The BFSA included general terms of approval with which this VMP is compliant.	Vegetation management required for biodiversity management is consistent with APZ requirements.
Erosion, Chemical Contamination and Biosecurity Risks	The sites Erosion and Sediment Control Plan (ESCP) and Construction Environmental Management Plan (CEMP) will significantly reduce any direct and indirect impacts to retained and revegetated areas or incursions of Biosecurity risks such as Chytrid fungus or <i>Phytophthora cinnamomi</i> managed under this VMP and the surrounding vegetation.	No impacts to native vegetation from erosion, hazardous chemicals or increased biosecurity risks to the vegetation from <i>Phytophthora cinnamomi</i>
Impacts to vegetation from Machinery and construction workers	Delineate 'No Go Zones' across all management zones prior to construction works commence. Brief construction worker on the locations of these areas and maintain occupational awareness around sensitive biodiversity values.	No accidental crushing of vegetation by machinery or construction workers.
Invasive pest species	Implement VMP monitoring and report on any direct and indirect observations of vertebrate pest animal species. If vertebrate pest animals are identified over more than two monitoring events look to implementing a vertebrate pest animal strategy or control actions such as engaging a suitably qualified pest animal contractor.	No increases in vertebrate pest animal activity leading to impacts to vegetation.
Climatic hazards	Climatic hazards resulting in impacts to revegetation activities will be monitored and mitigation by replacing any plants lost will be	Climatic hazards minimised through replacement ratios.



Site Management Issue	Mitigation	Outcome
	at a 1:1 ratio.	
Protection of retained vegetation	Management any High Environmental Value (HEV) vegetation and/or red flags overlaps with the development under this VMP	High Environmental Value (HEV) vegetation and/or red flags are protected, restored and enhanced.

## 5 Threatened Fauna Considerations

### 5.1 Introduction

The following threatened fauna species have been recorded at the site (JWA 2011, AWC 2022):

- Common Planigale (*Planigale maculata*)
- Eastern Osprey (*Pandion cristatus*)
- Glossy Black-cockatoo (*Calyptorhynchus lathamii*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Koala (*Phascolarctos cinereus*)
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*)
- Little Bent-winged Bat (*Miniopterus australis*)
- Olongburra Frog (*Litoria olongburensis*)
- Pale-vented Bush-hen (*Amaurornis moluccana*)
- Southern Myotis (*Myotis macropus*)
- Wallum Froglet (*Crinia tinnula*)
- White-bellied Sea-eagle (*Haliaeetus leucogaster*)
- White-throated Needletail (*Hirundapus caudacutus*).

Threatened species habitat directly affected by the development include the Wallum Froglet, Koala and Glossy Black-cockatoo. This VMP incorporates compensation measures (as required under the Statement of Commitments) to mitigate adverse impacts to the Glossy Black-cockatoo and Koala\* via:

- Planting of Glossy Black-cockatoo feed trees (Black She-oak *Allocasuarina littoralis*) will be implemented at a 2:1 ratio (as per Objective B2 in the Statement of Commitments) to compensate for trees removed from within the development footprint (refer Section 4.2 for further details).
- Planting of Koala feed trees (Swamp Mahogany) will also be planted at a 2:1 ratio as a compensatory measure (refer Section 4.2 for further details) to address Objective B2.

\*Note: surveys by AWC in 2021 failed to record Koalas at the site; the most recent record (BioNet) for the species at the site is from 2011.

Compensatory measures for the Wallum Froglet are provided in the *Revised Wallum Froglet Management Plan* (AWC 2023h).

Habitat for other threatened fauna species recorded at the site is retained within forested residual land in the east and west of the site where resources for all species will be maintained; refer summary at Table 4-1.

Table 5.1 Threatened fauna impacts and habitat protection/compensation

Species	Habitat Impacts	Compensation
Common Planigale	Slashed heath in development footprint impacted, other habitats unaffected.	None proposed. Habitat retained and protected within residual land.
Eastern Osprey	Foraging and nesting resources unaffected.	None proposed.
Glossy Black-cockatoo	Minor reduction of feed trees (Black She-oak) within development footprint. Foraging and potential breeding resources (hollow-bearing trees) retained within residue land.	Compensation plantings of Black She-oak. Nest boxes installation, refer to Section 6 and Appendix D.
Grey-headed Flying-fox	Minor loss of foraging resources within development footprint.	None proposed. Substantial foraging habitat retained and protected within residual land.
Koala	Loss of 29 scattered Swamp Mahogany (primary feed tree) within development footprint. Minor loss of secondary foraging resources (Scribbly Gum).	Compensation plantings of primary feed tree Swamp Mahogany.
Threatened Microbat species.	Foraging and breeding resources largely unaffected.	Installation of Microbat box as a mosquito minimisation measure. This is outside the requirement for habitat compensation.
Olongburra Frog	Habitat retained adjacent to development footprint.	Habitat compensation proposed – refer WFMP.
Pale-vented Bush-hen	Habitat largely unaffected.	None proposed.
Wallum Froglet	Habitat impacted within development footprint.	Habitat compensation proposed – refer Wallum Frog Management Plan (AWC, 2023h).
White-bellied Sea-eagle	Habitat unaffected.	None proposed.
White-throated Needletail	Habitat unaffected.	None proposed.

## 5.2 Compensation

### 5.2.1 Glossy Black-Cockatoo

A total of 38 food trees (Black She-Oak *A. littoralis*) will require removal within the revised development footprint and compensation is therefore required to address Objective B2. Based on the prescribed 2:1 compensation ratio, 76 Black She-Oak will be planted. Details of compensation plantings are included within management actions in Section 5.

### 5.2.2 Koala

The proposed development requires the removal of 36 of the primary Koala food tree Swamp Mahogany. These trees will be offset by the planting of 72 Swamp Mahogany as part of restoration works to address Objective B2.

Details of compensation plantings are included within management actions in Section 5.



## 6 Restoration and Establishment Activities

### 6.1 Introduction

Four Management Zones (MZs) have been identified at the site (refer Figure 5.1). As noted, Management Zone 3 will be dedicated to Byron Shire Council once works are satisfactorily completed. Management Zones total approximately 17 ha or 57% of the site.

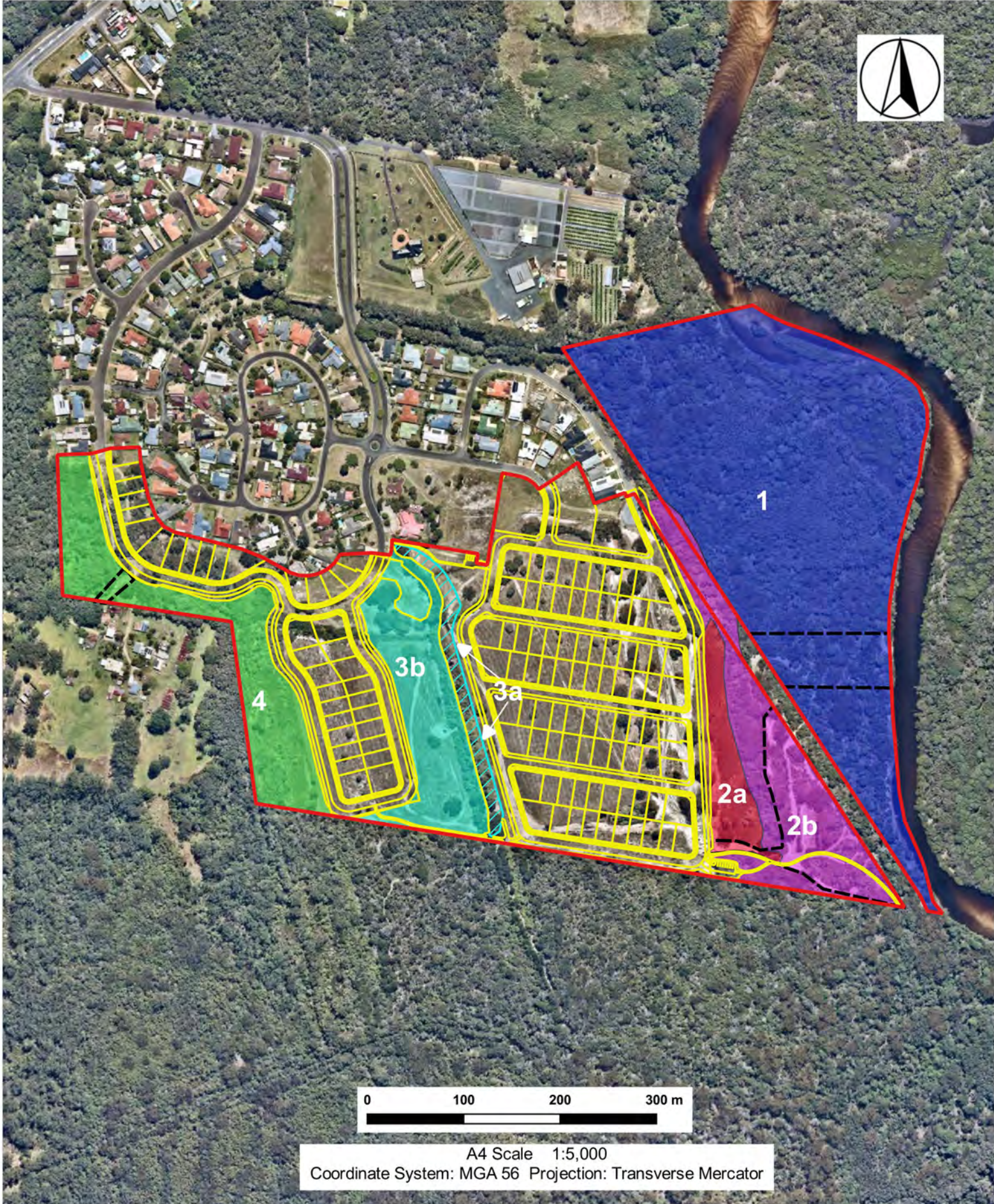
Details of MZs are described in Table 5-1. Note that within MZ 3b substantial works within frog habitat west of the central drain fall under the remit of the WFMP and so are not discussed further in this VMP except to note that management of frog habitat must ensure wallum and heath vegetation communities are maintained in perpetuity to maintain biodiversity values. Areas in MZ 2b will also include actions prescribed in the WFMP. These matters are excluded from this VMP. MZ 3a includes landscaping works following construction of the new stormwater drain and other drainage features (swales etc.).

The north-eastern portion of MZ 3b will be maintained as open space and no infill planting is proposed; management actions in this area are limited to weed and regrowth control only. Management actions within each zone are discussed in the following Sections.

Table 6.1 Vegetation Management Zones

MZ	Details	Vegetation
1	Largest VMZ, occupying residual land in the east of the site  Lot B128 in the Landscape Plan.	Mangrove forest ( <i>Avicennia marina</i> , <i>Aegiceras corniculatum</i> ), Swamp forest ( <i>Casuarina glauca</i> +/- <i>Melaleuca quinquenervia</i> ) and brackish swamp ( <i>Juncus kraussii</i> , <i>Acrostichum speciosum</i> ), Dune sclerophyll forest ( <i>Eucalyptus racemosa</i> , <i>Allocasuarina littoralis</i> , <i>Banksia aemula</i> ).
2a	South-east corner of the site west of the road reserve. Identified Wallum Froglet habitat.  Lot P1 in the Landscape Plan.	Sedge swamp/wet heath
2b	South-east corner of the site west of the road reserve. Additional plantings will be implemented within degraded tracks.  Lot P1 in the Landscape Plan.	Dune sclerophyll forest
3a	Drainage reserve (to be constructed).	Slashed heath and regrowth
3b	Central drainage area  Northern portion where weed management will be completed comprises approximately (0.3 ha).  Lot P2 in the Landscape Plan.	North: Slashed grassland; two isolated patches of <i>Eucalyptus robusta</i> .  Central drain: Regrowth vegetation retained ( <i>Allocasuarina littoralis</i> , <i>Nematolepis squamea</i> )
4	Western portion of site. Includes Wallum Froglet habitat; additional plantings will be implemented along degraded access track.  Lot P3 in the Landscape Plan.	Swamp forest, Dune sclerophyll forest





0 100 200 300 m

A4 Scale 1:5,000  
Coordinate System: MGA 56 Projection: Transverse Mercator



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Care was taken in the creation of this map. AWC should be consulted as to the suitability of the information shown herein prior to the commencement of any works based on the information provided. AWC cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties expressed or implied as to the suitability of this map for a particular purpose. However, notification of any errors will be appreciated.

### Legend

- Site Boundary
- Layout
- Existing Access Track - Planting Area

### Management Zones

- 1
- 2a
- 2b
- 3a
- 3b
- 4

## Figure 5.1 Management Zones

Data source:  
Aerial - Nearmaps 2022  
Management Zones - AWC  
Existing Access Track - AWC  
Layout - Civiltech

Date: 27-10-22  
Job No: 211400  
Drawn: ED  
Checked: IC



## 6.2 Management Action Overview

Various management actions are prescribed within each zone with the aim of restoring existing vegetation/habitat and re-establishing vegetation within formerly cleared areas. Management actions have been based on consideration of several factors including:

- Existing threats to vegetation and mitigation measures to reduce these threats
- Existing vegetation community
- Existing seed banks and ability to utilise the existing seed bank
- Threatened species habitat
- Topography and landform
- Flooding and hydroperiod.

In response, general actions are detailed in the following Sections including fencing, weed control and assisted regeneration by ripping and planting.

In the construction period, the following points apply to all of the MZs to protect existing vegetation and habitat:

- No stockpiling or storage (etc.) is permitted within any MZs.
- No works (except for tracks for pedestrian access or for essential environmental management purposes) is permitted within any MZs.
- Vehicular access, apart from for essential environmental management purposes, is not permitted within any MZs.

These measures, in addition to protocols for the clearing of any vegetation within the development footprint will be detailed in the project Construction Environmental Management Plan (CEMP).

## 6.3 Management Zone 1

Vegetation within VMZ 1 is generally in very good condition, with disturbance along the western margins from historic track making and disturbance by vehicles and motorbikes. This management zone is approximately 10.3 ha. The majority of this VMZ does not require extensive application of the management actions below.

Management actions for MZ 1 include:

- Control of Whiskey Grass by a professional experienced bush regenerator.
- Informal trail management:
  - Shallow ripping (multi-tine ripper to 300 mm depth) of compact sand on informal tracks to stimulate germination.
  - Repurpose vegetation removed i.e., large branches and logs from within the development footprint to restrict further access to informal tracks. Conduct brush matting to promote revegetation.
  - If regeneration rates are low, infill and compensatory plantings (refer Section 5.8) shall be implemented.
  - Monitoring informal trails for signs of continued disturbance from disturbance from the public recreational activities, vehicles and motorbikes.
  - Monitoring of plantings on informal trails as required. Compensatory plantings for individual plants lost must be conducted at a 1:1 ratio.

- Conduct shallow ripping (multi-tine ripper to 300 mm depth) of areas compact sand to promote germination, monitor for signs of regeneration and brush mat as required.
- Maintenance of wetland and heath communities.
- Protection of Pink Nodding Orchids. Key risks to these plants are theft and trampling. The orchid colony will be protected by temporary construction fencing during the construction phase, with the key action being the installation of the eastern walkway. For the on-maintenance and occupation phase, a buffer planting installed to screen the orchids from view will be completed. Signage stating 'Protected habitat – please keep out' (or words of similar intention) shall be installed along the walkway and at the walkway entry point.

A species schedule for infill plantings within degraded areas and the orchid buffer in MZ 1 is provided at Section 8.2.1.

### 6.3.1 Mitchell's Rainforest Snail

Areas of suitable habitat for Mitchell's Rainforest Snail within MZ1 and MZ4 will consist of slightly elevated ground on the margins of coastal wetlands or narrow strips of rainforest vegetation with a well-developed moist leaf litter layer with dead palm fronds (refer Figure 5.2). Management actions with these areas will consist of:

- Maintenance of microclimates surrounding areas of suitable habitat in proximity to the development footprint through:
  - Staged weed control i.e., removal of portions large weed infestations followed by infill plantings to increase canopy cover if this cover falls to less than 70%.
- Hand weeding and no herbicide use in areas that provide suitable habitat.
- Retention of a dense leaf litter layer and dead palms fronds
- Establishment of 'No-Go Zones' in areas where suitable habitat is identified, and where no weed control works are required.

## 6.4 Vegetation Management Zone 2a and 2b

MZ 2a and 2b collectively consist of an area of approximately 3.3ha. These MZs are highly disturbed from many informal tracks exposing large areas of compacted sand. Much of this area has been previously cleared with regrowth occurring patchily throughout. The key aspect of restoration works outside of Wallum Froglet habitat (Zone 2a) is the restoration of these degraded areas via a combination of planting and assisted regeneration (via ripping). Prior to construction works the western zone boundary must be clearly marked in the field by a registered surveyor and temporary fencing installed to restrict entry by vehicles/plant and personnel.

Management actions for MZ 2 include:

- Fence the western side of MZ 2 to prohibit entry by vehicles during construction. Informal entry to MZ 1 will be restricted during the occupation phase to control public access. This will be achieved by installation of bollards along the edge of the perimeter road and car park to restrict vehicle access.
- Dense plantings along the proposed creek access pathway to restrict residential access to bushland and further discourage opportunities for the creation of informal pathways.
- Installation of signage at strategic locations stating "*Regeneration area, No Entry*" or "*Sensitive Ecological Area – No Entry*".
- Control of Whiskey Grass by a professional experienced bush regenerator.





- Ripping sandy soils on informal tracks (as per MZ 1) (2b).
- Installation of compensatory and infill plantings (refer Section 5.8) (2b).
- Maintenance of heath and wetland habitats (2a).
- Monitoring of plantings and ripping actions (2b).

The delineation of MZ 2a and 2b is shown in Figure 5.1.

**Notes:**

- Incursions of eucalypt species from the fringing the proposed carpark area must be removed from the heathland in order to maintain light levels and prevent shading out (MZ 2a).
- For the long term habitat maintenance of wet heath and sedgeland habitat within MZ 2a (acid frog habitat), incursions of woody vegetation (eg. eucalypts, wattles etc. which may form a closed canopy) must be removed to maintain biodiversity values associated with existing high quality habitat.

## 6.5 Management Zone 3a

MZ 3a is approximately 0.5ha and is comprised of the drainage reserve east of the existing drain, where a second stormwater channel and swales will be constructed. Drain construction will require disturbance of all existing vegetation in this zone, therefore post construction planting may only occur when works are complete and signed off by the project engineer and stormwater consultant. Management actions for MZ 3a are limited to landscape plantings to establish wallum sand heath and a treatment swale, as specified in the landscape plan at Appendix B. Monitoring of the plantings will be required following installation.

**Notes:**

- For the long term habitat maintenance of wet heath, incursions of woody vegetation (eg. eucalypts, wattles etc. which may form a closed canopy) must be removed to maintain biodiversity values associated with adjacent existing high quality habitat.

Management actions for MZ 3a therefore are limited to:

- Landscape plantings to establish wallum sand heath and a treatment swale, as specified in the Landscape Plan and Habitat Creation Revision C.2 at Appendix B (AWC 2021). The landscape plan will specifically include a dense planting of sedges and grasses to widths of up to 5m (space permitting) along mapped watercourses to restrict cane toad incursions (refer to Early Ecological Works Package Rev C (AWC 2023) in Appendix B).

## 6.6 Management Zone 3b

The majority of MZ 3b will be managed as Wallum Froglet habitat (refer WFMP). MZ 3b consists of an area approximately 2ha in size. In the northeast of MZ 3b two isolated patches of Swamp mahogany occur within mown grassland. Several woody weeds occur within this area along with some dumped building refuse and concrete. Areas of mown grassland will be retained as open space. In addition, planting will occur within the bioswale and new drain to be constructed east of the existing drain. These plantings are detailed in the Early Ecological Works Package (AWC 2023) (refer Appendix B) however consistent with this VMP landscapes works must ensure designated vegetation communities are maintained.

Note that the existing central drain will not be subject to any works and all existing regrowth flanking the drain will be retained in-situ. This vegetation is in good condition, weed free and is regenerating well; no further management is required.

Management actions for MZ 3b therefore are limited to:

- Removal/control of weed and exotic plant species (refer Figure 3.2) by a professional experienced bush regenerator.
- Rubbish removal.
- Maintaining Wallum Froglet habitat in accordance with the Wallum Froglet Management Plan (WFMP) (AWC 2023h).
- Landscape plantings to establish wallum sand heath and a treatment swale, as specified in the Landscape Plan and Habitat Creation Revision C.2 at Appendix B (AWC 2021). The landscape plan will specifically include a dense planting widths of up to 5m (space permitting) along mapped watercourses to restrict cane toad incursions (refer to Early Ecological Works Package Rev C (AWC 2023) in Appendix B).

#### Notes:

- For the long term habitat maintenance of wet heath and sedgeland habitat within MZ 3b (acid frog habitat), incursions of woody vegetation (eg. eucalypts, wattles etc. which may form a closed canopy) must be removed to maintain biodiversity values associated with adjacent existing high quality habitat.

## 6.7 Management Zone 4

MZ 4 flanks the western boundary of the site and is partly bisected by powerlines and an access track in the northern portion and is approximately 2.2ha in size. Vegetation in the north outside of these disturbed areas is in excellent condition. At the boundary with the adjacent property to the south several mature Coral Tree and Umbrella Tree occur. Old vehicle tracks in this area have regenerated significantly with Bracken and regenerating heath. The southern portion of MZ 4 is in excellent condition and no works are required. Substantial regeneration of Prickly Teatree (*Leptospermum juniperinum*) flanks the eastern edge of adjacent swamp forest. The southern portion of MZ 4 comprises acid frog habitat as acknowledged in the WFMP.

Management actions for MZ 4 include:

- Installation of bollards along the edge of the perimeter road to restrict vehicle access.
- Installation of signage at strategic locations stating “*Regeneration area, no entry*” (or words of similar intention).
- Removal/control of exotic species (refer Figure 3.2) by a professional experienced bush regenerator.
- Ripping sandy soils on informal tracks (as per MZ 1).
- Installation of compensatory and infill plantings (refer Section 5.8).
- Monitoring of plantings and ripping actions.
- Maintenance of appropriate heath and wetland vegetation.

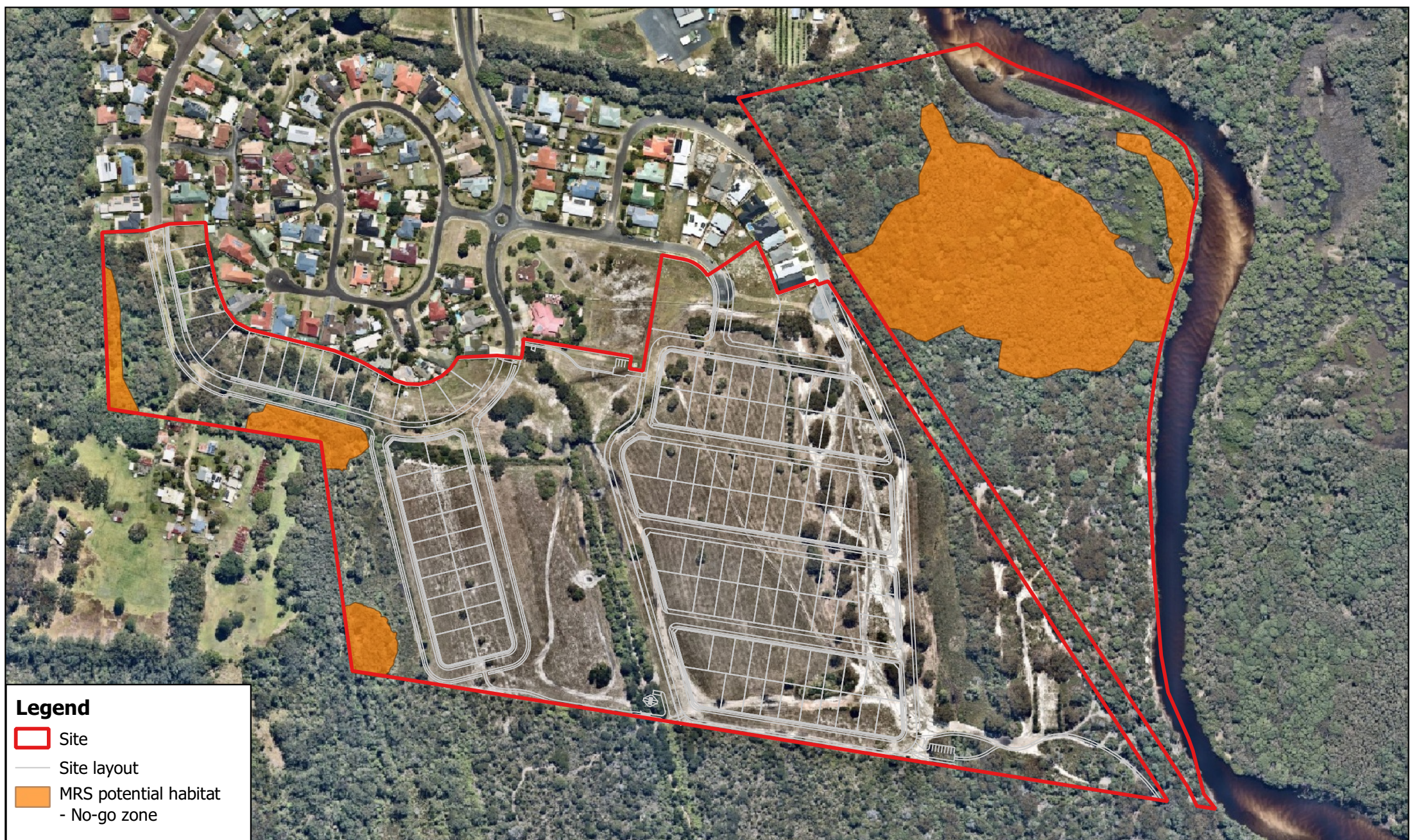


### 6.7.1 Mitchell's Rainforest Snail

Areas of suitable habitat for Mitchell's Rainforest Snail within MZ 1 and MZ4 will consist of slightly elevated ground on the margins of coastal wetlands or narrow strips of rainforest vegetation with a well-developed moist leaf litter layer with dead palm fronds (refer Figure 5.2 ). Management actions with these areas will consist of:

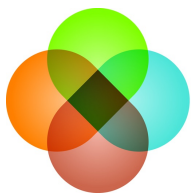
- Maintenance of microclimates surrounding areas of suitable habitat in proximity to the development footprint through:
  - Staged weed control i.e., removal of portions large weed infestations followed by infill plantings to increase canopy cover if this cover falls to less than 70%.
- Hand weeding and no herbicide use in areas that provide suitable habitat.
- Retention of a dense leaf litter layer and dead palms fronds.
- Establishment of 'No-Go Zones' in areas where suitable habitat is identified, and no weed control works are required.





## Legend

- Site
- Site layout
- MRS potential habitat  
- No-go zone



**AWC**

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0 50 100 150 200 m



A4 Scale 1:4,000

Coordinate System: MGA 56 Projection: Transverse Mercator

Figure:

**5.2 - Mitchell's Rainforest Snail  
Potential Habitat**

File:

1-211400-BaysideBrunswick\_ClarenceProperty

Source:

Aerial Image - Near Maps 2021  
PCTs - AWC 2021, BSC 2017



## 7 Hollow and Nest box Installation and Monitoring

A total of 50 hollows or nest boxes will be installed across MZ1 and MZ2 to compensate for the loss of hollow bearing trees within the development footprint in accordance with the development application conditions of consent for DA10.2021.575.1 (BSC 2023).

Hollows will be installed using mechanical cavity drilling as a preferred method of hollow construction. Nest boxes will be utilised where the mechanical cavity drilling is not feasible. Hollows and nest boxes will be installed as a part of the Early Stage 1 works to provide habitat for any displaced fauna a nest box monitoring plan (HNBMP) will be implemented in conjunction with the installation of the nest boxes. The HNBMP will broadly consist of a nest box inspection schedule and mitigation measures to safeguard the success of the installation (refer Appendix D). Species specific hollows or nest boxes and their numbers will consist of:

- 16 nest boxes for Glossy Black-Cockatoo (*Calyptorhynchus lathamii*)
- 7 nest boxes for Brush-tailed Phascogale (*Phascogale tapoatafa*)
- 6 nest boxes for Eastern Ringtail Possum (*Pseudocheirus peregrinus*)
- 6 nest boxes for Feathertail Glider (*Acrobates pygmaeus*)
- 2 nest boxes for Mountain Brushtail Possum (*Trichosurus caninus*)
- 5 nest boxes for Squirrel Glider (*Petaurus norfolkensis*)
- 8 nest boxes for Sugar Glider (*Petaurus breviceps*)

To support the Mosquito Risk Management Plan (MMP) (AWC 2023) 15 microbat boxes are proposed to be installed across MZ1, MZ2b and MZ4 and in proximity to the development in order to minimise mosquito numbers (USC 2017).

## 7.1 Summary of Actions

A summary of prescribed management actions within each Management Zones is provided in Table 6-1.

Table 7.1 Summary of management actions

MZ	Weed control	Planting (Autumn and Spring)	Ripping	Habitat Maintenance*	Rubbish Removal	Fencing (Construction)	Exclusion (Occupation)	Nest box installation
1	✓ (minor)	✓	✓	✓*	-	✓	✓	✓
2a	✓ (As required)	✓	-	✓*	-	✓	✓	
2b	✓ (minor)	✓	✓	-	-	✓	✓	✓
3a		✓		✓*	-	✓	✓	
3b		✓		✓*	✓	✓	✓	
4	✓	✓	✓	✓*		✓	✓	✓

\*For the long term habitat maintenance of wet heath and sedgeland, damp leaf litter layers and microclimates (Acid Frog and threatened species habitat i.e., Mitchell's Rainforest Snail), incursions of woody vegetation (eg. eucalypts, wattles etc which may form a closed canopy) must be removed to maintain suitable habitat.



## 7.2 Planting Specifications

### 7.2.1 Infill plantings (MZ 1, MZ 2b, MZ 4)

All infill plantings within informal tracks and extensive weed control areas will be planted at spacings 5 metre centres. Tree and shrub plantings will be installed following initial ripping works. All trees and shrubs will be installed as planted tubestock, be sourced from a reputable supplier of native plants, be in good health and free of pests and disease and ideally be of native provenance. The planting methodology will consist of:

- Digging a hole that is deeper and wider than the tube.
- Addition of terraform as required. Notably if planting occurs in drier seasons.
- Backfill the hole ensuring no smooth surfaces and create a water dish
- Mulch with weed free materials i.e., site tub grinds or tea tree mulch.
- Water in thoroughly and install a tree guard.

Any plants lost must be replaced at a 1:1 ratio and representative of the species lost.

Note the requirement regarding eucalypt landscaping around the carpark in the south-east of the site (MZ 2b): Incursions of eucalypts species from the proposed plantings fringing the carpark in MZ 2a must be removed in order to maintain light levels within the heathland.

A watering regime applies to all planted trees as follows:

- Initial watering and daily watering for five days
- Watering every 3 days for four weeks.

Additional watering may be required should adverse conditions occur; this will be completed at the discretion of the appointed contractor. A planting schedule is provided at Table 6-2 and represents common species within Scribbly Gum open forest at the site. Species chosen include resources for the Koala and Glossy Black-cockatoo – these are additional to compensation requirements (refer Section 4.2).

**Note: Infill planting must not alter the composition of vegetation communities as described in this plan.**

Table 6.2 Infill plantings – species schedule

Scientific name	Common name	Growth form
<i>Acacia suaveolens</i>	Sweet Wattle	Shrub
<i>Allocasuarina littoralis</i> *	Black She-oak	Tree
<i>Banksia aemula</i>	Wallum Banksia	Tree
<i>Elaeocarpus reticulatus</i>	Blueberry Ash	Tree
<i>Eucalyptus racemosa</i> ^	Scribbly Gum	Tree
<i>Eucalyptus robusta</i> **	Swamp Mahogany	Tree
<i>Leptospermum polygalifolium</i>	Tantoon	Shrub
<i>Persoonia stradbokensis</i>	Geebung	Shrub

\*Glossy Black-cockatoo feed tree

\*\*Primary Koala feed tree (Note: not to be planted in Pink Nodding Orchid buffer planting)

^ Secondary Koala feed tree

Table 7.2 Infill Planting MZ4 for PCT 1230

Scientific name	Common name	Growth form
<i>Acacia maidenii</i>	Maiden's wattle	Shrub
<i>Cordyline stricta</i>	Narrow-leaved palm lily	Shrub
<i>Banksia aemula</i>	Wallum banksia	Shrub
<i>Glochidion ferdinandi</i>	Cheese tree	Shrub
<i>Leptospermum juniperinum</i>	Prickly Tea-tree	Shrub
<i>Leptospermum polygalifolium</i>	Jellybush	Shrub
<i>Baloskion tetraphyllum</i>	-	Sedge
<i>Gahnia sieberiana</i>	Red-fruit saw-sedge	Sedge
<i>Hypolepis muelleri</i>	Harsh Ground Fern	Fern
<i>Ischaemum australe</i>	-	Grass
<i>Xanthorrhoea fulva</i>	Grass Tree	Grass

### **7.2.2 Landscape plantings (MZ 3a)**

Establishment of wallum sand heath and swale plantings will be completed in accordance with landscape specifications (refer Appendix B) following construction of stormwater facilities.

## **7.3 Licensing and Qualifications**

A scientific license is required when completing bush regeneration works in Threatened Ecological Communities. All contractors completing works under the provisions of this VMP must be appropriately qualified and supervised (minimum Certificate III in Bush Regeneration).



## 8 Implementation

### 8.1 Key Performance Indicators

Management outcomes must be specific and measurable such that objectives summarised in Section 2.2 of this Plan are demonstrably achieved. Key Performance Indicators (KPIs) associated within each management action are detailed in Table 7-1.

#### NOTES:

- Works may not commence until this VMP has been approved by Byron Shire Council.
- A summary of the management actions and zones are presented for easy reference for contractors/land managers at Appendix C.

### 8.2 Implementation and Funding

Table 7-2 provides a schedule for implementation of prescribed management actions. In order to achieve optimal environmental outcomes, implementation of management actions within this VMP should follow the sequence below:

1. Weed control and rubbish removal
2. Erect exclusion fencing around all zones (and sensitive habitats) prior to construction works
3. Ripping and planting within degraded informal tracks of Management Zones 1, 2 & 4
4. Installation of exclusion bollards/fencing and signage at the completion of the above works.

All works will be funded by the proponent with all prescribed management actions maintained for a period of five years, or until nominated KPIs have been achieved. Once KPIs have been met to Council's satisfaction, management of Management Zone 3 will be transferred to Council.

#### 8.2.1 Contingency and mitigation measures

While this plan is intended to comprehensively address all management issues related to vegetation and biodiversity, it is possible that issues with implementation arise. In these circumstances, a process of review, rectification and monitoring will be required, with the following steps to be taken when a KPI has not been achieved:

1. Identify the root cause of the non-compliance
2. Develop the appropriate rectification or management response in consultation with relevant consultants and/or contractors
3. Implement the response
4. Monitor effectiveness.

Table 8.1 Management actions and KPIs for VMZs

Phase	Actions	Location*	Timing	KPIs	Adaptive Management	Responsibility
<b>1 (Establishment phase)</b>	Remove environmental weeds and implement ripping within degraded areas/ informal tracks.	MZ 1-4	Prior to construction works and be completed within one year.  YEAR 1	<ul style="list-style-type: none"> <li>90% of woody weeds and exotic groundcover removed.</li> <li>Ripping completed within all areas of degraded land/informal tracks.</li> <li>Existing and emergent weeds controlled by initial treatment following ripping.</li> <li>Rubbish removed (where relevant).</li> </ul>	<ul style="list-style-type: none"> <li>Review weed control methods if weed control KPI not met i.e., chemical use or mechanical methods.</li> <li>Increase number of site visits.</li> <li>Monitoring for dumping increased construction rubbish</li> </ul>	Appointed contractor
<b>1 (Establishment phase)</b>	Installation of 'no go' fencing prior to and during construction. Establish protective fencing for Pink Nodding Orchids in MZ1	MZ 1-4	Prior to construction works.  YEAR 1	<ul style="list-style-type: none"> <li>Vegetation management zones fenced off to restrict access by vehicle/plant and signage installed stating all MZs are 'no go' zones</li> <li>Established protective fencing for Pink Nodding Orchids.</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of fence condition and functionality</li> <li>Review fencing types and installation methods if fencing not successfully installed or maintained</li> </ul>	Project manager/developer
<b>1 (Establishment phase)</b>	Installation of fauna nest boxes, artificial habitats	MZ 1-4	Prior to construction works and be completed within one year.  YEAR 1	<ul style="list-style-type: none"> <li>All nest boxes/habitat installed in accordance with the Nest Box Management Plan in Appendix D</li> <li>Locations and orientation approved by the project ecologist</li> </ul>	<ul style="list-style-type: none"> <li>Review proposed nest box locations if previously identified locations deemed unsuitable in consultation with the project ecologist</li> </ul>	Project manager/developer
<b>2 (Establishment phase)</b>	Follow up removal of environmental weeds and monitor areas where ripping has been completed. Maintain protective fencing for all MZs, including the protective fencing for Pink Nodding Orchids in MZ1	MZ 1-4	To be continued during the second year of construction. Monitoring to be completed.  YEAR 2	<ul style="list-style-type: none"> <li>95% of woody weeds and exotic groundcover removed.</li> <li>Initial ripping of sandy areas produces a minimum native groundcover of 20% within monitoring plots,</li> <li>90% survival of planted trees.</li> <li>Any dead plants are replaced as required.</li> <li>All fencing maintained including the protective</li> </ul>	<ul style="list-style-type: none"> <li>Review weed control methods if weed control KPI not met i.e., chemical use or mechanical methods.</li> <li>Increase number of site visits.</li> <li>Replace dead plants at a 1:1 ratio respective of species lost. Review species selection.</li> <li>Conduct brush</li> </ul>	Appointed contractor

Phase	Actions	Location*	Timing	KPIs	Adaptive Management	Responsibility
				fencing for Pink Nodding Orchids in MZ1.	matting or infill planting if ripped areas do not meet KPI. <ul style="list-style-type: none"> <li>Monitor fencing for signs of degradation and loss of functionality. Replace and review fencing materials if signs of degradation observed.</li> </ul>	
<b>HOLD POINT – All the Phase One and Two Actions and associated KPIs are to be achieved prior to progressing to Maintenance Phase Three and Four</b>						
<b>3 (Maintenance phase)</b>	Follow up removal of environmental weeds and monitor areas where ripping has been conducted to assess required plant densities has been achieved.	MZ 1-4	To be continued during the third year of construction and completed prior to the end of second year of construction.  YEAR 3	<ul style="list-style-type: none"> <li>Native cover of 30% achieved within ripped areas.</li> <li>90% survival of planted trees.</li> <li>Emergent weeds controlled and comprise ≤5% total cover within all MZs.</li> <li>Any dead plants are replaced as required.</li> <li>Fencing maintained including protective fencing for Pink Nodding Orchids in MZ1.</li> </ul>	<ul style="list-style-type: none"> <li>Review weed control methods if weed control KPI not met i.e., chemical use or mechanical methods if weed control KPI not met.</li> <li>Increase number of site visits.</li> <li>Replace dead plants at a 1:1 ratio respective of species lost. Review species selection.</li> <li>Conduct brush matting or infill planting if ripped areas don't meet KPI.</li> <li>Monitor fencing for signs of degradation and loss of functionality. Replace and review fencing materials if signs of degradation observed.</li> </ul>	Appointed contractor



Phase	Actions	Location*	Timing	KPIs	Adaptive Management	Responsibility
4 (Maintenance phase)	Prescribed densities of plants from ripping and/or planting sandy areas are achieved as per monitoring requirements	MZ 1-4	All actions to be completed by the end of 4 <sup>th</sup> year from construction initiation date.  YEAR 4	<ul style="list-style-type: none"> <li>Native cover of 40% achieved within ripped areas.</li> <li>Minimum 90% native plant survivorship (plantings) achieved by end of 4<sup>th</sup> year of on ground works,</li> <li>Emergent weeds continue to be controlled and comprise ≤5% total cover within all MZs</li> <li>Any dead plants are replaced as required.</li> <li>Removal of tree guards.</li> </ul>	<ul style="list-style-type: none"> <li>Review weed control methods if weed control KPI not met i.e., chemical use or mechanical methods if weed control KPI not met.</li> <li>Replace dead plants at a 1:1 ratio respective of species lost. Review species selection.</li> <li>Conduct brush matting or infill planting if ripped areas don't meet KPI.</li> <li>Removal and appropriate disposal of all tree guards.</li> </ul>	Appointed contractor
<b>HOLD POINT – All the Phase Three and Four Actions and associated KPIs are to be achieved prior to progressing to the Completion Phase Five</b>						
5 (Completion phase)	Prescribed densities of plants from ripping and/or planting sandy areas are achieved as per monitoring requirements	MZ 1-4	All actions to be completed by the end of 4 <sup>th</sup> year from construction initiation date.  YEAR 5	<ul style="list-style-type: none"> <li>Native cover of 50% achieved within ripped areas.</li> <li>Minimum 90% native plant survivorship (plantings) achieved by end of 5<sup>th</sup> year of on ground works,</li> <li>Emergent weeds continue to be controlled and comprise ≤5% total cover within all MZs</li> <li>Any dead plants are replaced as required.</li> <li>Dense plantings around Pink Nodding Orchids established. Remove protective fencing.</li> </ul>	<ul style="list-style-type: none"> <li>Review weed control methods if weed control KPI not met i.e., chemical use or mechanical methods if weed control KPI not met.</li> <li>Replace dead plants at a 1:1 ratio respective of species lost.</li> <li>Conduct brush matting or infill planting if ripped areas don't meet KPI and areas of protective plantings not established</li> </ul>	Appointed contractor

Phase	Actions	Location*	Timing	KPIs	Adaptive Management	Responsibility
	<b>HOLD POINT – All the Phase Five Actions and associated KPIs are to be achieved prior to progressing to the Occupation Phase</b>					
<b>Occupation – vegetation management</b>	Removal of all non-heath vegetation within MZ 2a and MZ 3a/3b to maintain biodiversity values *refer Figure 5.1	MZ 2a, MZ 3a/3b	Annually	<ul style="list-style-type: none"> <li>MZ 2a <u>must</u> remain as a wetland/wet heath community (acid frog habitat). Any incursions of Eucalypts or other sclerophyllous trees which may close out the canopy must be removed. (ie. Intervention management).</li> <li>MZ 3a/3b <u>must</u> remain as heath which provides acid frog and threatened species habitat. Any incursions of Eucalypts or other sclerophyllous trees which may close out the canopy must be removed. (ie. Intervention management).</li> </ul>	<ul style="list-style-type: none"> <li>Increase site visits and review control methods of Eucalypts or other sclerophyllous trees.</li> <li>Conduct infill planting if large scale removal of Eucalypts or other sclerophyllous trees occurs in wetland/wet heath communities.</li> </ul>	MZ owner

Table 8.2 Implementation Schedule

Activity		MZ	Month															
			1	2	3	4	6	9	10	12	18	24	30	36	42	48	54	60
Monitoring	Baseline vegetation monitoring (prior to works)	All																
	Vegetation monitoring event	All																
Weed Control	Primary weed control	All																
	Secondary weed control	All																
	Follow up weed control	All																
Habitat Protection	Fencing	All																
	Signage	All																
	Ripping	All																
Planting	Site preparation	All																
	Plantings	All																
	Planting Maintenance	All																
	Final maintenance, monitoring & evaluation report	All																



## 9 Monitoring and Reporting

### 9.1 Introduction

Monitoring is essential to ensure the success of all on ground works. Should monitoring reveal that KPIs are not being met, adaptive management will be necessary in order to rectify performance shortcomings.

Baseline monitoring within each Management Zone will be completed prior to initial works taking place via the establishment of permanent plots and photo points. Following commencement of works, monitoring will be completed at 12 months intervals for a total period of five years (5 monitoring events). A brief report should be produced annually that outlines the progress of revegetation and restoration works over each monitoring event.

### 9.2 Monitoring

As there are various methods for revegetation and restoration works prescribed within this VMP, monitoring methods differ for planting and ripping. Monitoring plots and points are outlined in Figure 8.1, the monitoring requirements are as follows:

#### 9.2.1 Infill Plantings

Monitoring methods include:

- In year one, two 5 x 5 m plots will be established within each Management Zone to monitor areas that have been planted.
- Each plot will be surveyed with a GPS unit and permanently marked with star pickets. Permanent photo points will be established at each plot.
- Inspection of plots site at 12-month intervals with tasks including:
  - Inspection of plant health and vigour
  - Identify any plant mortalities within the plot and within each Management Zone in general
  - Assessment of weed cover
  - Photographs from set photo points (locations to be agreed at project inception)

#### 9.2.2 - Assess mulch cover and tree guards.Ripping (Assisted Regeneration)

Monitoring methods include:

- Two 5 x 5 m plots will be established within each Management Zone where areas have been ripped in order to determine the success of seed germination following disturbance.
- Each plot will be surveyed with a GPS unit and permanently marked with star pickets. Permanent photo points will be established at each plot.
- Inspection of the plots at 12-month intervals with tasks including:
  - Inspection of plant health and vigour
  - Identify species regenerating and species cover
  - Assessment of weed cover (if relevant)
  - Photographs from set photo points (locations to be agreed at project inception).

### 9.2.3 Informal tracks and trails

Monitoring methods include:

- Photographs of informal tracks and positions of repurposed vegetation for established photo monitoring positions
- Inspection of informal track areas at 12-month intervals for signs of regeneration, further signs of degradation or any increases in alternative informal track routes.
- Assessment of weed cover (if relevant).

## 9.3 Reporting

Reporting on the progress of works relating to this VMP is required to demonstrate that KPIs are being met. Annual monitoring reports are to be completed by either a qualified bush regenerator or ecologist and reports will be supplied to the proponent and Council. Annual reports shall include the following information:

- A timetable of restoration and maintenance works completed in that year.
- Details on the replacement of any dead or unhealthy tube stock or plantings where relevant
- The results of the monitoring completed regarding KPIs.
- Comments on any problems at the site (e.g., vandalism, informal track making, rubbish dumping etc.) and how these have been managed.
- Photographs from fixed photo points in order monitoring the progress of the planting and ripping over the lifetime of this VMP.
- A log of herbicide uses during maintenance operations.
- Outline any adaptive management/corrective actions if significant natural events such as flooding, fire etc. will impact the KPIs listed in this VMP.
- Any other relevant information or recommendations for future maintenance such as the presence of vertebrate pest animals or insect pests.





Source:

Imagery: Nearmaps 2023  
Fauna Corridors: SEED 2023  
VMZ: AWC 2021-2023

Disclaimer:

Care was taken in the creation of this map. AWC should be consulted as to the suitability of the information shown herein prior to the commencement of any works based on the information provided. AWC cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties expressed or implied as to the suitability of this map for a particular purpose. However, notification of any errors will be appreciated.



0 50 100 150 200 250 300 m

A4 Scale 1:5,000

Coordinate System: MGA 56 Projection: Transverse

### Legend

Site  
Development Area

VMZs

1  
2a  
2b  
3a  
3b  
4

Monitoring Points  
Monitoring Plots

Figure 8.1:  
Monitoring Plots  
and Photo Points

Job No:211400

Drawn: AW

Checked:AL

Date: 6/12/2023



## 10 Ongoing Management Following Establishment

Once the restoration and establishment phases are complete, management zones will be transferred to their respective owners for management. It is anticipated that monitoring and management activities will be periodic and minor assuming all KPI's have been achieved in previous phases, however issues may arise periodically or over time which must be addressed to ensure management objectives are maintained (eg. Maintaining a canopy free zones in acid frog habitats to maintain biodiversity values).

Ongoing monitoring and management actions in the post-establishment phase are detailed in Table 9-1.

Table 10.1 Summary of monitoring and management actions required

Phase	Actions	Location	Timing	KPIs	Responsibility
Occupation	Monitoring including: <ul style="list-style-type: none"> <li>Rubbish and weeds</li> <li>Wallum and heath vegetation</li> </ul>	All MZs	Quarterly	<ul style="list-style-type: none"> <li>All rubbish and weeds are controlled and removed.</li> <li>Sensitive species and habitats are protected.</li> <li>Wallum and heath vegetation do not contain forest species (MZ 2a, MZ 3)</li> </ul>	MZ owner
Occupation	Wallum froglet habitat is protected and sustained as wallum habitat.	MZ 2 & 3b	Annually	<ul style="list-style-type: none"> <li>Ensure inappropriate access is prevented.</li> <li>Remove any regenerating vegetation not consistent with wallum habitat (refer below). This includes colonising eucalypts (in a broad sense) and rainforest trees.</li> </ul>	MZ owner
Occupation	Removal of all non-heath vegetation within MZ 2a and MZ 3a/3b to maintain biodiversity values.	MZ 2a, MZ 3a/3b	Annually	<ul style="list-style-type: none"> <li>MZ 2a <u>must</u> remain as a wetland/wet heath community (acid frog habitat). Any encroachment of Eucalypts or other sclerophyllous trees which may close out the canopy must be managed by the removal of these trees (ie. Intervention management).</li> <li>MZ 3a/3b <u>must</u> remain as heath which provides acid frog and threatened species habitat. Any encroachment of Eucalypts or other sclerophyllous trees which may close out the canopy must be managed by the removal of these trees (ie. Intervention management).</li> </ul>	MZ owner

# 11 Compliance

This VMP addresses requirements of the Concept Approval and Statement of Commitments, through the various actions prescribed. A summary response to VMP requirements is provided in Table 10-1.

Table 11.1 Compliance with Concept Approval

Requirement	Demonstration of Compliance
<b>Concept Approval</b>	
<i>a) dimensions of the reserves</i>	Refer Section 5.1, Table 5-1.
<i>b) details of how any rehabilitation within the reserve is to occur</i>	Refer Section 5. Various rehabilitation methods are described.
<i>c) actions required to protect and improve habitat for threatened species including Koala, Glossy Black-Cockatoo and Wallum Froglet as well as actions to re-establish habitat for threatened species on cleared lands</i>	Refer Section 5. Compensation plantings are discussed for the Koala and Glossy Black-Cockatoo. Actions to improve Wallum Froglet habitat are discussed in the stand alone WFMP. Justification for additional compensation actions is provided in Table 4-1. Habitat for these species is maintained within residual land in the east and west of the site, totalling approximately 17 ha.
<i>d) measures to control weeds</i>	Refer Section 3.6 and Sections 5.3 – 5.5. Due to low fertility soils, weeds occur at very low frequencies.
<i>e) details of any fencing to protect the reserves</i>	Refer Sections 5.3 – 5.5. Bollards will be installed along the outer edges of perimeter roads (and the eastern car park) to exclude vehicles from entering adjacent bushland. The creek walking track will be fenced to discourage residents from accessing adjacent bushland. Signage will be installed at various locations noting restoration and regeneration areas and that entry is prohibited.
<i>f) identification of timeframes and responsibilities for each action</i>	Refer Section 7. Timeframes for implementation of all works have been nominated.
<i>g) bushfire management</i>	Refer Section 5.1. Vegetation restoration and protection works require consideration with regard to bushfire management as Asset Protection Zones (APZs) for MZ 3. This area is designated as wallum heath and must remain so. On this basis, any non-heath regeneration (ie. Eucalypts) which establish in this area must be removed in perpetuity.  No management of vegetation within any other MZs is required to reduce bushfire hazard.
<i>h) measures to control public access within the reserves to minimise damage</i>	Refer Sections 5.3 – 5.5. Exclusion fencing will be installed during the construction phase, with bollards and signage to be installed to limit public access during the occupation stage.
<i>i) details of future management and funding arrangements for the areas and measures to be implemented for the long-term protection of the areas, for example, through dedication.</i>	Refer Section 7.2. All actions in this VMP will be funded by the developer. All management zones will be dedicated to Council following the end of the five year maintenance period and/or meeting KPIs.
<b>Statement of Commitments</b>	
<i>B2: A Vegetation Management Plan will be prepared. The plan will outline both mitigation and compensatory strategies. The plan will set out a strategy for the rehabilitation and management of the</i>	Complies; refer entire VMP, particularly Section 6 regarding compensation plantings for the Koala and Glossy Black-Cockatoo.



Requirement	Demonstration of Compliance
<i>Environmental Protection Zones (i.e. the areas covering approximately 11.5 ha between the development footprint and Simpson's creek) and outline a compensatory replacement planting strategy to offset the loss of the ecologically significant trees. All Koala and Glossy black cockatoo food trees impacted by the development will be replaced at a ratio of 2:1.</i>	
<i>P6: The VMP is to include restoration plan of existing track.</i>	Existing tracks within MZ 1, 2 & 4 will be ripped and planted out; refer Section 6.2.
<b>Byron Shire Council – Conditions of Consent DA10.2021.575.1</b>	
<b>Amended Vegetation Management Plan – Early Stage 1: An amended vegetation management plan must be updated and submitted to Council for approval and include.</b>	
<i>a. Provide an accurate plan at 1:200 scale that clearly indicates the location of compensatory plantings for the glossy black cockatoo and the koala as indicated in the VMP as approved under Condition 1</i>	a) Refer to Eastern Habitat & Rehabilitation Zone – Drawing 1-211400_07 of the <i>BAYSIDE BRUNSWICK LANDSCAPE DOCUMENTATION AND HABITAT CREATION FOR DEVELOPMENT APPLICATION REV C.2 – FOR APPROVAL</i> .
<i>b. Provide details for the ongoing vegetation management of the Mitchell's rainforest snail habitat in Management Zones 1 and 4 and its long term protection.</i>	b) Refer to 5.3.1 and section 5.7.1.
<i>c. Provision of 50 nest boxes designed for glossy black cockatoos and a range of arboreal mammals found in the area. The plan to show the location of the boxes to be installed together with details of the monitoring and reporting to Council of their use. The boxes to be installed as part of Early Stage 1. The plan to also include details of the monitoring with a 6 monthly inspection regime, and reporting of the boxes across the seven stages of the development with mitigation measures to replace boxes if damaged or utilized by pest including bees, mynas and other feral animals, termites and the like.</i>	c) Refer to Appendix D for the Hollow and Nest Box Management Plan.
<i>d. Include details of strategies to be used to restrict breeding opportunities for the introduced Cane Toad <i>Rhinella marina</i>, such as the planting of dense sedges to widths of up to 5 m along watercourses.</i>	D) Refer to section 5.5 and Appendix B.

## 12 References

Australian Wetlands Consulting (2018) *Bayside Way Stage 1A Vegetation Management Plan*. A report to Codlea Pty Ltd.

Australian Wetlands Consulting (2023h) *Wallum Estate Torakina Road, Brunswick Heads Revised Wallum Froglet Management Plan*. A report to Clarence Property Pty Ltd.

Australian Wetlands Consulting (2023) *Wallum Estate Early Ecological Works Package, Revision D, For Approval, 16<sup>th</sup> of August 2023*. Prepared for Clarence Property Pty Ltd.

Australian Wetlands Consulting (2023) *Mosquito Risk Management Plan*. A report to Clarence Property Pty Ltd.

Australian Wetlands Consulting (2021) *Bayside Brunswick Landscape Documentation and Habitat Creation for Development Application REV C.2 – Revision C.2\_ For Approval, 19<sup>th</sup> of August 2021*

Australian Wetlands Consulting (2022c) *FINAL Wallum Estate BDAR*. A report to Clarence Property Pty Ltd.

Byron Shire Council (2023) – Conditions of Consent *DA 10.2021.575*

Bushfire Certifiers (2021). *Bushfire Assessment Report Lot 13 DP1251383, 131 Lot Residential Subdivision (s100B)*. Prepared for Bayside Brunswick Pty Ltd, August 2021.

Local Land Services (2022) *North Coast Regional Strategic Weed Management Plan 2023-2027*

Morand, D.T. (1994). *Soil Landscapes of the Lismore-Ballina 1: 100 000 Sheet*. Department of Land and Water Conservation, Sydney, NSW.

## Appendix A: Subdivision Plans





● Subdivision Design ● Civil Engineering ● Town Planning ● Project Management

CivilTech Consulting Engineers  
Ph. 0431 065 645  
PO BOX 4285  
Goonellabah NSW 2480

### LOCALITY PLAN:



# BAYSIDE BRUNSWICK

## 126 Lot Residential Subdivision

### 15 Torakina Road, Brunswick Heads

### Lot 13 DP 1251383

for  
**BAYSIDE BRUNSWICK Pty Ltd**

### INDEX:

ROADS & DRAINAGE	
SHEET 1	DA1 DRAWING COVER SHEET
SHEET 2	DA2 SUBJECT SITE AERIAL OVERLAY
SHEET 3	DA3 SUBDIVISION LAYOUT PLAN
SHEET 4	DA4 STAGING PLAN
SHEET 5	DA5 BULK EARTHWORKS CUT FILL PLAN
SHEET 6	DA6 ROADWORKS PLAN
SHEET 7	DA7 STORMWATER DRAINAGE LAYOUT PLAN
SHEET 8	DA8 STORMWATER DRAINAGE CATCHMENT PLAN
SHEET 9	DA9 GRAVITY SEWER & LPS CONCEPT LAYOUT
SHEET 10	DA10 WATER, ELEC & COMMS SCHEMATIC CONCEPT
SHEET 11	DA11 N-S DRAIN REALIGNMENT PLAN AND SECTIONS
SHEET 12	DA12 LOCAL AREA TRAFFIC MANAGEMENT PLAN
SHEET 13	DA13 ROAD 1 LONG SECTION & CROSS SECTIONS
SHEET 14	DA14 ROAD 2 LONG SECTION - START TO CH600
SHEET 15	DA15 ROAD 2 LONG SECTION - CH600 TO END
SHEET 16	DA16 ROAD 2 CROSS SECTIONS - START TO CH500
SHEET 17	DA17 ROAD 2 CROSS SECTIONS - CH550 TO END
SHEET 18	DA18 ROAD 3 LONG SECTION & TYPICAL SECTION
SHEET 19	DA19 ROAD 3 CROSS SECTIONS
SHEET 20	DA20 ROAD 4 LONG SECTION & TYPICAL SECTION
SHEET 21	DA21 ROAD 4 CROSS SECTIONS
SHEET 22	DA22 ROAD 5 LONG SECTION & TYPICAL SECTION
SHEET 23	DA23 ROAD 5 CROSS SECTIONS
SHEET 24	DA24 ROAD 6 LONG SECTION & TYPICAL SECTION
SHEET 25	DA25 ROAD 6 CROSS SECTIONS
SHEET 26	DA26 ROAD 7 LONG SECTION & TYPICAL SECTION
SHEET 27	DA27 ROAD 7 CROSS SECTIONS
SHEET 28	DA28 FILTER MEDIA PROFILES & ENGINEERING DETAILS
SHEET 29	DA29 TYPICAL SECTIONS & HYDRAULIC CALCULATIONS
SHEET 30	DA30 INTERSECTION TREATMENT DETAILS & CALCS
SHEET 31	DA31 TYPICAL STORMWATER INFILTRATION DETAILS

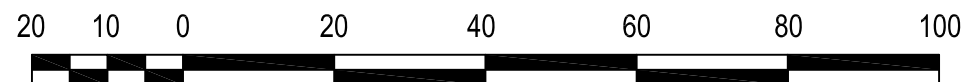
# CIVIL ENGINEERING

## DEVELOPMENT APPLICATION

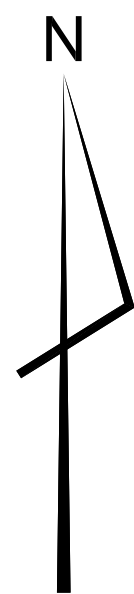
**INDEX SHEET**  
**1133-DA1D**

February 2023





SCALE 1:1,000 AT A1, 1:2,000 AT A3



### LEGEND

- SUBJECT SITE BOUNDARY
- 105  
450m<sup>2</sup>  
NEW LOT POLYGON & LOT AREA
- EASEMENT (PROPOSED TBC)
- PUBLIC ROAD PAVEMENT (PROPOSED)

LOT AREAS AND DIMENSIONS SUBJECT TO D.A. APPROVAL AND DETAILED DESIGN AS PART OF SUBDIVISION WORKS CERTIFICATE

D	FOR RE-SUBMISSION	WF	WF	10.02.2023
C	UPDATE LOT NUMBERS	WF	WF	16.11.2022
B	FOR RE-SUBMISSION	WF	WF	01.08.2022
A	FOR SUBMISSION	WF	WF	01.09.2021

Iss	Description	Des	Drw	Date	Appd
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**BAYSIDE BRUNSWICK Pty. Ltd.**  
**ENGINEERING PLANS FOR D.A.**  
**126 LOT SUBDIVISION OF LOT 13 DP 1251383**  
**15 TORAKINA ROAD, BRUNSWICK HEADS**

### SUBDIVISION LAYOUT PLAN

Scale: 1:2,000 at A3  
Datum: AHD

CAD file: 1133-DA3D.dwg

CivilCAD file: 1133-ENG



Subdivision Design • Civil Engineering • Town Planning • Project Management

CivilTech Consulting Engineers

Ph. 0431 065 645

PO BOX 4285

Gosnell's NSW 2480

www.civiltech.net.au

Sheet No.

3 of 31

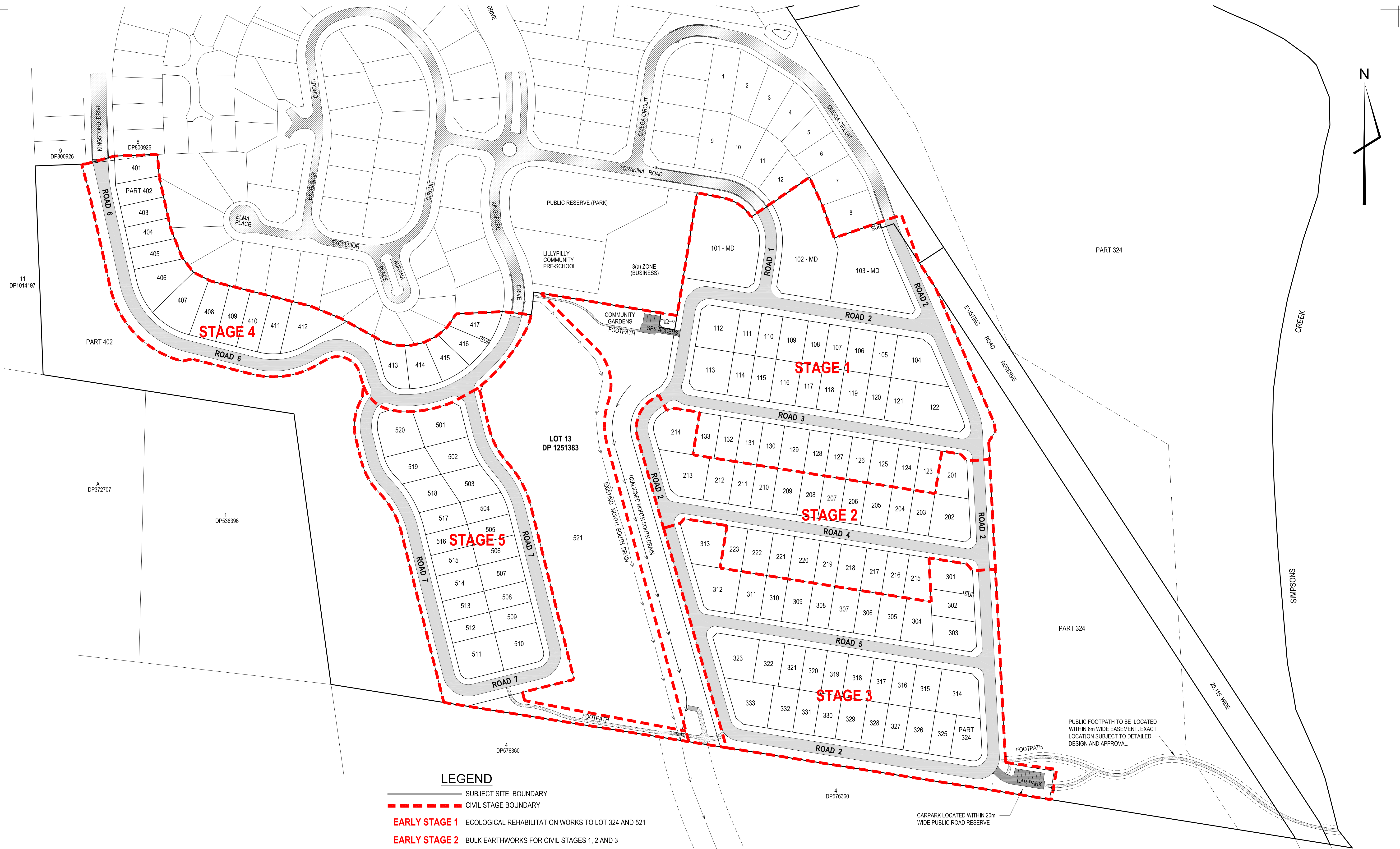
Dwg. No.

1133-DA3

Issue

D





### LEGEND

- SUBJECT SITE BOUNDARY
- CIVIL STAGE BOUNDARY
- EARLY STAGE 1** ECOLOGICAL REHABILITATION WORKS TO LOT 324 AND 521
- EARLY STAGE 2** BULK EARTHWORKS FOR CIVIL STAGES 1, 2 AND 3
- CIVIL STAGE 1** 30 LOTS + 3 M.D. LOTS
- CIVIL STAGE 2** 23 LOTS
- CIVIL STAGE 3** 33 LOTS
- CIVIL STAGE 4** 17 LOTS
- CIVIL STAGE 5** 20 LOTS + LOT 521

EASTERN PRECINCT EARTHWORKS & N-S DRAIN TO BE CONSTRUCTED IN EARLY STAGE 2

WESTERN PRECINCT EARTHWORKS TO BE CONSTRUCTED IN CIVIL STAGE 4 & 5

20	10	0	20	40	60	80	100
SCALE 1:1,250 AT A1, 1:2,500 AT A3							
D	FOR RE-SUBMISSION	WF	WF	10.02.2023			
C	UPDATE LOT NUMBERS	WF	WF	16.11.2022			
B	FOR RE-SUBMISSION	WF	WF	01.08.2022			
A	FOR SUBMISSION	WF	WF	01.09.2021			
Iss	Description	Des	Drw	Date	Appd		

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**BAYSIDE BRUNSWICK Pty. Ltd.**  
**ENGINEERING PLANS FOR D.A.**  
**126 LOT SUBDIVISION OF LOT 13 DP 1251383**  
**15 TORAKINA ROAD, BRUNSWICK HEADS**

### SUBDIVISION STAGING PLAN

Scale: 1:2,500 at A3  
Datum: AHD

CAD file: 1133-DA4D.dwg  
CivilCAD file: 1133-ENG



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Sheet No.  
**4 of 31**

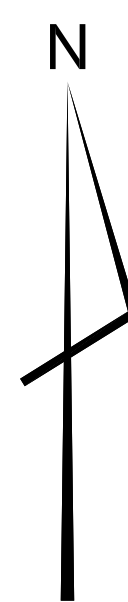
Dwg. No.  
**1133-DA4**

Issue  
**D**





SCALE 1:1,000 AT A1, 1:2,000 AT A3



LEGEND

- SUBJECT SITE BOUNDARY
- EXISTING NORTH SOUTH DRAIN INVERT
- REALIGNED NORTH SOUTH DRAIN
- EXTENT OF EARTHWORKS
- CUT DEPTH
- FILL DEPTH

EARTHWORKS VOLUMES

CUT	+ 8,048 m³
FILL	- 64,551 m³
TOPSOIL IMPORT (100mm)	+ 8,020 m³
ROAD PAVEMENT (425mm)	+ 9,590 m³
FILTER MEDIA	+ 3,520 m³
CLEAN SAND TO IMPORT	35,373 m³

PRELIMINARY EARTHWORK VOLUMES ONLY. NO ALLOWANCE HAS BEEN MADE FOR STRIPPING, COMPACTION, BULKING, UNSUITABLE OR TRENCHING EFFECTS.

EARTHWORKS VOLUMES AND EXTENT TO CONFIRMED BY DETAILED DESIGN AS PART OF SUBDIVISION WORKS CERTIFICATE APPLICATION.

D	FOR RE-SUBMISSION	WF	WF	10.02.2023
C	UPDATE LOT NUMBERS	WF	WF	16.11.2022
B	FOR RE-SUBMISSION	WF	WF	01.08.2022
A	FOR SUBMISSION	WF	WF	01.09.2021

Iss	Description	Des	Drw	Date	Appd
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ENGINEERING PLANS FOR D.A.  
126 LOT SUBDIVISION OF LOT 13 DP 1251383  
15 TORAKINA ROAD, BRUNSWICK HEADS

EARTHWORKS CUT FILL PLAN  
0.2m DESIGN CONTOURS

Scale: 1:2,000 at A3 CAD file: 1133-DA5D.dwg  
Datum: AHD CivilCAD file: 1133-ENG



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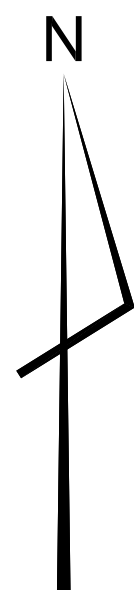
Sheet No.  
**5 of 31**

Dwg. No.  
**1133-DA5**  
Issue  
**D**



20 10 0 20 40 60 80 100

SCALE 1:1,000 AT A1, 1:2,000 AT A3



### LEGEND

- SUBJECT SITE BOUNDARY
- ROAD CENTRELINE
- ROAD PAVEMENT
- BIO-RETENTION SWALE
- LOCAL STREET TRAFFIC CALMING  
(SEE DETAIL ON 1133-DA12)
- BUS ROUTE TRAFFIC CALMING  
(SEE DETAIL ON 1133-DA12)
- 1.2m CONCRETE PEDESTRIAN FOOTPATH
- 2.0m GRAVEL PEDESTRIAN PATH
- EXTENT OF EARTHWORKS
- EXISTING NORTH SOUTH DRAIN INVERT
- REALIGNED NORTH SOUTH DRAIN

REFER TO CIVILTECH PLANS 1133-DA13 TO 1133-DA27 FOR ALL ROAD LONG SECTIONS, TYPICAL SECTIONS & CROSS SECTIONS

DETAILED DESIGN OF ROADWORKS & EARTHWORKS TO BE UNDERTAKEN AS PART OF SUBDIVISION WORKS CERTIFICATE APPLICATION.

Iss	Description	Des	Drw	Date	Appd
D	FOR RE-SUBMISSION	WF	WF	10.02.2023	
C	UPDATE LOT NUMBERS	WF	WF	16.11.2022	
B	FOR RE-SUBMISSION	WF	WF	01.08.2022	
A	FOR SUBMISSION	WF	WF	01.09.2021	

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**126 LOT SUBDIVISION OF LOT 13 DP 1251383**  
**15 TORAKINA ROAD, BRUNSWICK HEADS**

### ROADWORKS PLAN

#### 0.2m DESIGN CONTOURS

Scale: 1:2,000 at A3 CAD file: 1133-DA6D.dwg  
Datum: AHD CivilCAD file: 1133-ENG



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Sheet No.  
**6 of 31**

Dwg. No.

**1133-DA6**

Issue

**D**

CONCRETE CARPARK WITH 8 SPACES. 2.6m WIDE AND 5.4m LONG. FALL SOUTH TO BIO-RETENTION SWALE.

4  
DP576360

PEDESTRIAN BRIDGE. 2m WIDE & 7m LONG. REFER TO AWC PLANS (DA28) FOR PRELIMINARY DETAILS

3m WIDE CONCRETE ACCESS RAMP, MAX 25% INTO DRAIN.  
OSD WEIR. 3x 600DIA RCP WITH COBBLE WEIR AT RL3.6 (DA28)

REFER TO 1133-DA30 FOR DETAIL OF KERB FLOW DRAINAGE ACROSS INTERSECTION

2m WIDE COMPACTED GRAVEL ACCESS PATH LINKING EAST & WEST PRECINCTS.

4  
DP576360

1000 DISH CROSSING DIRECT K&G FLOWS WEST TO SWALE.

1000 DISH CROSSING DIRECT K&G FLOWS EAST TO SWALE.

LOT 13  
DP 1251383

TRANSITION FROM EXISTING CROWN ROAD TO ONE-WAY CROSSFALL. 434.692

3(a) ZONE (BUSINESS)  
REFER TO AWC PLANS FOR COMMUNITY GARDEN & CARPARK DETAILS.

REFER TO DA30 FOR CAUSEWAY DETAIL AT TRANSITION

COMMUNITY GARDENS  
FOOTPATH  
SPS ACCESS 4.0

LILLYPILLY COMMUNITY PRE-SCHOOL

TORAKINA ROAD

OMEGA CIRCUIT

1 2 3 4 5 6 7 8 9 10 11 12

EXISTING

PROPOSED

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EXISTING

EXISTING

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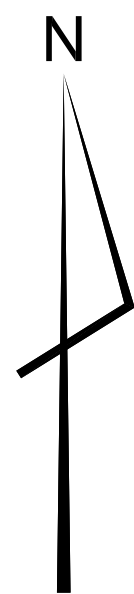
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20 10 0 20 40 60 80 100

SCALE 1:1,000 AT A1, 1:2,000 AT A3



## LEGEND

- SUBJECT SITE BOUNDARY
- EXISTING NORTH SOUTH DRAIN INVERT
- REALIGNED NORTH SOUTH DRAIN
- FINISHED SURFACE LEVEL
- CROWNED ROAD WITH KERB & GUTTER
- ROAD WITH ONE-WAY CROSSFALL OUT TO BIO-RETENTION SWALE
- ROAD WITH ONE-WAY CROSSFALL AND KERB & GUTTER
- BIO-RETENTION SWALE - WBD TYPE 4 WITH NO UNDER DRAIN (REFER DA28)
- SEALED BIO-RETENTION SWALE WBD TYPE 2 (REFER DA28)

NO STORMWATER PIPES OR PIT NETWORKS TO BE CONSTRUCTED. ALL SURFACE STORMWATER FLOWS WILL DRAIN TO PERIMETER BIO-RETENTION SWALES VIA KERB & GUTTERS, DISH DRAINS & ONE-WAY CROSSFALL ROADS.

ROOF WATER FROM DWELLINGS TO BE DETAINED IN DETENTION TANKS BEFORE DRAINING TO RUBBLE INFILTRATION PITS. PITS THAT SURCHARGE IN LARGE EVENTS WILL BE DRAINED TO KERB VIA RHS PIPES. ALL LOTS TO BE PROVIDED WITH ROOFWATER CONNECTION POINT & VERGE CROSSING AS PER DETAILS ON DA31.

Iss	Description	Des	Drw	Date	Appd
D	FOR RE-SUBMISSION	WF	WF	10.02.2023	
C	UPDATE LOT NUMBERS	WF	WF	16.11.2022	
B	FOR RE-SUBMISSION	WF	WF	01.08.2022	
A	FOR SUBMISSION	WF	WF	01.09.2021	

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**ENGINEERING PLANS FOR D.A.**  
**126 LOT SUBDIVISION OF LOT 13 DP 1251383**  
**15 TORAKINA ROAD, BRUNSWICK HEADS**

## STORMWATER MANAGEMENT PLAN

### 0.2m DESIGN CONTOURS

Scale: 1:2,000 at A3 CAD file: 1133-DA7D.dwg  
Datum: AHD CivilCAD file: 1133-ENG



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Sheet No.  
**7 of 31**

Dwg. No.

**1133-DA7**

Issue

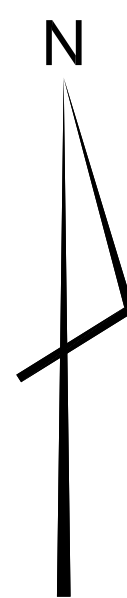
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SCALE 1:1,000 AT A1, 1:2,000 AT A3



LEGEND

- SUBJECT SITE BOUNDARY
- STORMWATER CATCHMENT BOUNDARY, AREA & FLOW DIRECTION
- EXISTING N-S DRAIN INVERT
- REALIGNED NORTH SOUTH DRAIN
- BIO-RETENTION SWALE

Iss	Description	Des	Drw	Date	Appd
D	FOR RE-SUBMISSION	WF	WF	10.02.2023	
C	UPDATE LOT NUMBERS	WF	WF	16.11.2022	
B	FOR RE-SUBMISSION	WF	WF	01.08.2022	
A	FOR SUBMISSION	WF	WF	01.09.2021	

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**126 LOT SUBDIVISION OF LOT 13 DP 1251383**  
**15 TORAKINA ROAD, BRUNSWICK HEADS**

**STORMWATER CATCHMENT PLAN**  
**0.2m DESIGN CONTOURS**

Scale: 1:2,000 at A3 CAD file: 1133-DA8D.dwg  
Datum: AHD CivilCAD file: 1133-ENG



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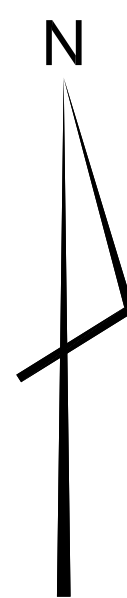
Dwg. No.  
**1133-DA8**

Issue  
**D**





SCALE 1:1,000 AT A1, 1:2,000 AT A3



### LEGEND

- SUBJECT SITE BOUNDARY
- W WATERMAIN (PROPOSED)
- WE WATERMAIN (EXISTING)
- E C SHARED ELEC & COMMS (PROPOSED)
- E O/H ELECTRICITY (TO BE RELOCATED)
- S GRAVITY SEWER (PROPOSED)
- LOW PRESSURE SEWER RM (PROPOSED)  
(BOUNDARY KITS TO EACH LPS LOT WITH PUMP, POD & TELEMETRY BY OTHERS)
- SE GRAVITY SEWER (EXISTING)
- INDICATIVE EASEMENT (PROPOSED)
- EXISTING NORTH SOUTH DRAIN INVERT
- REALIGNED NORTH SOUTH DRAIN

DETAILED DESIGN OF EASEMENTS, GRAVITY SEWER, LOW PRESSURE SEWER & SPS STORAGE TO BE UNDERTAKEN AS PART OF SUBDIVISION WORKS CERTIFICATE APPLICATION.

Iss	Description	Des	Drw	Date	Appd
D	FOR RE-SUBMISSION	WF	WF	10.02.2023	
C	UPDATE LOT NUMBERS	WF	WF	16.11.2022	
B	FOR RE-SUBMISSION	WF	WF	01.08.2022	
A	FOR SUBMISSION	WF	WF	19.08.2021	

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**126 LOT SUBDIVISION OF LOT 13 DP 1251383**  
**15 TORAKINA ROAD, BRUNSWICK HEADS**

### GRAVITY SEWER AND LPS CONCEPT PLAN

Scale: 1:2,000 at A3 CAD file: 1133-DA9D.dwg  
Datum: AHD CivilCAD file: 1133-ENG



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**9 of 31**

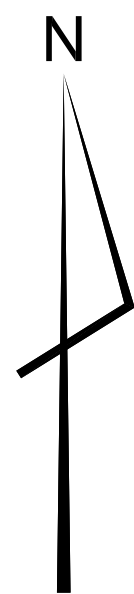
Dwg. No.  
**1133-DA9**

Issue  
**D**



20 10 0 20 40 60 80 100

SCALE 1:1,000 AT A1, 1:2,000 AT A3



### LEGEND

- SUBJECT SITE BOUNDARY
- 1000 WATERMAIN (PROPOSED)
- HYDRANTS AT MAX. 60m SPACINGS
- WATERMAIN (EXISTING)
- WE
- SHARED ELEC & COMMS (PROPOSED)
- E
- O/H ELECTRICITY (TO BE RELOCATED)
- S
- GRAVITY SEWER (PROPOSED)
- SE
- GRAVITY SEWER (EXISTING)
- INDICATIVE EASEMENT (PROPOSED)
- EXISTING NORTH SOUTH DRAIN INVERT
- REALIGNED NORTH SOUTH DRAIN

DETAILED DESIGN OF RETICULATED WATER, ELECTRICAL, COMMUNICATIONS & STREET LIGHTS TO BE UNDERTAKEN AS PART OF SUBDIVISION WORKS CERTIFICATE APPLICATION.

D	FOR RE-SUBMISSION	WF	WF	10.02.2023
C	UPDATE LOT NUMBERS	WF	WF	16.11.2022
B	FOR RE-SUBMISSION	WF	WF	01.08.2022
A	FOR SUBMISSION	WF	WF	01.08.2021

Iss	Description	Des	Drw	Date	Appd
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**126 LOT SUBDIVISION OF LOT 13 DP 1251383**  
**15 TORAKINA ROAD, BRUNSWICK HEADS**

### WATER, ELEC & COMMS SCHEMATIC CONCEPT PLAN

Scale: 1:2,000 at A3 CAD file: 1133-DA10D.dwg  
Datum: AHD CivilCAD file: 1133-ENG



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Sheet No.  
**10 of 31**

Dwg. No. **1133-DA10** Issue **D**





## **Appendix B: Landscape Plans and Early Ecological Works Package**

# WALLUM ESTATE BRUNSWICK HEADS

## EARLY ECOLOGICAL WORKS PACKAGE

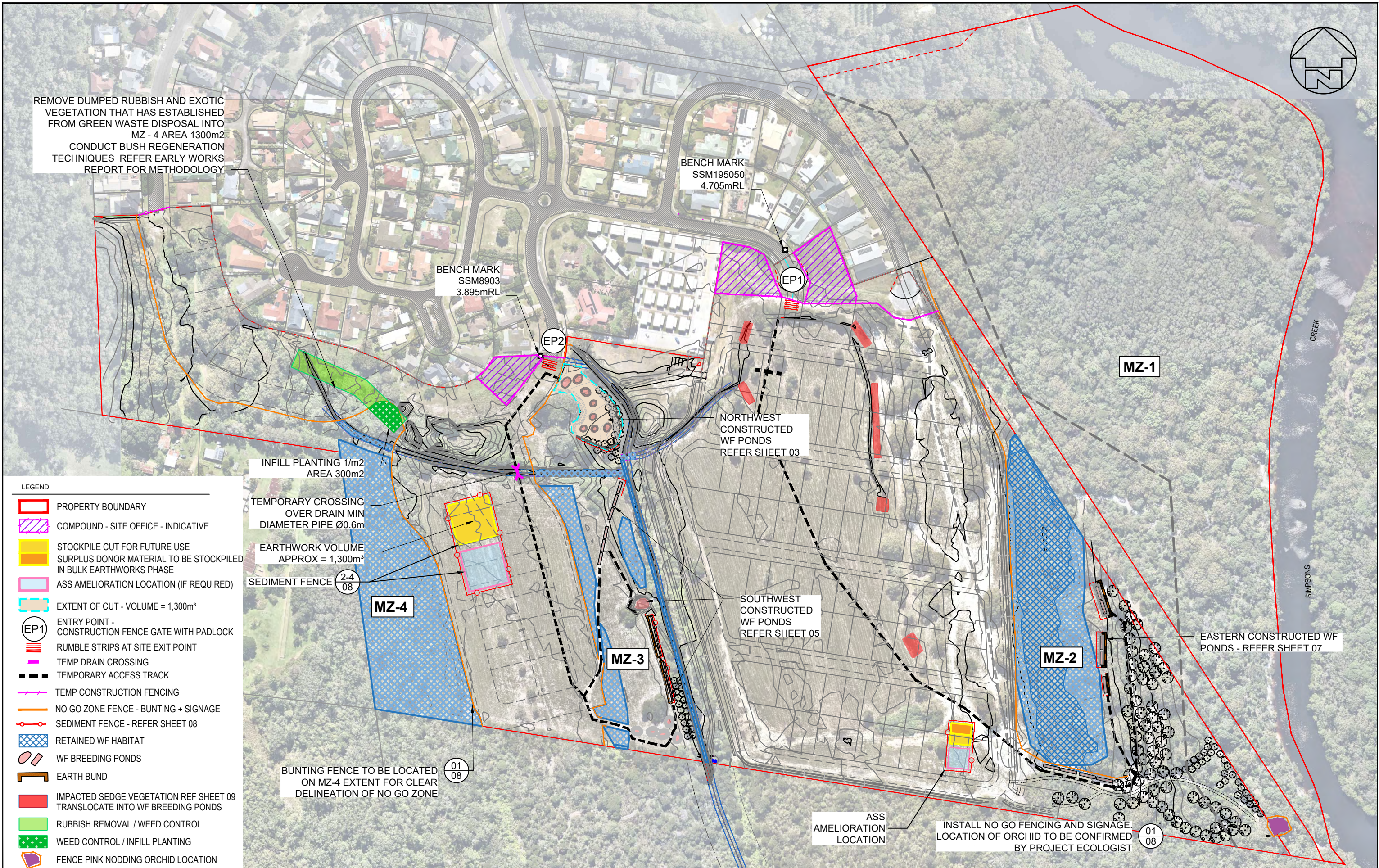
REV E - FOR APPROVAL - 21.11.23

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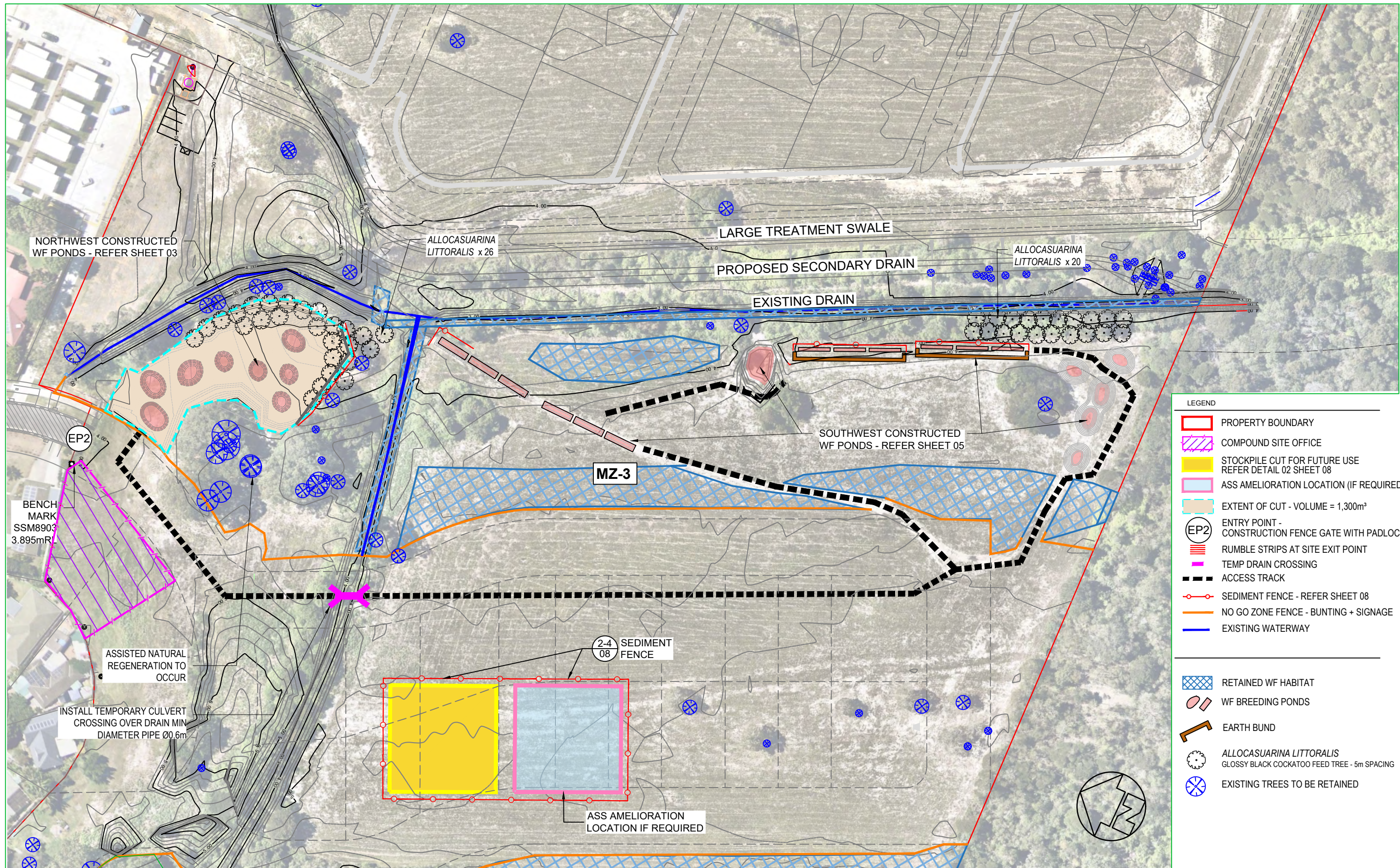
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- 1-211400\_EW\_01 - GENERAL ARRANGEMENT AND ACCESS PLAN
- 1-211400\_EW\_02 - CENTRAL DRAIN HABITAT REHABILITATION ZONE
- 1-211400\_EW\_03 - NORTH WEST WF PONDS & SECTION AA
- 1-211400\_EW\_04A - STOCKPILE CUT - SECTIONS BB - DD
- 1-211400\_EW\_04B - STOCKPILE CUT - SECTIONS EE
- 1-211400\_EW\_05A - SOUTH WEST WF PONDS
- 1-211400\_EW\_05B - SOUTH WEST WF PONDS
- 1-211400\_EW\_06 - EASTERN HABITAT & REHABILITATION ZONE
- 1-211400\_EW\_07 - EASTERN WF BREEDING PONDS - SECTION HH
- 1-211400\_EW\_08 - DETAILS SHEET
- 1-211400\_EW\_09 - "LIVE SOIL" WF PONDS DONOR MATERIAL PLAN
- 1-211400\_EW\_10 - "LIVE SOIL" WF PONDS DONOR MATERIAL PLAN
- 1-211400\_EW\_11 - "LIVE SOIL" WF PONDS DONOR MATERIAL PLAN
- 1-211400\_EW\_12 - NORTH WEST WF PONDS PLANTING PLAN
- 1-211400\_EW\_13 - EASTERN WF PONDS PLANTING PLAN
- 1-211400\_EW\_14 - SOUTH WESTERN WF POND PLANTING PLAN 01 & 02
- 1-211400\_EW\_15 - SOUTH WESTERN WF POND PLANTING PLAN 03
- 1-211400\_EW\_16 - EASTERN HABITAT & REHABILITATION ZONES
- 1-211400\_EW\_17 - EASTERN WF BREEDING PONDS PLANTING PLAN 01
- 1-211400\_EW\_18 - PLANTING NOTES AND DETAILS
- 1-211400\_EW\_19 - TRAFFIC MANAGEMENT PLAN
- 1-211400\_EW\_20 - DA 10.2021.575.1 CONSTRUCTION CONDITIONS 01
- 1-211400\_EW\_21 - DA 10.2021.575.1 CONSTRUCTION CONDITIONS 02









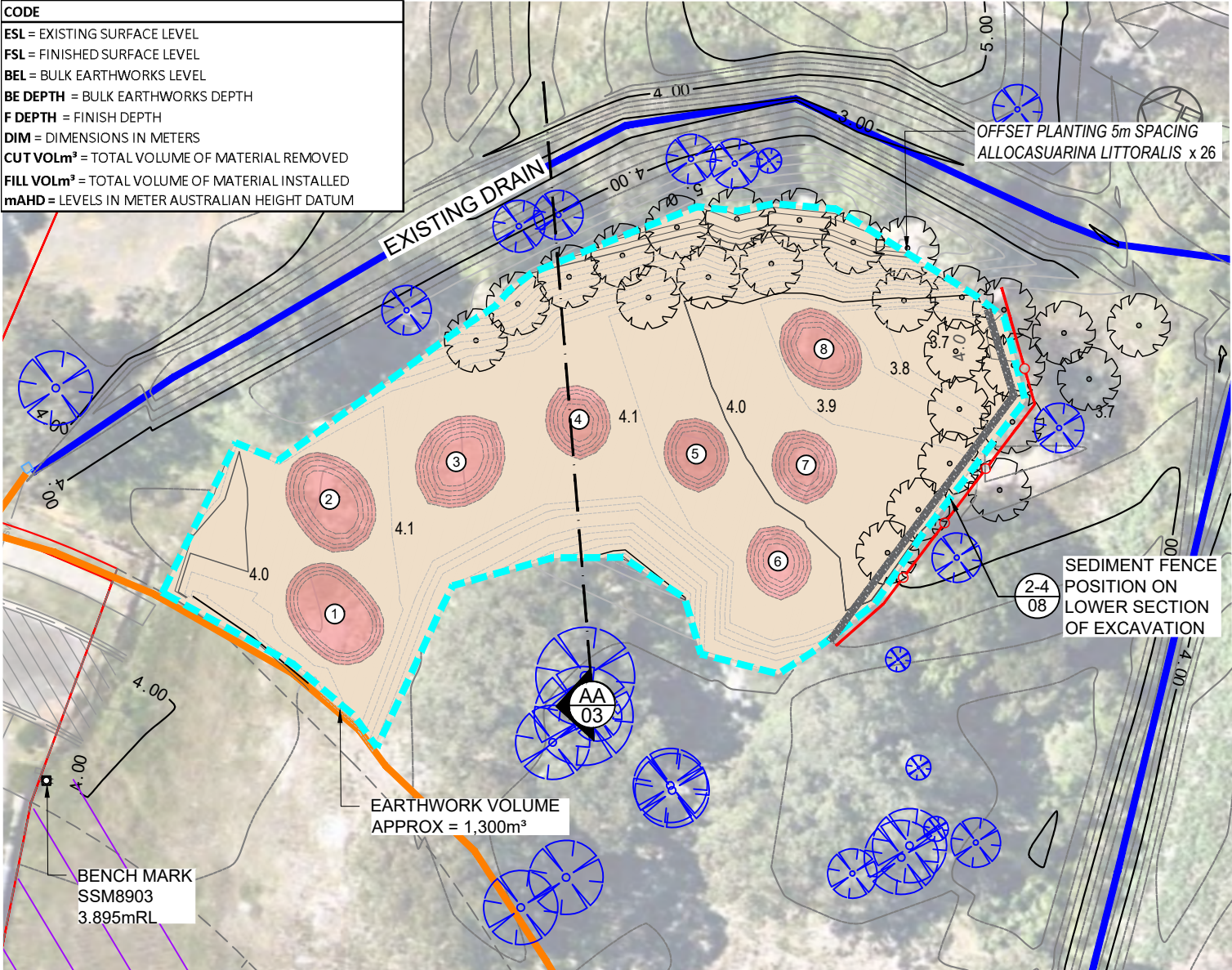


- LEGEND
- PROPERTY BOUNDARY
  - COMPOUND SITE OFFICE
  - STOCKPILE CUT FOR FUTURE USE  
REFER DETAIL 02 SHEET 08
  - ASS AMELIORATION LOCATION (IF REQUIRED)
  - EXTENT OF CUT - VOLUME = 1,300m³
  - ENTRY POINT -  
CONSTRUCTION FENCE GATE WITH PADLOCK
  - RUMBLE STRIPS AT SITE EXIT POINT
  - TEMP DRAIN CROSSING
  - ACCESS TRACK
  - SEDIMENT FENCE - REFER SHEET 08
  - NO GO ZONE FENCE - BUNTING + SIGNAGE
  - EXISTING WATERWAY
  - RETAINED WF HABITAT
  - WF BREEDING PONDS
  - EARTH BUND
  - ALLOCASUARINA LITTORALIS  
GLOSSY BLACK COCKATOO FEED TREE - 5m SPACING
  - EXISTING TREES TO BE RETAINED

REV.	ISSUE / AMENDMENTS	DATE
A	FOR DISCUSSION	16.02.22
B	FOR REVIEW	12.04.22
C	FOR APPROVAL	20.06.23
D	FOR APPROVAL	16.08.23
E	FOR APPROVAL	21.11.23



CODE  
ESL = EXISTING SURFACE LEVEL  
FSL = FINISHED SURFACE LEVEL  
BEL = BULK EARTHWORKS LEVEL  
BE DEPTH = BULK EARTHWORKS DEPTH  
F DEPTH = FINISH DEPTH  
DIM = DIMENSIONS IN METERS  
CUT VOLm³ = TOTAL VOLUME OF MATERIAL REMOVED  
FILL VOLm³ = TOTAL VOLUME OF MATERIAL INSTALLED  
mAHD = LEVELS IN METER AUSTRALIAN HEIGHT DATUM



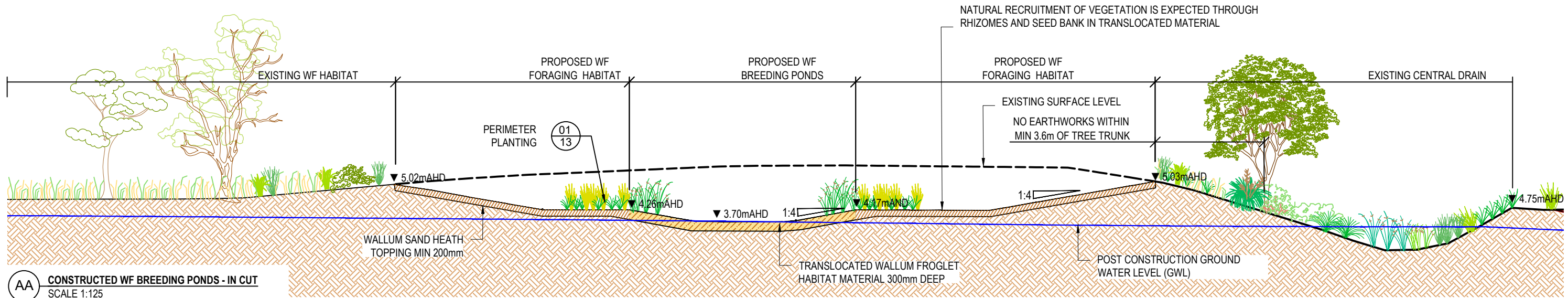
CONSTRUCTED WF BREEDING PONDS PROPERTIES - NORTH WEST								
POND 1	ESL	FSL	BEL	BE DEPTH	F DEPTH m	AREA m²	CUT VOL m³	FILL VOL m³
1	4.0	3.7	3.4	0.6	0.3	47.0	27.8	14.1
2	4.0	3.7	3.4	0.6	0.3	44.0	26.0	13.2
3	4.1	3.55	3.3	0.9	0.6	42.0	35.3	12.6
4	4.1	3.7	3.4	0.7	0.4	23.0	15.7	6.9
5	4.0	3.7	3.4	0.6	0.3	23.0	13.4	6.9
6	4.0	3.55	3.3	0.8	0.5	23.0	16.8	6.9
7	3.9	3.5	3.2	0.7	0.4	23.0	15.7	6.9
8	3.8	3.4	3.1	0.7	0.4	33.0	22.7	9.9
TOTAL m²							173.1	77.4
TOTAL VOLUME OF TRANSLOCATED WF HABITAT @ DEPTH OF 03m IN PROPOSED PONDS								77.4
TOTAL VOLUME OF IMPACTED WALLUM HEATH MATERIAL OVER EXCAVATED SITE @0.3 DEPTH								180

EARTHWORKS METHODOLOGY

- NO TREES ARE TO BE IMPACTED IN THIS WORKS. MIN DISTANCE OF 3.6m FROM TREE TRUNK TO EARTHWORKS EXTENT
- EARTHWORKS EXTENT TO BE LOCATED BY A SURVEYOR AND BUNTING FENCE AND ENVIRONMENTAL NO GO ZONE SIGNS INSTALLED
- FINAL EXTENT TO BE CONFIRMED BY ARBORIST OR ECOLOGIST TAKING INTO ACCOUNT THE SURROUNDING TREES TPZ.
- WALLUM HEATH TOP SOIL, ORGANIC MATTER AND VEGETATION TO BE STOCKPILED WITHIN THE EARTHWORKS EXTENT. TOP DRESS AREA WITH STOCKPILE ORGANIC MATERIAL BULK EARTHWORKS. APPROX 400m³ (TOTAL AREA 2000m² x DEPTH 200mm)
- CLEAN SAND APPROPRIATE FOR FILL TO BE EXCAVATED FROM SITE AND MOVED TO STOCKPILE LOCATION REFER SHEET 01
- APPROX 1,300m³ OF CUT TO BE TRANSPORTED FROM NORTH WESTERN SITE TO WESTERN STOCKPILE LOCATION.
- INSTALL 300mm OF TRANSLOCATED 'LIVE SOIL' FROM IMPACTED WF BREEDING HABITAT ON EASTERN SIDE OF DEVELOPMENT TO ACHIEVE DESIGN FINISHED FLOOR LEVEL - REFER SHEET 01B
- TOPDRESS 200mm OF STOCKPILED TOPSOIL, ORGANIC MATTER AND VEGETATION FROM IMPACTED WALLUM HEATH OVER EXCAVATED SITE. VOLUME = 280m³ AREA = 1338m²
- REFER NW WF POND PLANTING PLAN 01 SHEET 12 FOR PLANTING SCHEDULE
- NATURAL REGENERATION OF VEGETATION IS EXPECTED IN TRANSLOCATED MATERIAL. REVIEW SUCCESS OF REGENERATION IN 6MTH TO DETERMINE IF FURTHER ACTION IS REQUIRED.

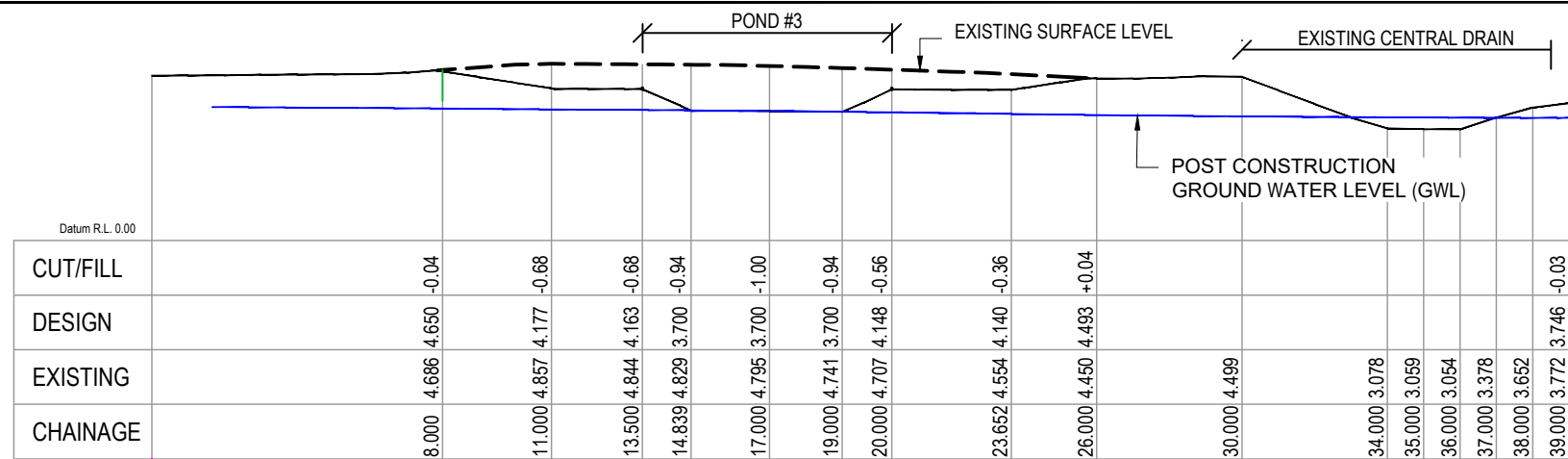
LEGEND

- |  |                                      |  |   |
|--|--------------------------------------|--|---|
|  | PROPERTY BOUNDARY                    |  | EXISTING TREES TO BE RETAINED                               |
|  | EXTENT OF CUT - VOLUME = 1,300m³     |  | ALLOCASUARINA LITTORALIS<br>COCKATOO FEED TREE - 5m SPACING |
|  | PROPOSED CONTOUR                     |  | TRANSLOCATED "LIVE SOIL" DEPTH 300mm                        |
|  | EXISTING WATERWAY                    |  | TOPDRESS WALLUM SAND HEATH TOP SOIL DEPTH 200mm             |
|  | NO GO ZONE FENCE - BUNTING + SIGNAGE |  |   |
|  | SEDIMENT FENCE - REFER SHEET 08      |  |   |

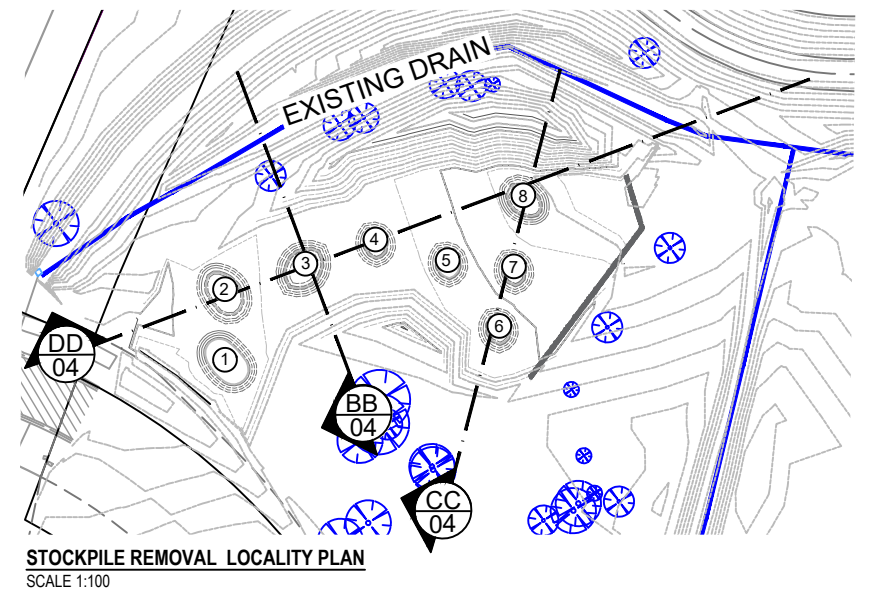


AA CONSTRUCTED WF BREEDING PONDS - IN CUT  
SCALE 1:125

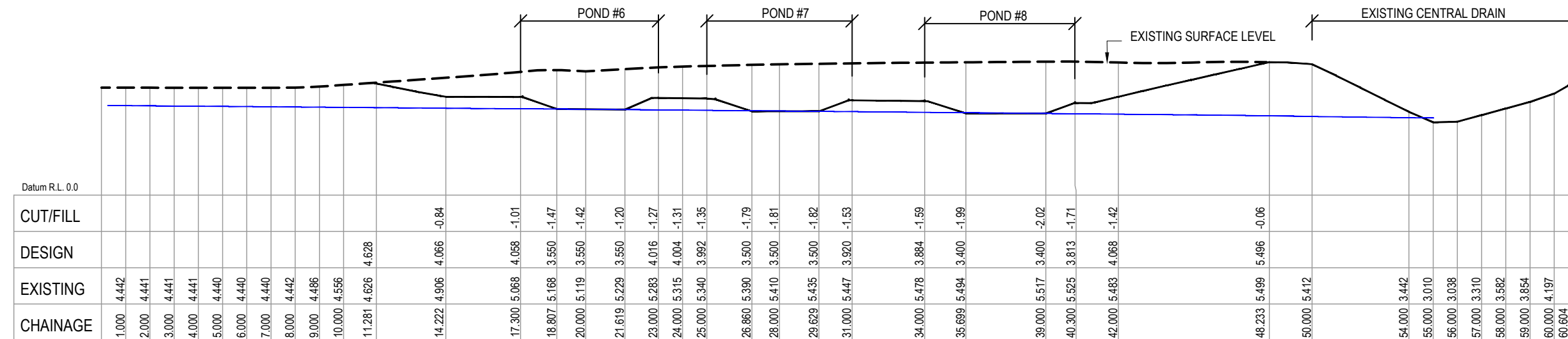




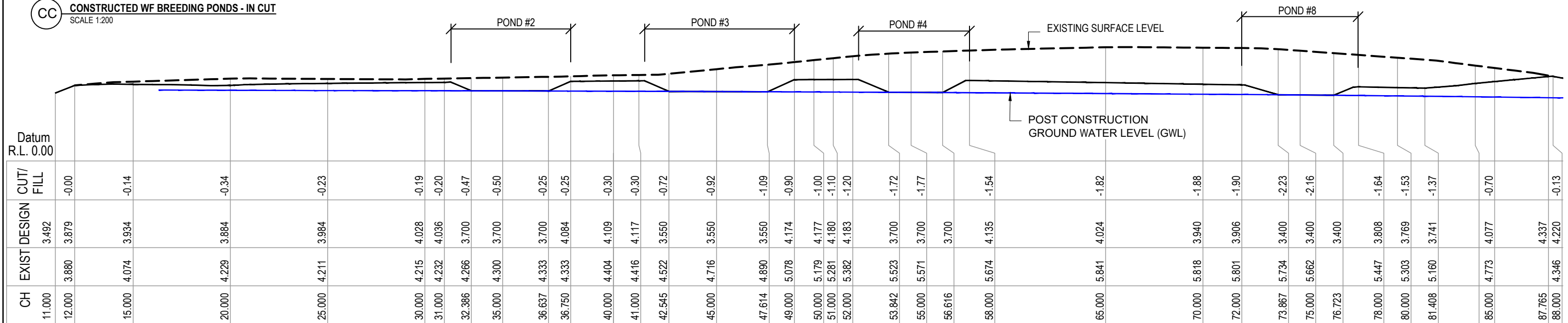
BB CONSTRUCTED WF BREEDING PONDS - IN CUT  
SCALE 1:200



STOCKPILE REMOVAL LOCALITY PLAN  
SCALE 1:100



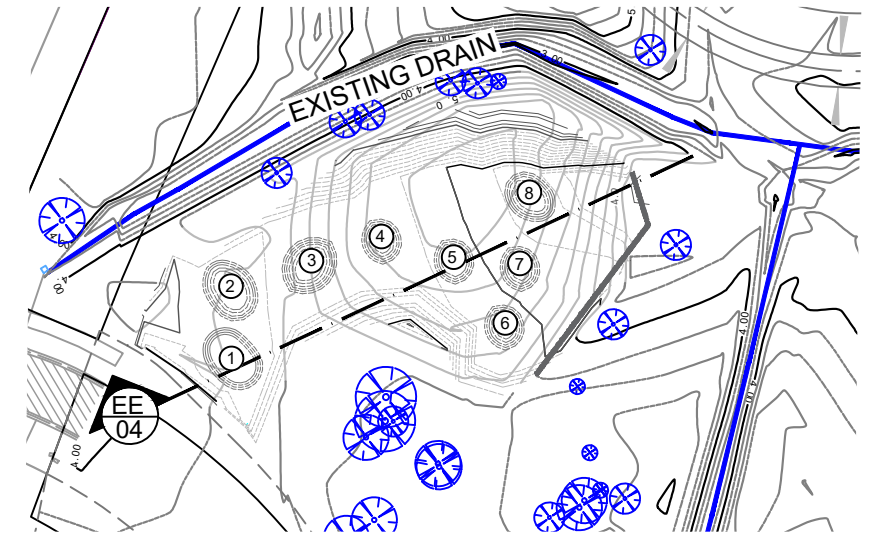
CC CONSTRUCTED WF BREEDING PONDS - IN CUT  
SCALE 1:200



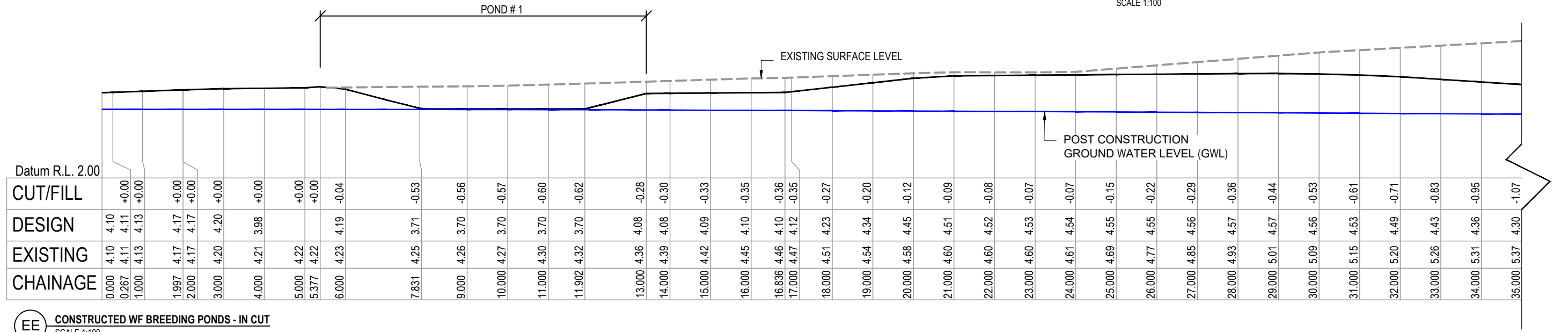
DD CONSTRUCTED WF BREEDING PONDS - IN CUT  
SCALE 1:100



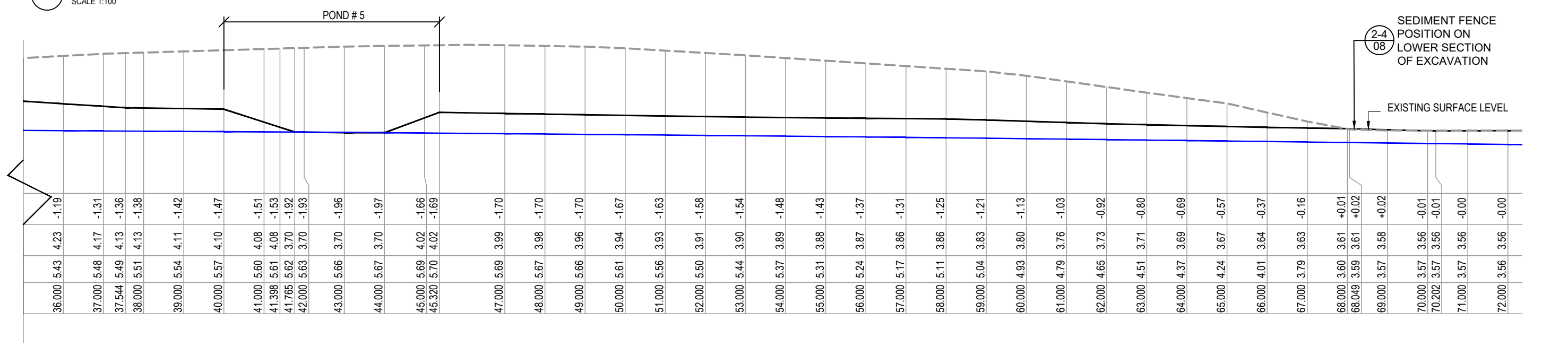




STOCKPILE REMOVAL LOCALITY PLAN  
SCALE 1:100



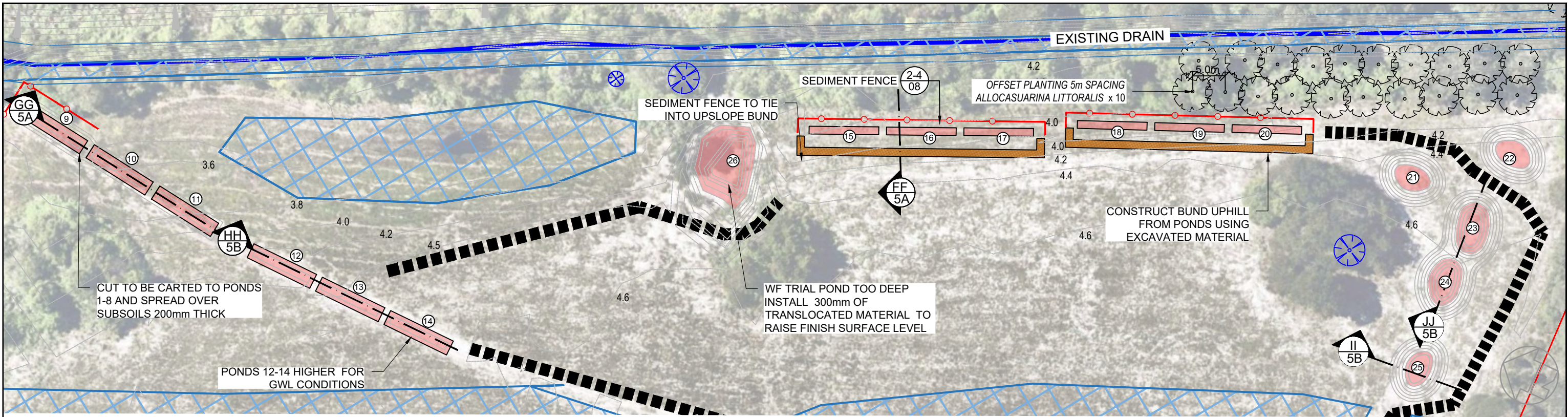
EE CONSTRUCTED WF BREEDING PONDS - IN CUT  
SCALE 1:100



SEDIMENT FENCE  
POSITION ON  
LOWER SECTION  
OF EXCAVATION

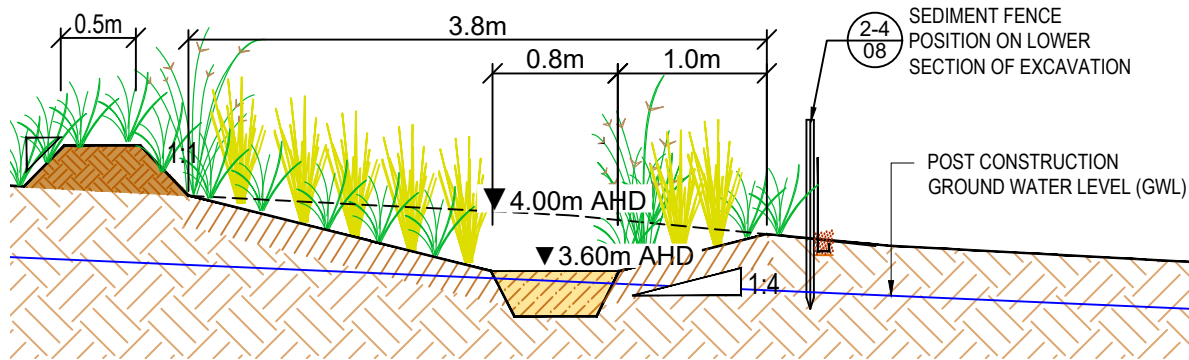
EXISTING SURFACE LEVEL



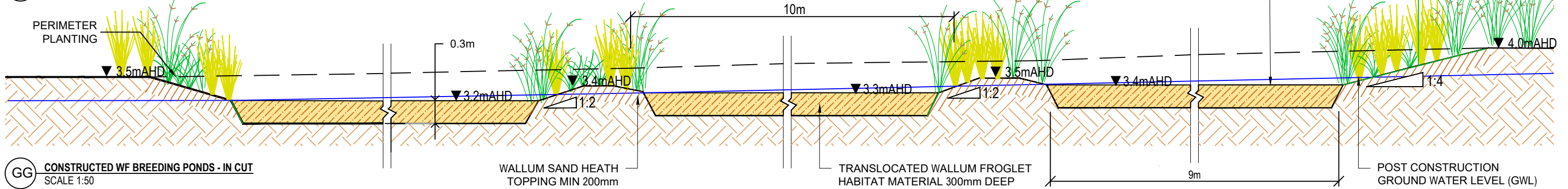


LEGEND

- PROPERTY BOUNDARY
- RUMBLE STRIPS AT SITE EXIT POINT
- TEMP DRAIN CROSSING
- ACCESS TRACK
- NO GO ZONE FENCE - BUNTING + SIGNAGE
- WF BREEDING PONDS
- EARTH BUND
- ALLOCASUARINA LITTORALIS GLOSSY BLACK COCKATOO FEED TREE - 5m SPACING
- EXISTING TREES TO BE RETAINED
- RETAINED WF HABITAT
- SEDIMENT FENCE - REFER SHEET 08



FF CONSTRUCTED WF BREEDING PONDS - IN CUT  
SCALE 1:50



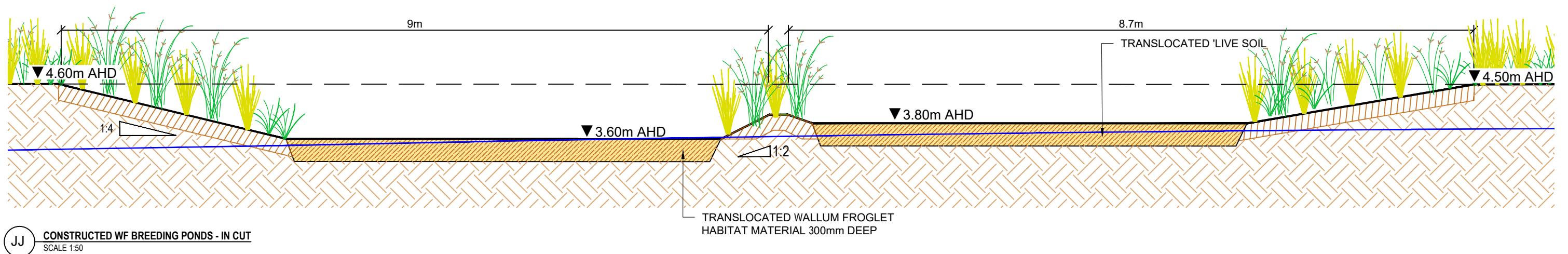
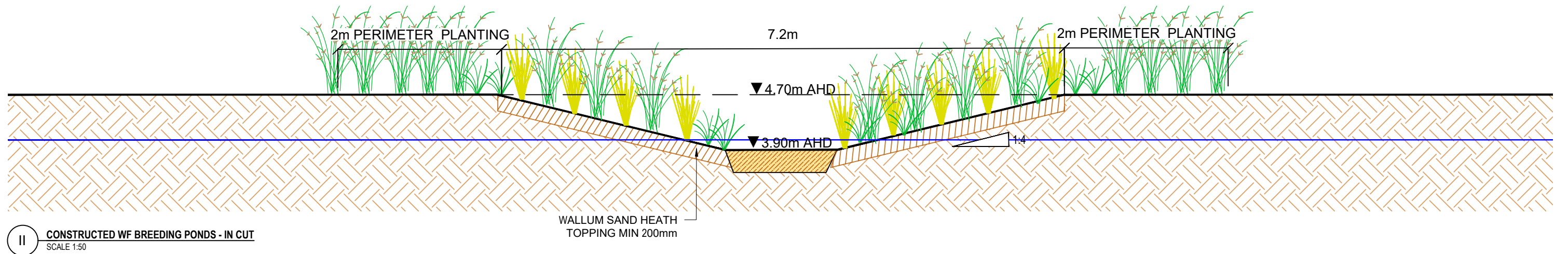
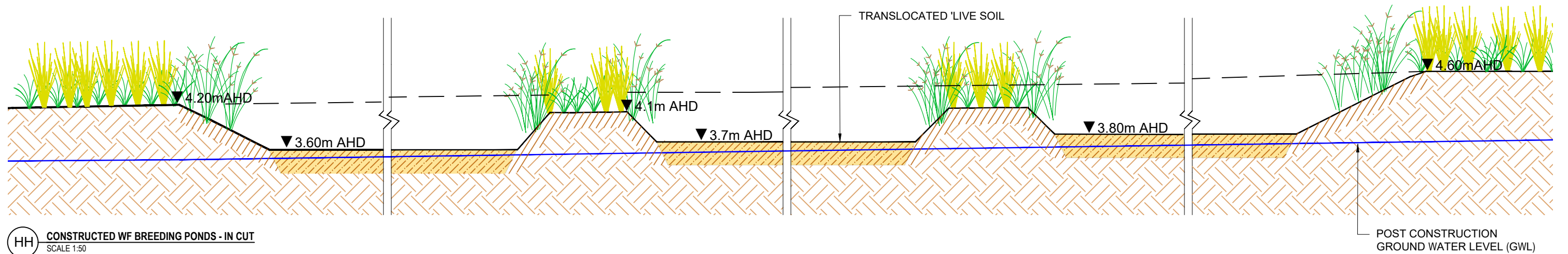
GG CONSTRUCTED WF BREEDING PONDS - IN CUT  
SCALE 1:50

CONSTRUCTED WF BREEDING PONDS PROPERTIES - SOUTH WEST									
POND 1	ESL	FSL	BEL	BE DEPTH	F DEPTH m	AREA m <sup>2</sup>	CUT VOL m <sup>3</sup>	FILL VOL m <sup>3</sup>	PLANTS
9	3.6	3.2	2.9	0.7	0.4	18	12.5	5.4	44
10	3.6	3.3	3.0	0.6	0.3	18	10.7	5.4	44
11	3.7	3.4	3.1	0.6	0.3	18	10.7	5.4	44
12	4.1	3.6	3.3	0.8	0.5	18	14.3	5.4	44
13	4.4	3.7	3.4	1.0	0.7	18	17.9	5.4	44
14	4.6	3.8	3.5	1.1	0.8	18	19.7	5.4	44
15	4.0	3.6	3.3	0.7	0.4	9.0	6.0	2.7	40
16	4.0	3.6	3.3	0.7	0.4	9.0	6.0	2.7	40
17	4.0	3.6	3.3	0.7	0.4	9.0	6.0	2.7	40
18	4.0	3.6	3.3	0.7	0.4	9.0	6.0	2.7	40
19	4.0	3.6	3.3	0.7	0.4	9.0	6.0	2.7	40
20	4.0	3.6	3.3	0.7	0.4	9.0	6.0	2.7	40
21	4.4	3.6	3.3	1.1	0.8	10.0	11.0	3.0	26
22	4.4	3.8	3.5	0.9	0.6	11.0	9.9	3.3	26
23	4.5	3.8	3.5	1.0	0.7	30.0	29.6	9.0	40
24	4.6	3.8	3.5	1.1	0.8	30.0	32.6	9.0	40
25	4.7	3.9	3.6	1.1	0.8	10.0	11.0	3.0	26
26	3.5	3.3	3.0	0.5	0.2	47.0	0.0	10.0	60
TOTAL m <sup>3</sup>							215.4	85.9	TOTAL QTY
TOTAL VOLUME OF TRANSLOCATED WF HABITAT @ DEPTH OF 03m IN PROPOSED PONDS								85.9	722

CODE

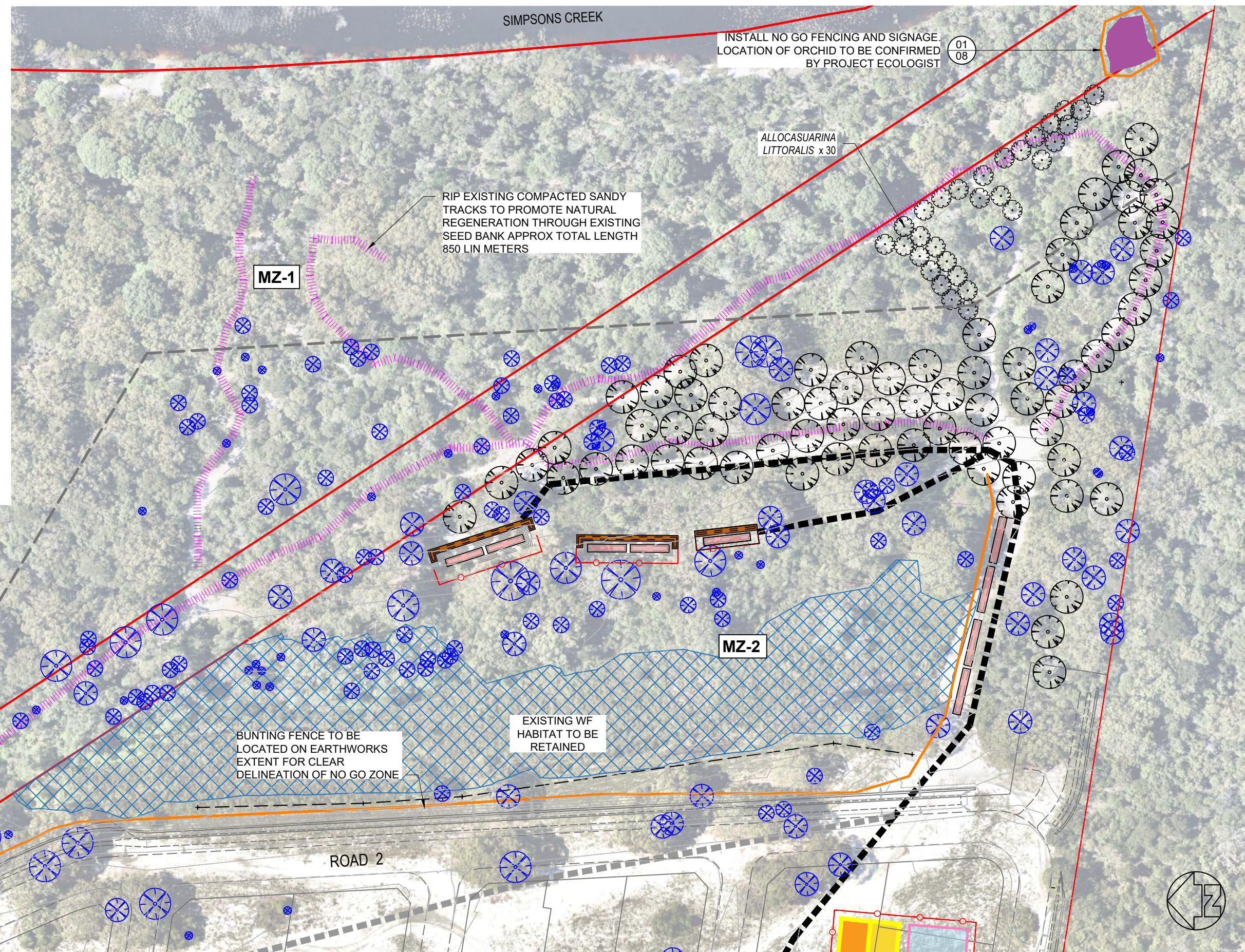
- ESL = EXISTING SURFACE LEVEL
- FSL = FINISHED SURFACE LEVEL
- BEL = BULK EARTHWORKS LEVEL
- BE DEPTH = BULK EARTHWORKS DEPTH
- F DEPTH = FINISH DEPTH
- DIM = DIMENSIONS IN METERS
- CUT VOLm<sup>3</sup> = TOTAL VOLUME OF MATERIAL REMOVED
- FILL VOLm<sup>3</sup> = TOTAL VOLUME OF MATERIAL INSTALLED
- mAHD = LEVELS IN METER AUSTRALIAN HEIGHT DATUM



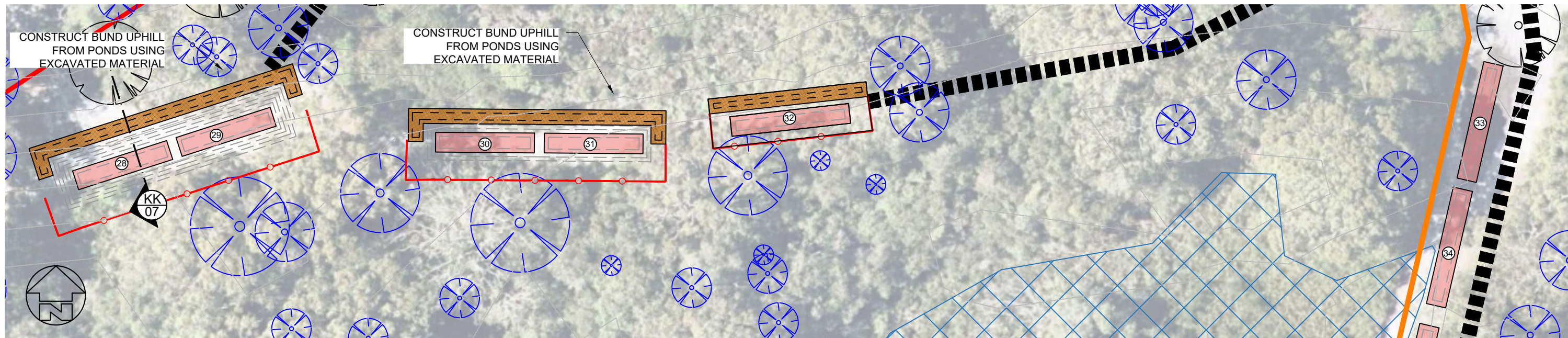




- LEGEND
- PROPERTY BOUNDARY
  - COMPOUND SITE OFFICE
  - STOCKPILE CUT FOR FUTURE USE
  - ASS AMELIORATION LOCATION (IF REQUIRED)
  - ENTRY POINT - CONSTRUCTION FENCE GATE WITH PADLOCK
  - ACCESS TRACK
  - NO GO ZONE FENCE - BUNTING + SIGNAGE
  - SEDIMENT FENCE - REFER SHEET 08
  - ALLOCASUARINA LITTORALIS  
GLOSSY BLACK COCKATOO FEED TREE - 5m SPACING
  - EUCALYPTUS ROBUSTA QTY  
KOALA FEED TREE - 10m SPACING
  - EXISTING TREES TO BE RETAINED
  - RETAINED WF HABITAT
  - WF BREEDING PONDS
  - IMPACTED SEDGE VEGETATION  
TRANSLOCATE INTO WF BREEDING PONDS
  - EXISTING SANDY TRACK TO BE RIPPED TO PROMOTE  
REGENERATION. KEEP CLEAR OF TREE ROOTS  
APPROX LENGTH 850 lin m







**EASTERN CONSTRUCTED WF BREEDING PONDS - PLAN**  
SCALE 1:400

CONSTRUCTED WF BREEDING PONDS PROPERTIES - EASTERN									
POND 1	ESL	FSL	BEL	BE DEPTH	F DEPTH m	AREA m <sup>2</sup>	CUT VOL m <sup>3</sup>	FILL VOL m <sup>3</sup>	PLANTS
27	4.00	3.50	3.20	0.80	0.50	30.0	23.6	9.0	56
28	4.00	3.50	3.20	0.80	0.50	20.0	15.6	6.0	56
29	3.60	3.50	3.20	0.40	0.10	30.0	11.6	9.0	76
30	3.60	3.50	3.20	0.40	0.10	20.0	7.6	6.0	56
31	3.60	3.50	3.20	0.40	0.10	20.0	7.6	6.0	56
32	3.60	3.50	3.20	0.40	0.10	21.0	8.0	6.3	57
33	3.30	2.80	2.50	0.80	0.50	4.0	2.8	1.2	24
34	3.45	3.05	2.75	0.70	0.40	11.0	7.3	3.3	38
35	3.60	3.60	3.30	0.30	0.00	18.0	5.0	5.4	52
36	3.80	3.80	3.50	0.30	0.00	25.0	7.1	7.5	66
						TOTAL m <sup>3</sup>	95.7	29.7	TOTAL QTY
TOTAL VOLUME OF TRANSLOCATED WF HABITAT @ DEPTH OF 03m IN PROPOSED PONDS								29.7	537

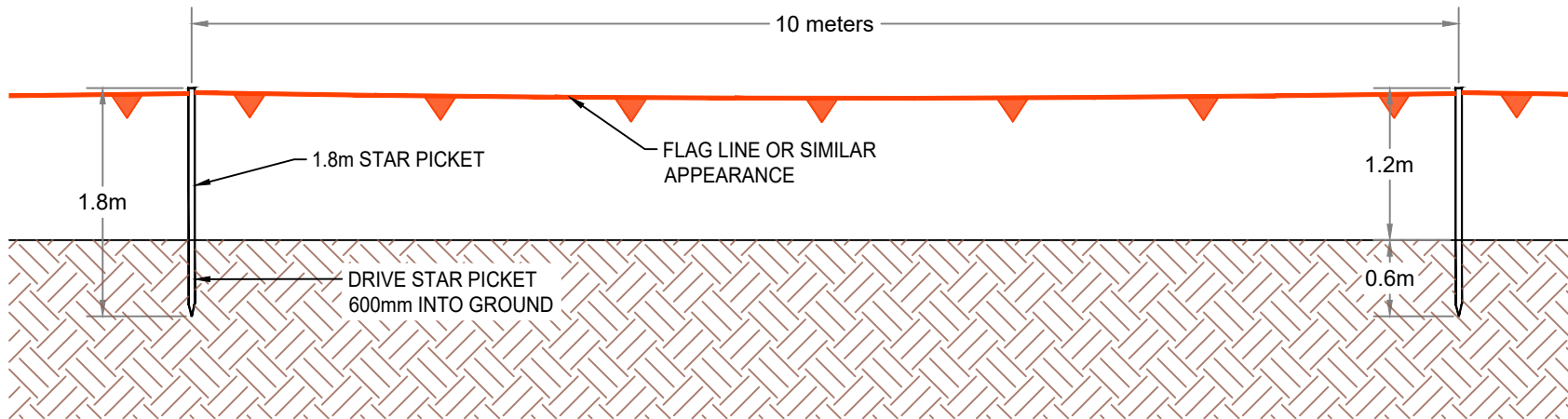
CODE
ESL = EXISTING SURFACE LEVEL
FSL = FINISHED SURFACE LEVEL
BEL = BULK EARTHWORKS LEVEL
BE DEPTH = BULK EARTHWORKS DEPTH
F DEPTH = FINISH DEPTH
DIM = DIMENSIONS IN METERS
CUT VOLm <sup>3</sup> = TOTAL VOLUME OF MATERIAL REMOVED
FILL VOLm <sup>3</sup> = TOTAL VOLUME OF MATERIAL INSTALLED
mAHD = LEVELS IN METER AUSTRALIAN HEIGHT DATUM



**EASTERN WF BREEDING PONDS - TYPICAL SECTION**  
SCALE 1:50

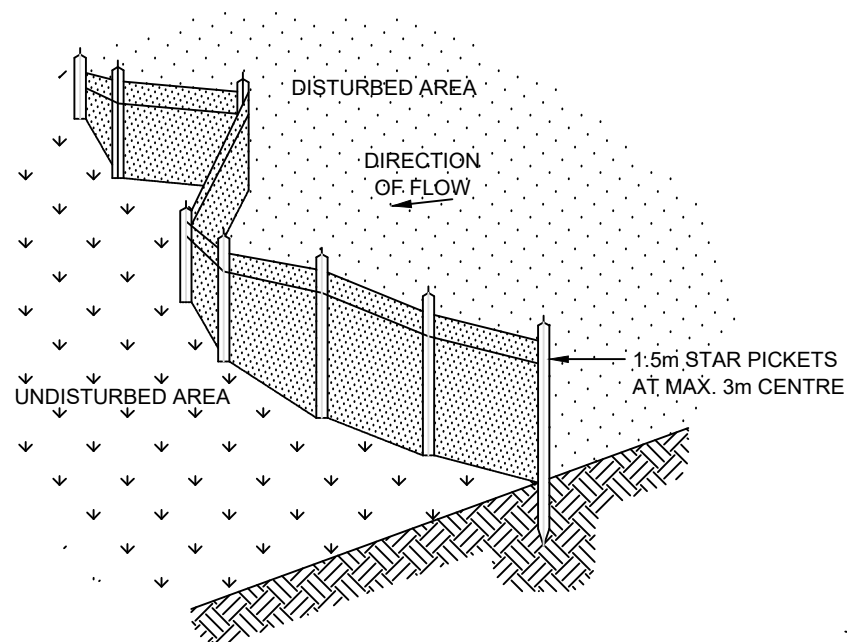
- LEGEND
- DEVELOPMENT BOUNDARY
  - NO GO ZONE FENCE - BUNTING + SIGNAGE
  - SEDIMENT FENCE - REFER SHEET 08
  - EXISTING WF HABITAT
  - EARTH BUND
  - WF BREEDING PONDS
  - EXISTING TREES TO BE RETAINED
  - EUCALYPTUS ROBUSTA QTY
  - KOALA FEED TREE - 10m SPACING



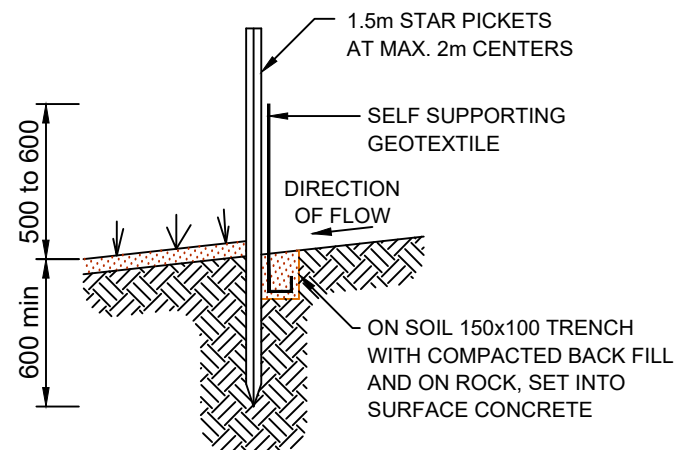


01  
08 **NO GO ZONE FENCE - BUNTING + SIGNAGE - ELEVATION**

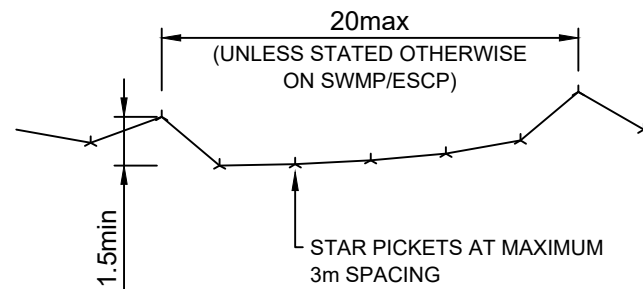
SCALE 1:50



02  
08 **SEDIMENT FENCE - PERSPECTIVE**  
SCALE NTS



03  
09 **SEDIMENT FENCE - TYPICAL DETAIL**  
SCALE 1:50



#### SEDIMENT FENCE CONSTRUCTION NOTES:

1. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO PARALLEL TO THE CONTOURS OF THE SITE.
2. DRIVE 1.5 METER LONG STAR PICKETS INTO GROUND, 3 METERS APART.
3. DIG A 150 DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
4. BACK FILL TRENCH OVER BASE OF FABRIC
5. FIX SELF-SUPPORTING GEOTEXTILE TO UPSLOPE SIDE OF POSTS WITH WIRE TIES OR AS RECOMMENDED BY GEOTEXTILE MANUFACTURER.
6. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150 OVERLAP.

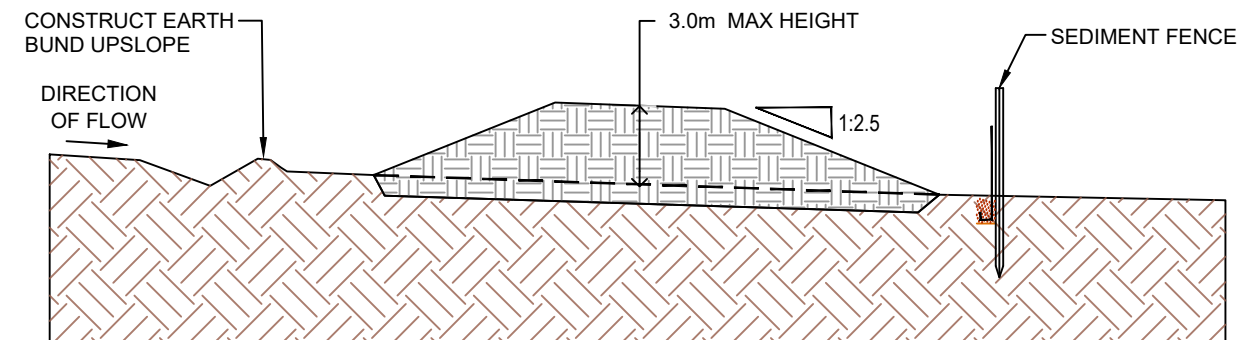
#### 'NO GO ZONE FENCING'

1. INSTALL WF PROTECTIVE FENCE AS INDICATED ON SHEET 1-211400\_EW\_01
2. CONSTRUCT FENCE AS SHOWN IN SECTION LEFT
3. WHERE POSSIBLE ALIGN FENCE ALONG EXISTING ROADS, ON SIDE OF CONSTRUCTED PONDS
4. ALIGNMENT TO WORK AROUND EXISTING VEGETATION
5. INSTALL 'NO GO ZONE' SIGNS AS SHOWN BELOW , EVERY 50m ALONG PROTECTIVE FENCE
6. SIGN TO BE A4 AND LAMINATED

**ENVIRONMENTAL  
NO GO ZONE  
AUTHORISED  
ACCESS ONLY**



05  
08 **NO GO ZONE FENCE - SIGN**  
SCALE 1:50

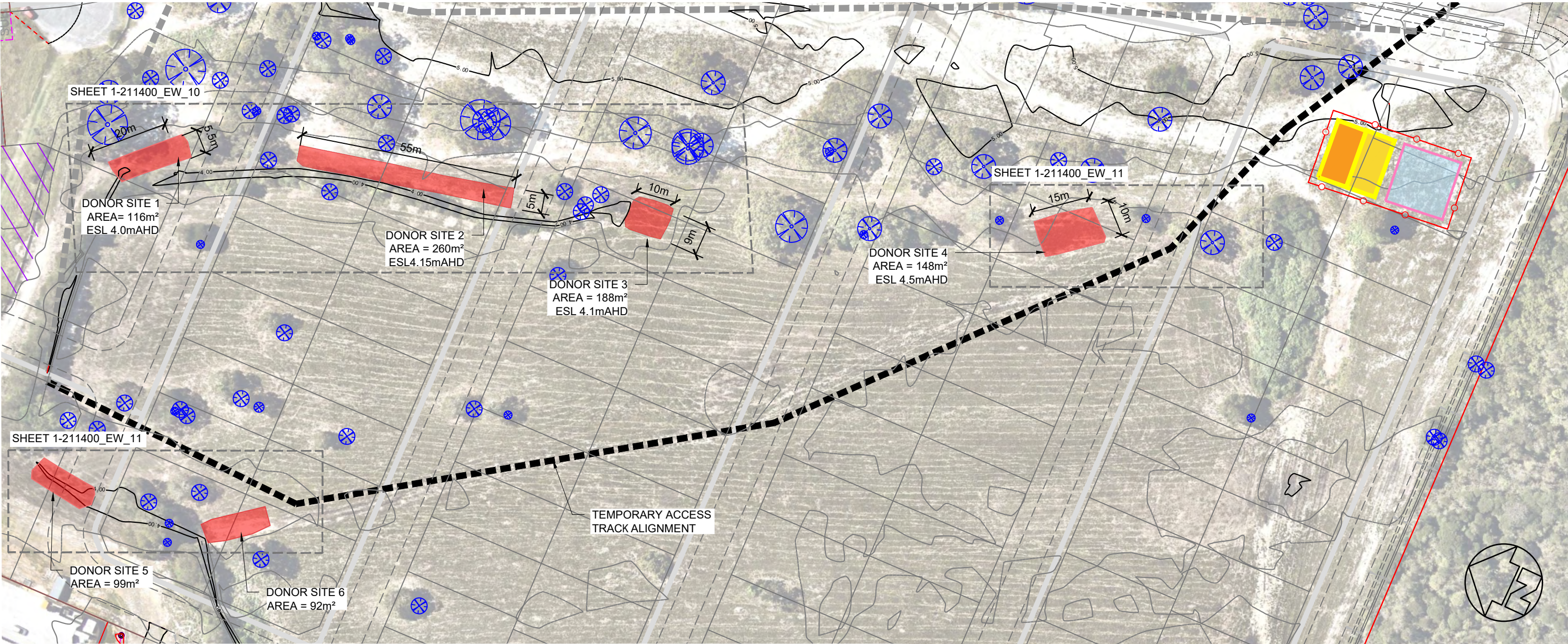


04  
08 **SEDIMENT FENCE - TYPICAL DETAIL**  
SCALE NTS

#### STOCKPILE CONSTRUCTION NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METERS FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. THIS AREA IS TO BE STRIPPED OF ORGANIC MATERIAL AND CLEAN SAND AND TOPSOIL TO BE KEPT SEPARATE FOR REUSE.
4. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 3m IN HEIGHT.
5. BATTER SLOPE MAXIMUM 1:2.5
6. CONSTRUCT EARTH BANKS ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES 1 TO 2 METERS DOWNSLOPE





WF DONOR MATERIAL AND WALLUM HEATH TRANSLOCATION METHODOLOGY

PRIOR TO THE TRANSLOCATION OF ANY WALLUM FROGLET HABITAT FROM THE PROPOSED HOUSE LOT AREA, WALLUM FROGLET POPULATION SURVEYS ARE TO BE CARRIED OUT BEFORE AND AFTER RAINFALL EVENTS AT THESE SITES TO ESTABLISH BOTH POPULATION SIZE AND DENSITY OF EXISTING WALLUM FROGLET'S IN THE WALLUM FROGLET HABITAT AREAS TO BE MOVED. REFER WALLUM MANAGEMENT PLAN FOR SURVEY METHODOLOGY.

AREA OF HIGH VALUE WF BREEDING HABITAT THAT ARE TO BE REMOVED IN PROPOSED DEVELOPMENT WORKS HAVE BEEN IDENTIFIED BY A QUALIFIED ECOLOGIST. SEE PLAN ABOVE IN RED.

- THE PROPOSED CONSTRUCTED WF BREEDING PONDS REQUIRES A TOTAL OF 215m³
- AREA OF "LIVE SOIL" DONOR MATERIAL AVAILABLE IS 240m³
- EXCAVATE 300mm OF TRANSLOCATED MATERIAL INCLUDING VEGETATION AND PLACE IN CONSTRUCTED WF BREEDING PONDS, TO A DEPTH OF 300mm.
- REFER - SHEETS 03, 05 & 07 FOR BREEDING POND DESIGNS.

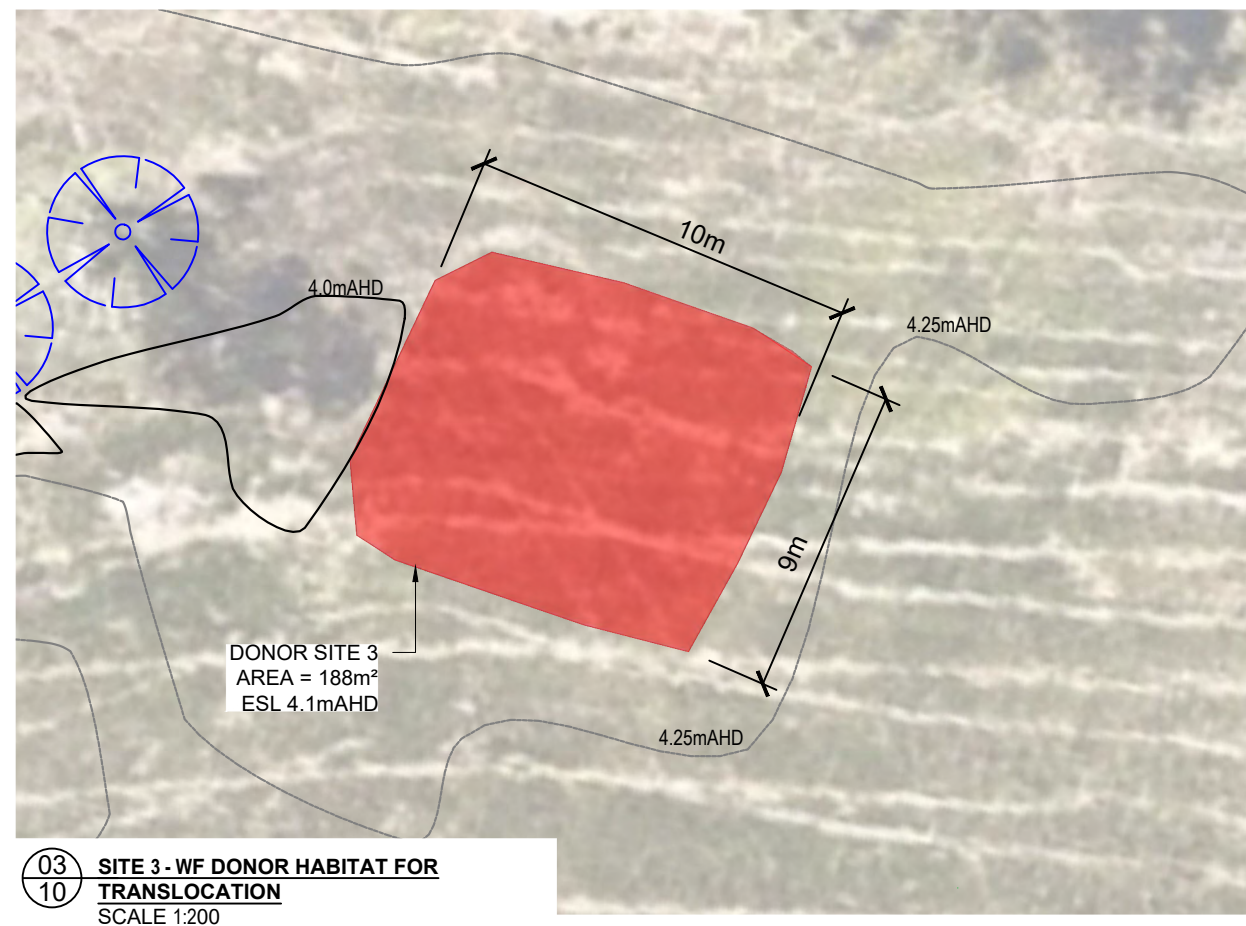
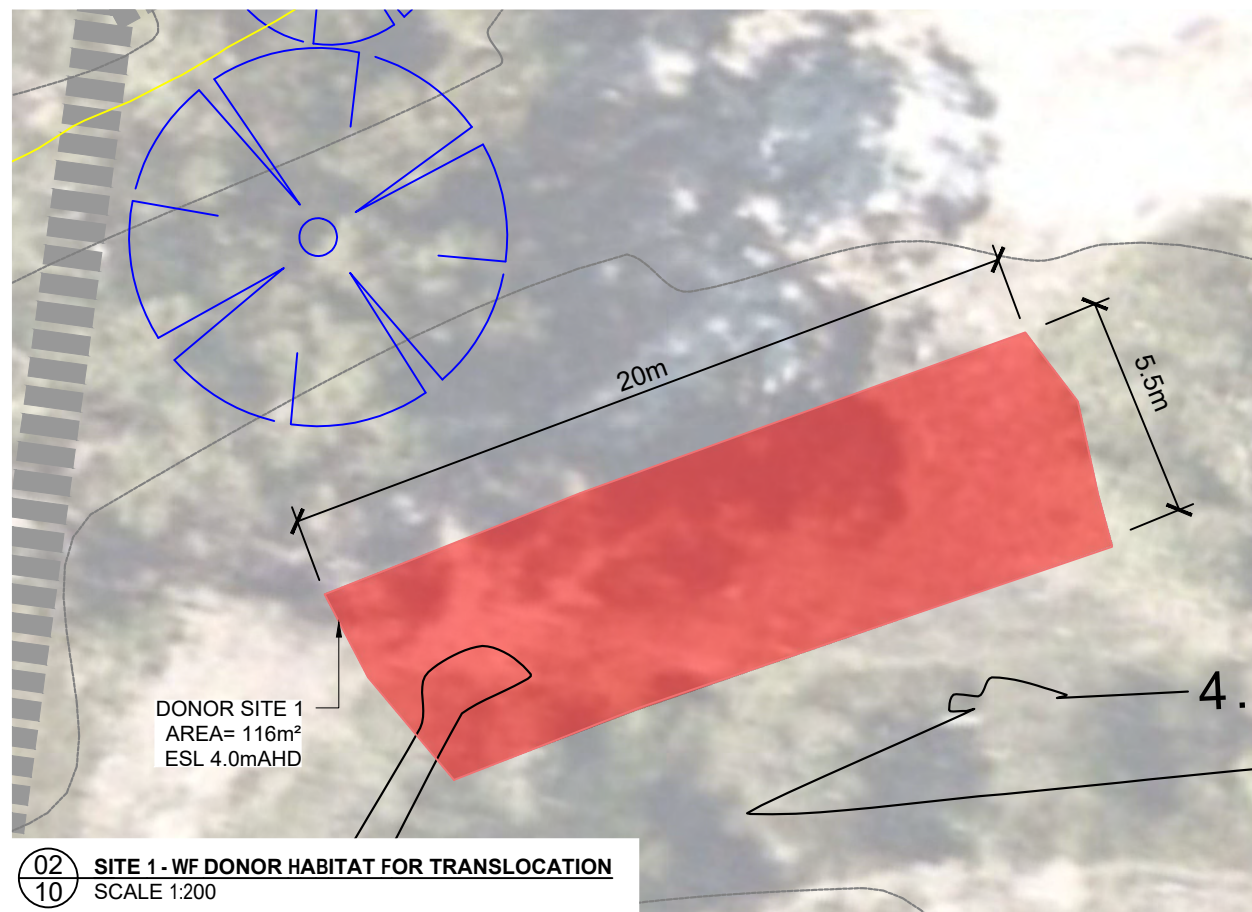
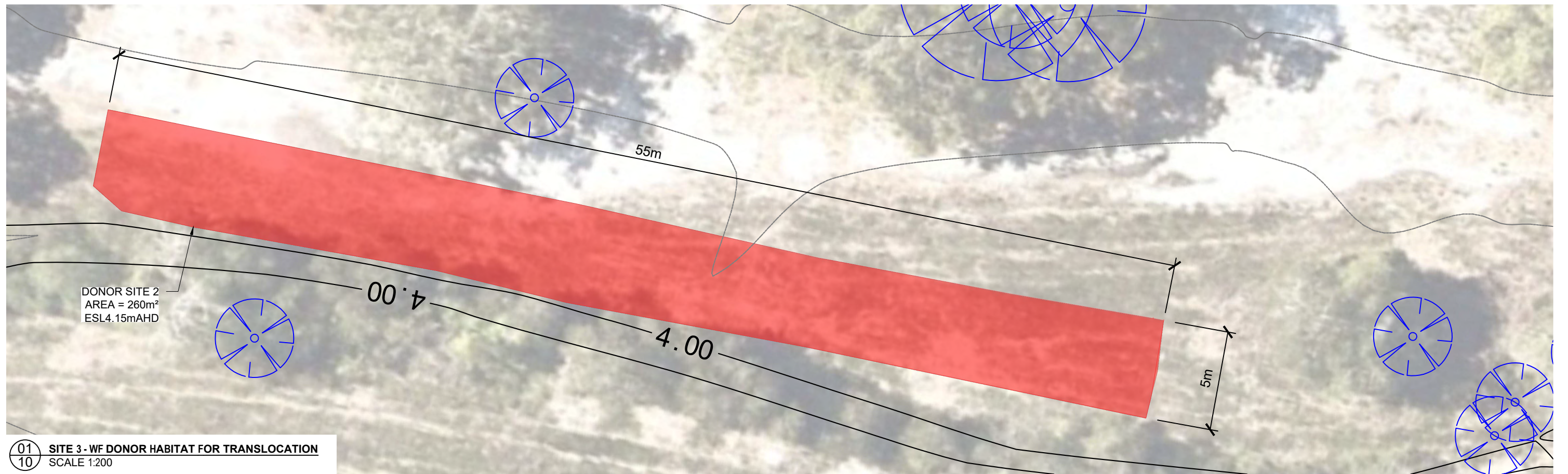
REQUIRED WF BREEDING PONDS DONOR MATERIAL		
CONSTRUCTED POND AREA	TOTAL m²	TOTAL m³
NORTH WEST WF PONDS	258	77.4
SOUTH WEST WF PONDS	300.0	85.9
EASTERN WF PONDS	271.0	51.3
	<b>TOTAL</b>	<b>829</b>
FILL PONDS 300mm FROM BAULK EARTHWORKS LEVEL WITH TRANSLOCATED DONOR MATERIAL.		
		<b>214.6</b>

IMPACTED WF BREEDING PONDS DONOR MATERIAL AVAILABLE		
CONSTRUCTED POND AREA	TOTAL m²	TOTAL m³
DONOR SITE 1	116	34.8
DONOR SITE 2	260	78
DONOR SITE 3	88	26.4
DONOR SITE 4	148	44.4
DONOR SITE 5	99	29.7
DONOR SITE 6	92	27.6
	<b>TOTAL</b>	<b>803</b>
		<b>240.9</b>
LIVE SOIL TO BE EXCAVATED AT A DEPTH OF 300mm. INCLUDING WALLUM HEATH VEGETATION FOR THERE IS APPROX 26m³ OF SURPLUS DONOR MATERIAL TO BE USED AS REQUIRED.		
ESL = EXSTING SURFACE LEVEL		

- LEGEND
- PROPERTY BOUNDARY
  - COMPOUND - SITE OFFICE - INDICATIVE
  - STOCKPILE CUT FOR FUTURE USE
  - SURPLUS DONOR MATERIAL TO BE STOCKPILED STOCKPILE IN BULK EARTHWORKS PHASE FOR POTENTIAL RECTIFICATION PURPOSES
  - ASS AMELIORATION LOCATION (IF REQUIRED)
  - ACCESS TRACK
  - EXISTING TREES TO BE RETAINED
  - IMPACTED SEDGE VEGETATION

FINAL EXTENT OF "LIVE SOIL" DONOR MATERIAL TO BE MARKED OUT BY PROJECT ECOLOGIST PRIOR TO EXCAVATION



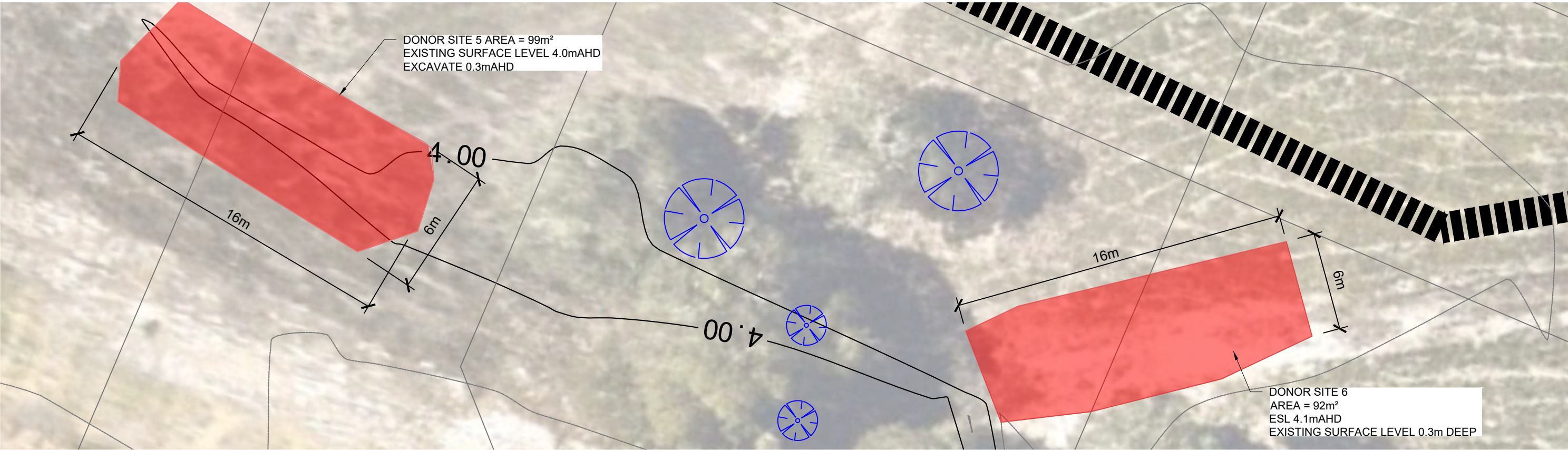


#### LEGEND

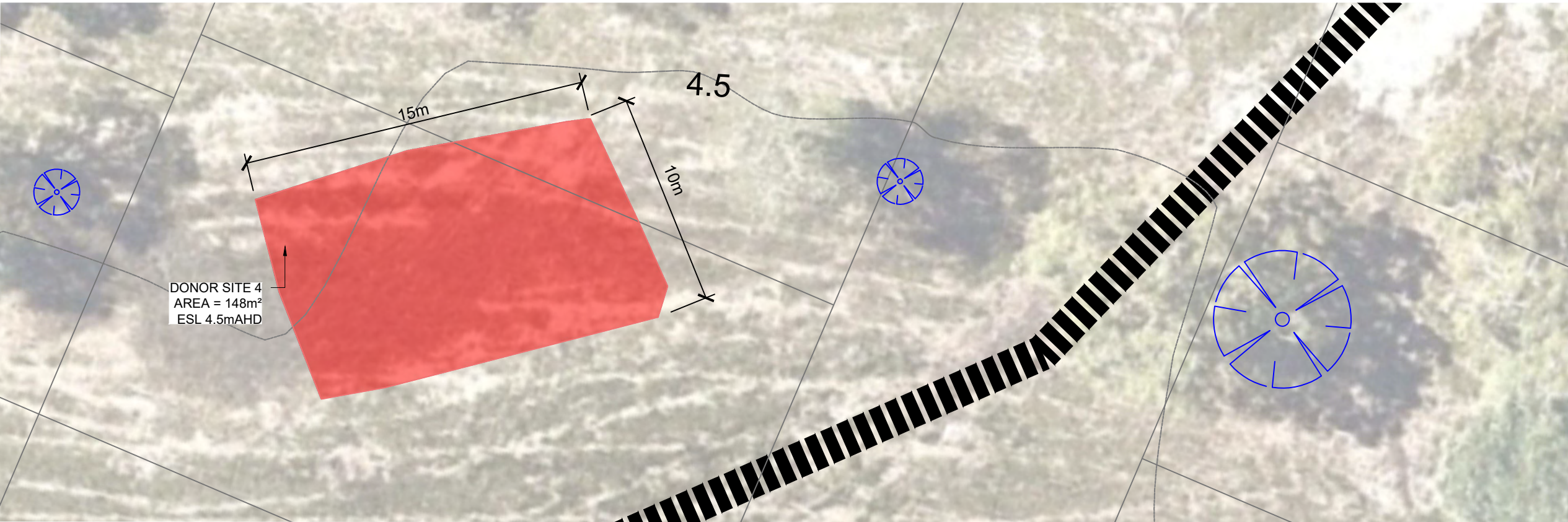
- TEMP ACCESS TRACK
- ⊗ EXISTING TREES TO BE RETAINED
- IMPACTED SEDGE VEGETATION  
TRANSLOCATE INTO WF BREEDING PONDS  
EXCAVATE AT DEPTH OF 300mm

FINAL EXTENT OF "LIVE SOIL" DONOR MATERIAL  
TO BE MARKET OUT BY PROJECT ECOLOGIST  
PRIOR TO EXCAVATION





01 SITE 5-6 - WF DONOR HABITAT FOR TRANSLOCATION  
11 SCALE 1:200



02 SITE 3 - WF DONOR HABITAT FOR TRANSLOCATION  
11 SCALE 1:200

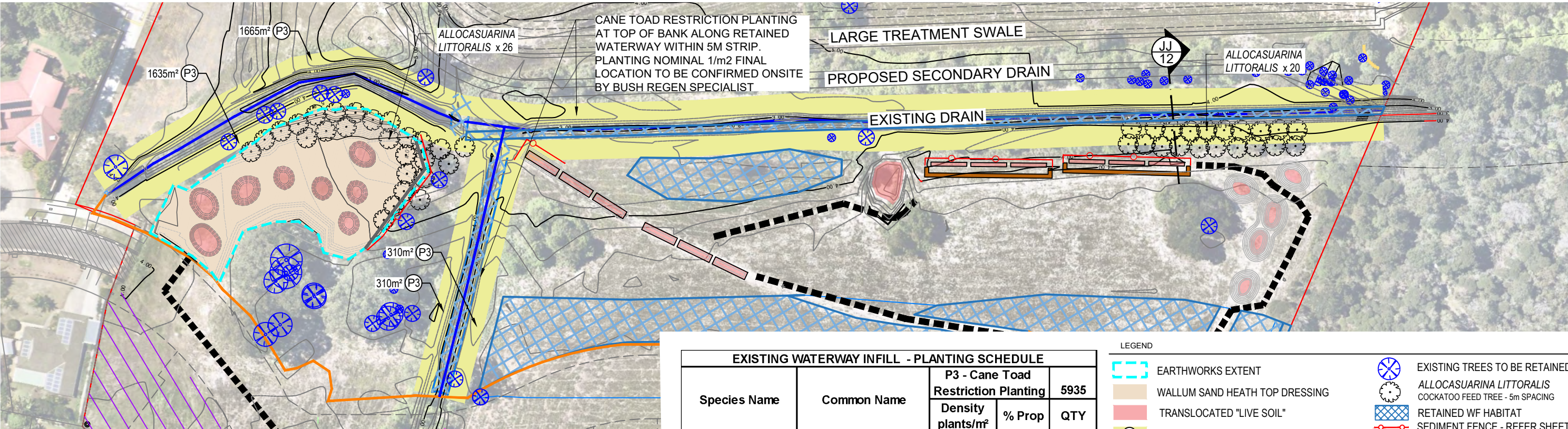
LEGEND

- TEMP ACCESS TRACK
- EXISTING TREES TO BE RETAINED
- IMPACTED SEDGE VEGETATION  
TRANSLOCATE "LIVE SOIL 300mm DEEP  
INTO WF BREEDING PONDS

FINAL EXTENT OF "LIVE SOIL" DONOR MATERIAL  
TO BE MARKET OUT BY PROJECT ECOLOGIST  
PRIOR TO EXCAVATION

REV.	ISSUE / AMENDMENTS	DATE
A	FOR DISCUSSION	16.02.22
B	FOR REVIEW	12.04.22
C	FOR APPROVAL	20.06.23
D	FOR APPROVAL	16.08.23
E	FOR APPROVAL	21.11.23



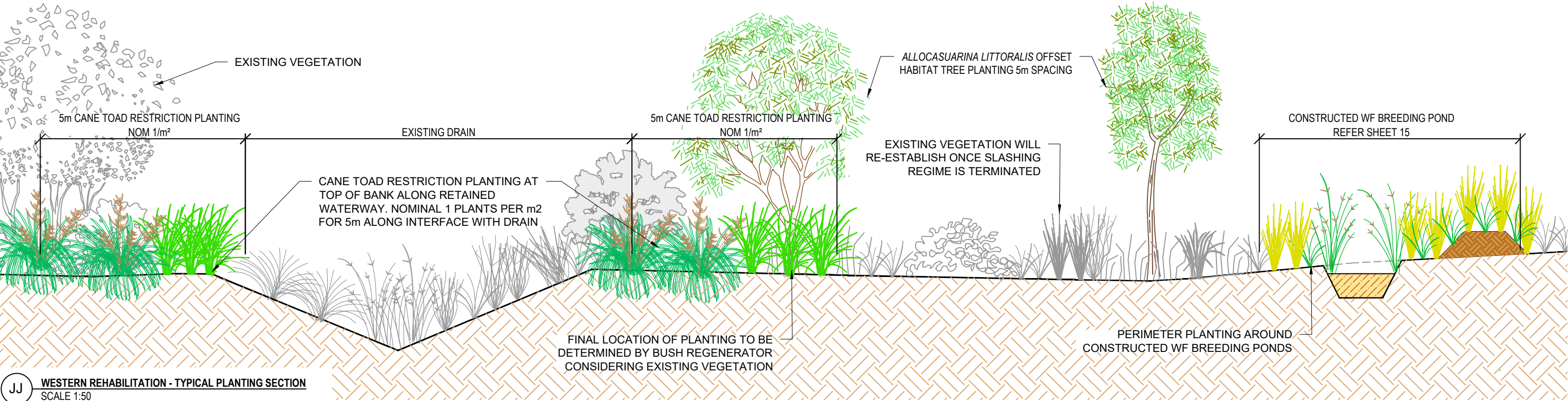


**WESTERN REHABILITATION - PLAN**  
SCALE 1:1000

EXISTING WATERWAY INFILL - PLANTING SCHEDULE				
Species Name	Common Name	P3 - Cane Toad Restriction Planting		5935
		Density plants/m²	% Prop	
<i>Gahnia clarkei</i>	Saw-sedge	1	20%	1187
<i>Gahnia sieberiana</i>	Red-fruit Saw Sedge	1	20%	1187
<i>Imperata cylindrica</i>	Blady grass	1	20%	1187
<i>Lomandra longifolia</i>	Spiny-headed mat-rush	1	20%	1187
<i>Lomandra hystrix</i>	Green mat-rush	1	20%	1187
TOTAL			100%	5935
A nominal amount of 1/m² has been applied for this zone. To be infill planted within existing vegetation. Area calculated by length of waterway x 5m				

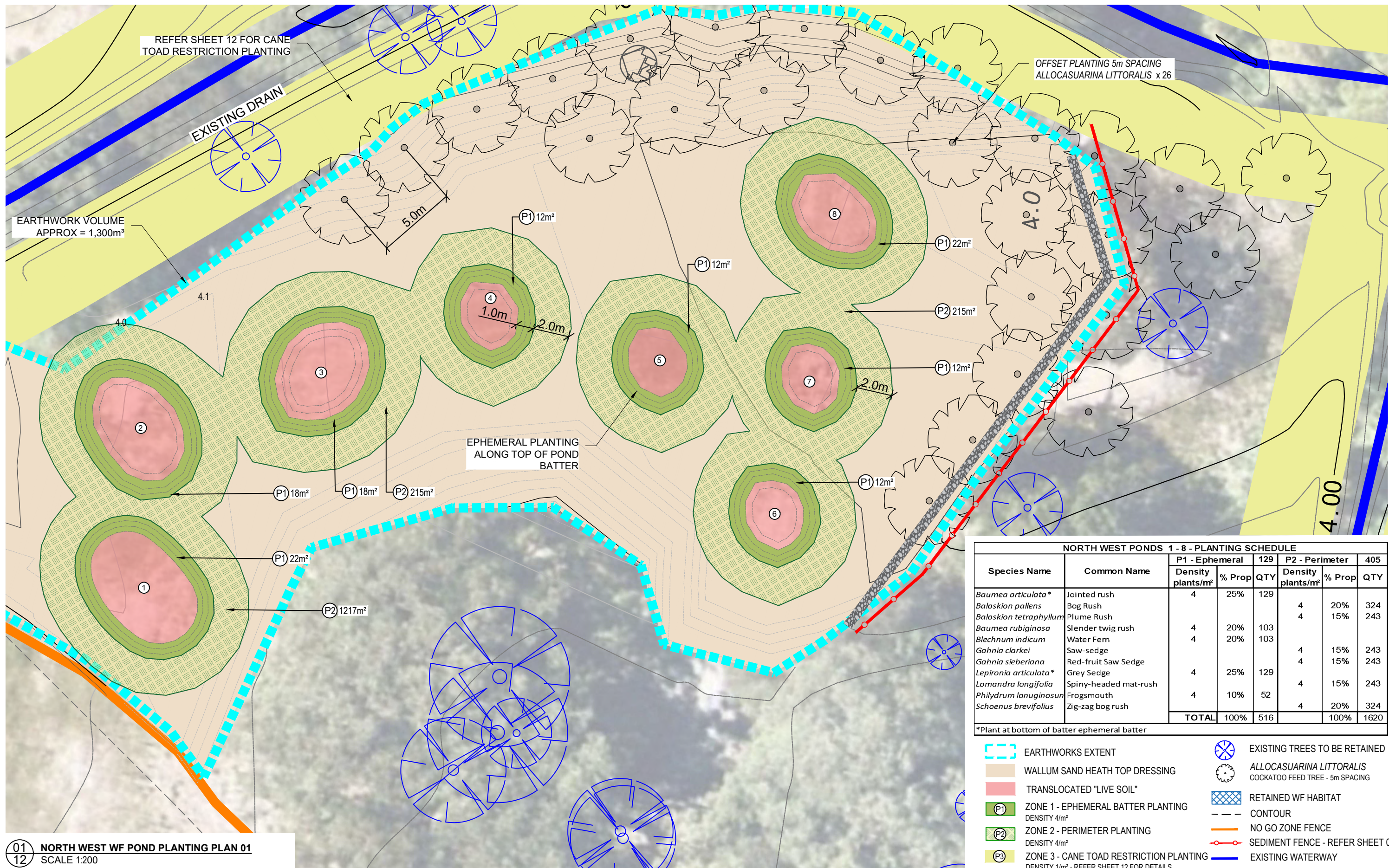
LEGEND	
	EARTHWORKS EXTENT
	WALLUM SAND HEATH TOP DRESSING
	TRANSLOCATED "LIVE SOIL"
	EXISTING TREES TO BE RETAINED
	ALLOCASUARINA LITTORALIS COCKATOO FEED TREE - 5m SPACING
	RETAINED WF HABITAT
	SEDIMENT FENCE - REFER SHEET 08
	NO GO ZONE FENCE
	ZONE 3 - CANE TOAD RESTRICTION PLANTING REFER SHEET 12 FOR DETAILS

WESTERN REHAB - HABITAT TREES OFFSET PLANTING			
Scientific name	Common name	Spacing	Total Qty
<i>Allocasuarina littoralis</i>	She Oak	5m	46
Plant size - Tube stock between 300-500mm tall (Forestry Tube Stock)			46
Install tree guards on all trees planted to protect from wallabies			



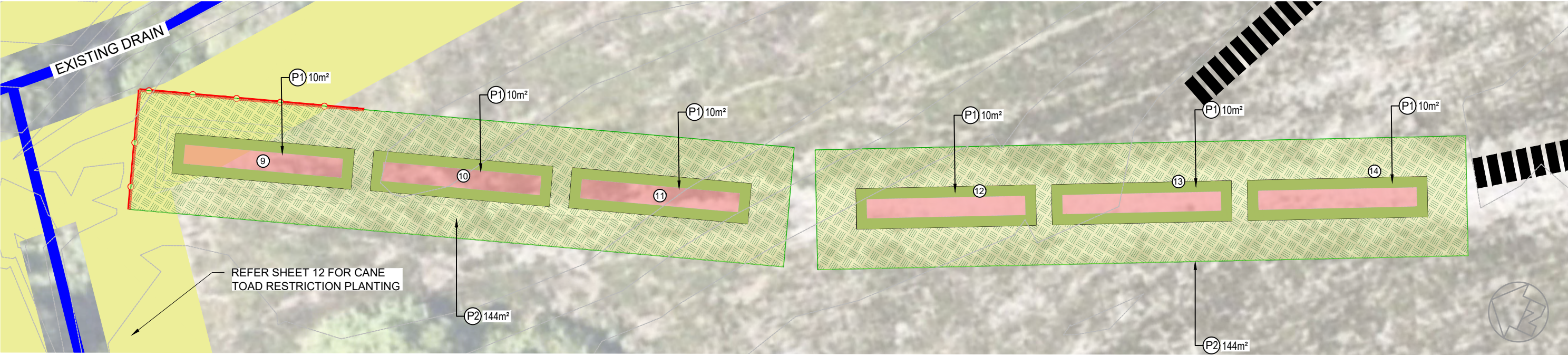
**WESTERN REHABILITATION - TYPICAL PLANTING SECTION**  
SCALE 1:50



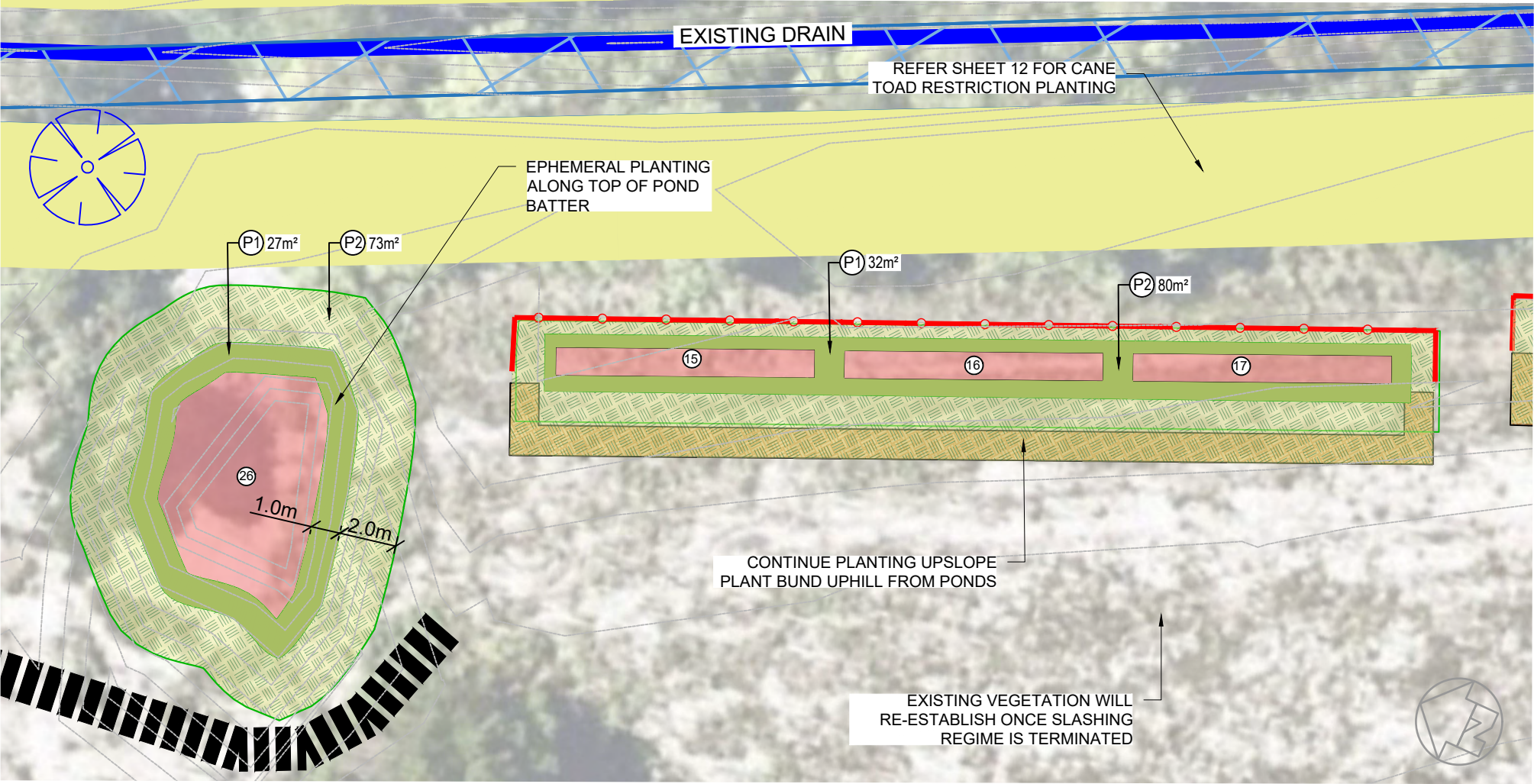


01 NORTH WEST WF POND PLANTING PLAN 01  
12 SCALE 1:200





01 SOUTH WEST WF POND PLANTING PLAN 01  
14 SCALE 1:200



02 SOUTH WEST WF POND PLANTING PLAN 01  
14 SCALE 1:200

LEGEND

EARTHWORKS EXTENT

WALLUM SAND HEATH TOP DRESSING

TRANSLOCATED "LIVE SOIL"

ZONE 1 - EPHEMERAL PLANTING  
DENSITY 4/m²

ZONE 2 - PERIMETER PLANTING  
DENSITY 4/m²

ZONE 3 - CANE TOAD RESTRICTION PLANTING  
REFER SHEET 12 FOR DETAILS

EXISTING TREES TO BE RETAINED

RETAINED WF HABITAT

CONTOUR

NO GO ZONE FENCE

SEDIMENT FENCE - REFER SHEET 08

EXISTING WATERWAY

SOUTH WEST PONDS 9 - 25 - PLANTING SCHEDULE							
Species Name	Common Name	P1 - Ephemeral Batter		368	P2 - Perimeter		731
		Density plants/m²	% Prop		Density plants/m²	% Prop	
Baumea articulata*	Jointed rush	4	25%	368			
Baloskion pallens	Bog Rush				4	20%	585
Baloskion tetraphyllum	Plume Rush				4	15%	439
Baumea rubiginosa	Slender twig rush	4	20%	294			
Blechnum indicum	Water Fern	4	20%	294			
Gahnia clarkei	Saw-sedge				4	15%	439
Gahnia sieberiana	Red-fruit Saw Sedge				4	15%	439
Lepironia articulata*	Grey Sedge	4	25%	368			
Lomandra longifolia	Spiny-headed mat-rush				4	15%	439
Philydrum lanuginosum	Frogsmouth	4	10%	147			
Schoenus brevifolius	Zig-zag bog rush				4	20%	585
TOTAL		100%		1472	100%		2924

\*Plant at bottom of batter ephemeral batter

AWC

Australian Wetlands Consulting Pty Ltd

25 LESLIE ST, BANGALOW NSW 2479

P (02) 6687 1550 | 1300 998 514

www.awconsult.com.au

CLIENT: 

CLARENCE PROPERTY

PARTNER: 

CivilTech Consulting Engineers

DRAWING: SOUTH WEST WF POND PLANTING PLAN 01 - 02

PROJECT: WALLUM ESTATE EARLY ECO WORKS PACKAGE

REV.	ISSUE / AMENDMENTS	DATE
A	FOR DISCUSSION	16.02.22
B	FOR REVIEW	12.04.22
C	FOR APPROVAL	20.06.23
D	FOR APPROVAL	16.08.23
E	FOR APPROVAL	21.11.23

ENG CERT

Wade Fletcher

Wade Fletcher

CivilTech Consulting Engineers

Chartered Professional Engineer

EA ID: 2954545

ADDRESS

LOT 13  
DP 1251383,  
TORAKINA DR  
BRUNSWICK  
HEADS

SCALE 1:200 @ A3

DESIGNED IC/SS

DRAWN SS/TC

CHECKED DMC

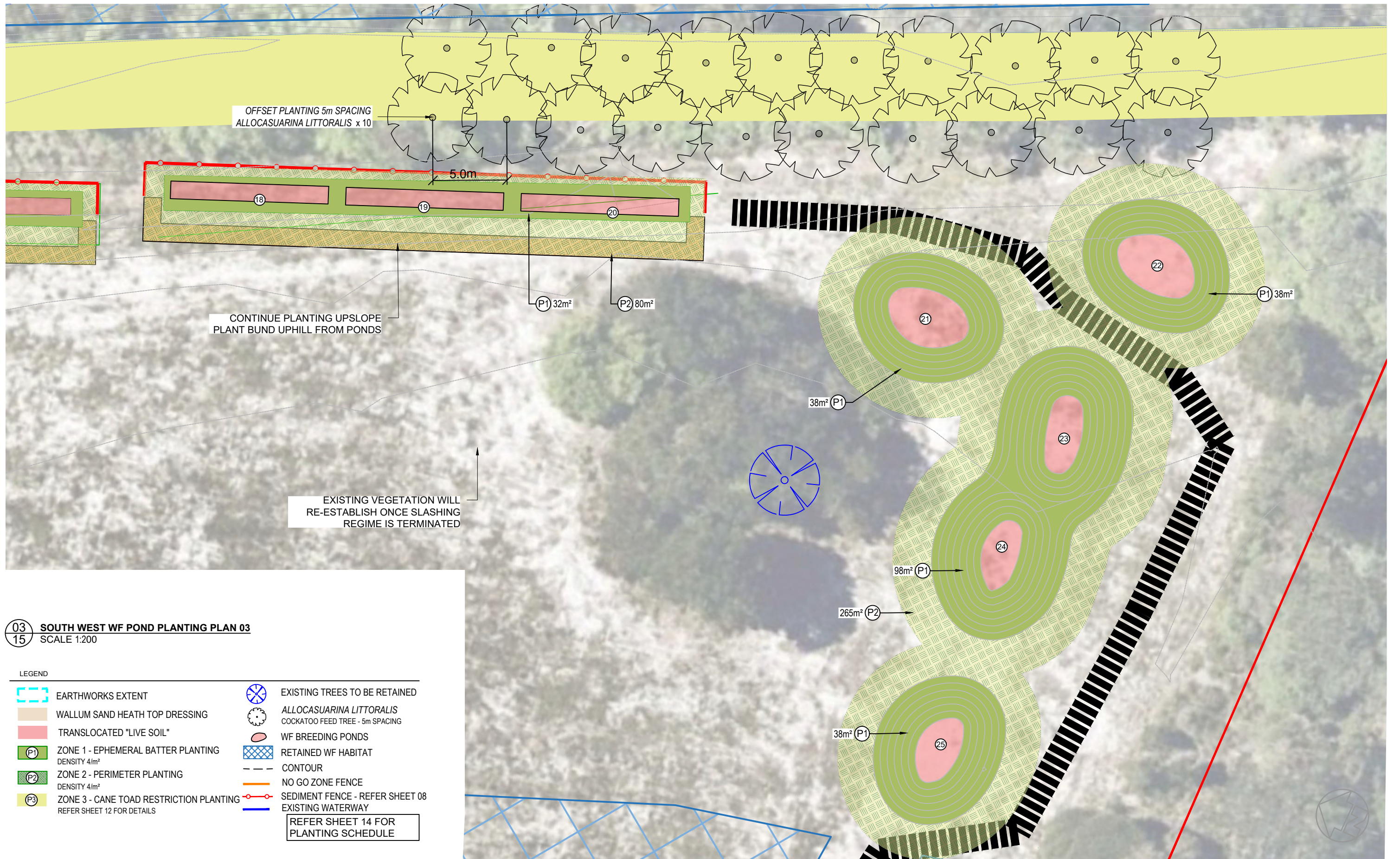
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1-211400\_EW\_14

REV.

E





03 SOUTH WEST WF POND PLANTING PLAN 03  
15 SCALE 1:200

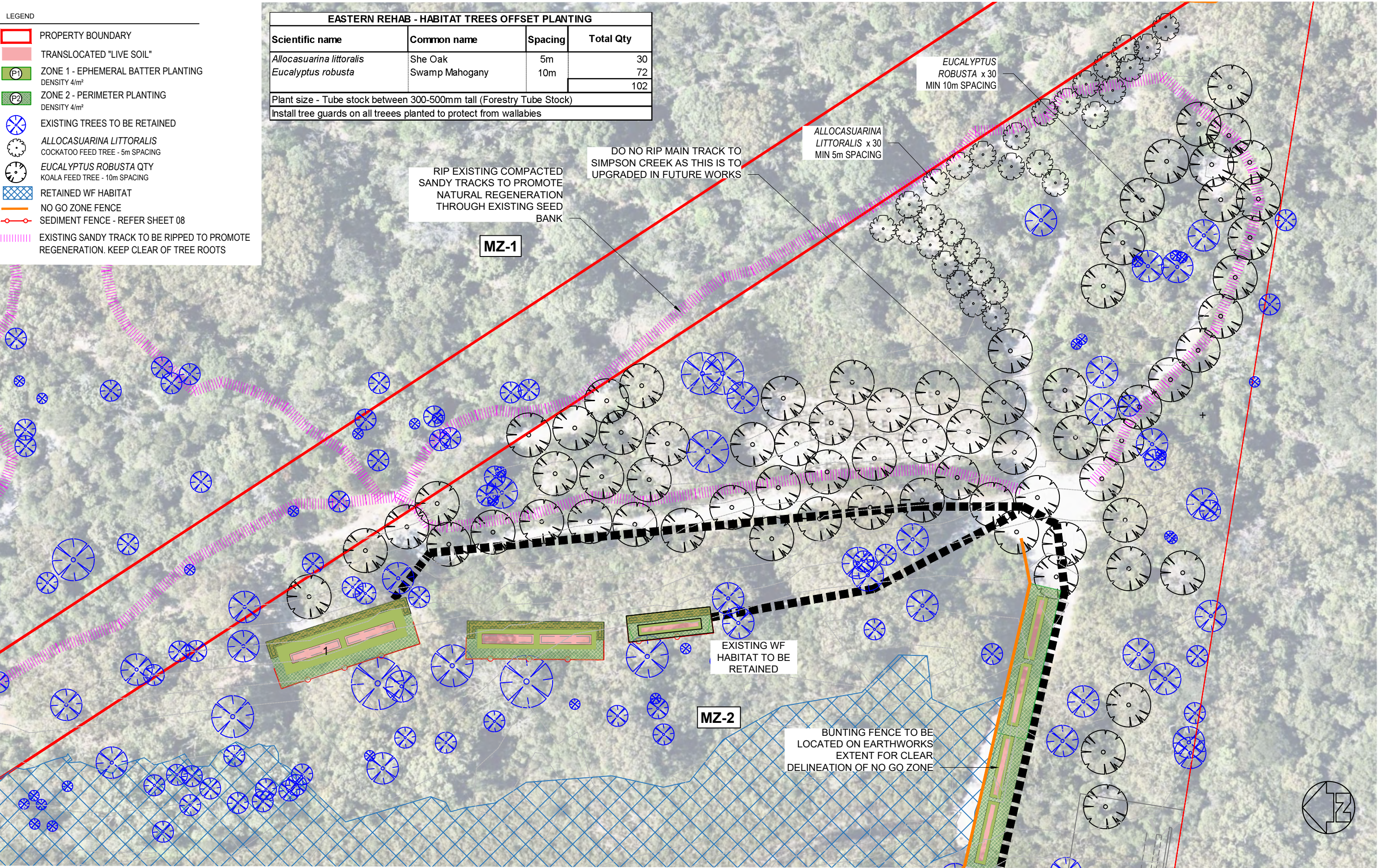
- LEGEND
- EARTHWORKS EXTENT
  - WALLUM SAND HEATH TOP DRESSING
  - TRANSLOCATED "LIVE SOIL"
  - ZONE 1 - EPHEMERAL BATTER PLANTING DENSITY 4/m<sup>2</sup>
  - ZONE 2 - PERIMETER PLANTING DENSITY 4/m<sup>2</sup>
  - ZONE 3 - CANE TOAD RESTRICTION PLANTING REFER SHEET 12 FOR DETAILS
  - EXISTING TREES TO BE RETAINED
  - ALLOCASUARINA LITTORALIS COCKATOO FEED TREE - 5m SPACING
  - WF BREEDING PONDS
  - RETAINED WF HABITAT
  - CONTOUR
  - NO GO ZONE FENCE
  - SEDIMENT FENCE - REFER SHEET 08
  - EXISTING WATERWAY
  - REFER SHEET 14 FOR PLANTING SCHEDULE



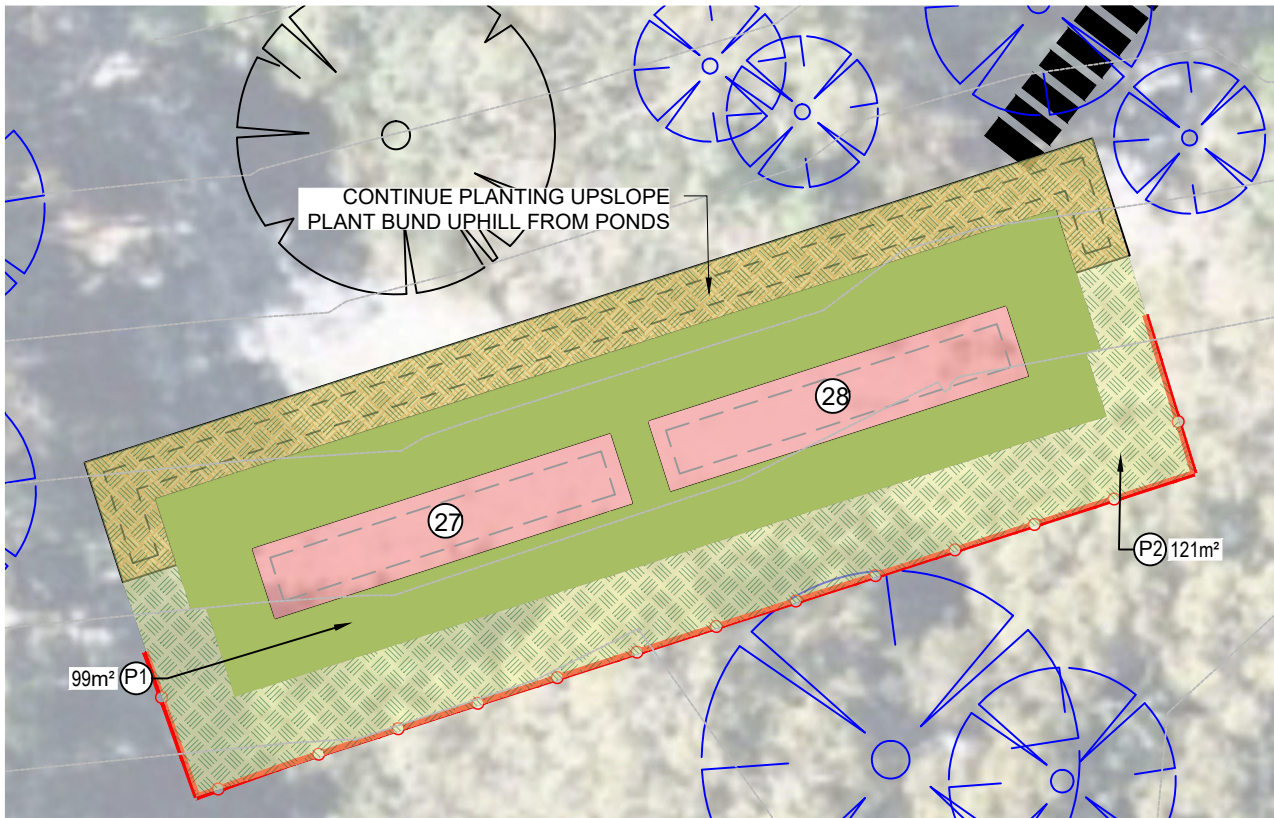
LEGEND

- PROPERTY BOUNDARY
- TRANSLOCATED "LIVE SOIL"
- ZONE 1 - EPHEMERAL BATTER PLANTING  
DENSITY 4/m²
- ZONE 2 - PERIMETER PLANTING  
DENSITY 4/m²
- EXISTING TREES TO BE RETAINED
- ALLOCASUARINA LITTORALIS  
COCKATOO FEED TREE - 5m SPACING
- EUCALYPTUS ROBUSTA QTY  
KOALA FEED TREE - 10m SPACING
- RETAINED WF HABITAT
- NO GO ZONE FENCE
- SEDIMENT FENCE - REFER SHEET 08
- EXISTING SANDY TRACK TO BE RIPPED TO PROMOTE  
REGENERATION. KEEP CLEAR OF TREE ROOTS

EASTERN REHAB - HABITAT TREES OFFSET PLANTING			
Scientific name	Common name	Spacing	Total Qty
<i>Allocasuarina littoralis</i>	She Oak	5m	30
<i>Eucalyptus robusta</i>	Swamp Mahogany	10m	72
			102
Plant size - Tube stock between 300-500mm tall (Forestry Tube Stock)			
Install tree guards on all trees planted to protect from wallabies			





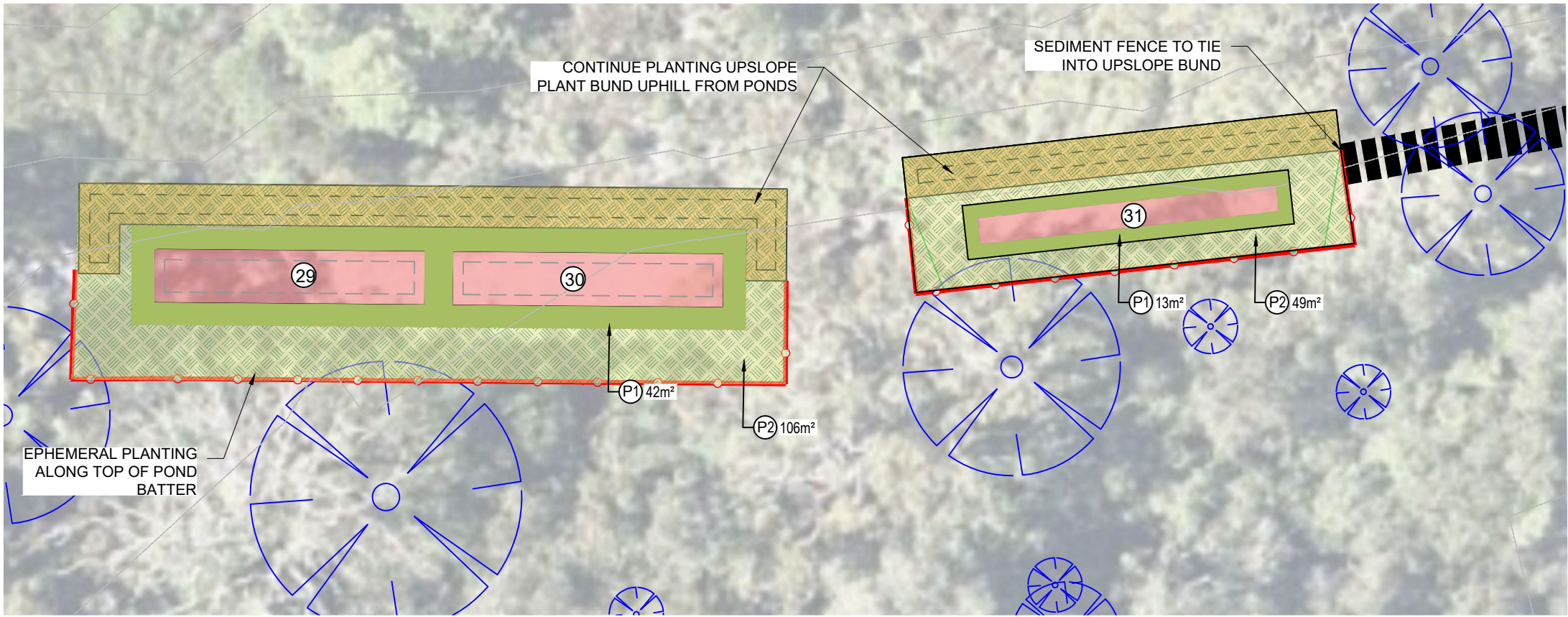


01  
17  
EASTERN CONSTRUCTED WF BREEDING PONDS  
SCALE 1:200

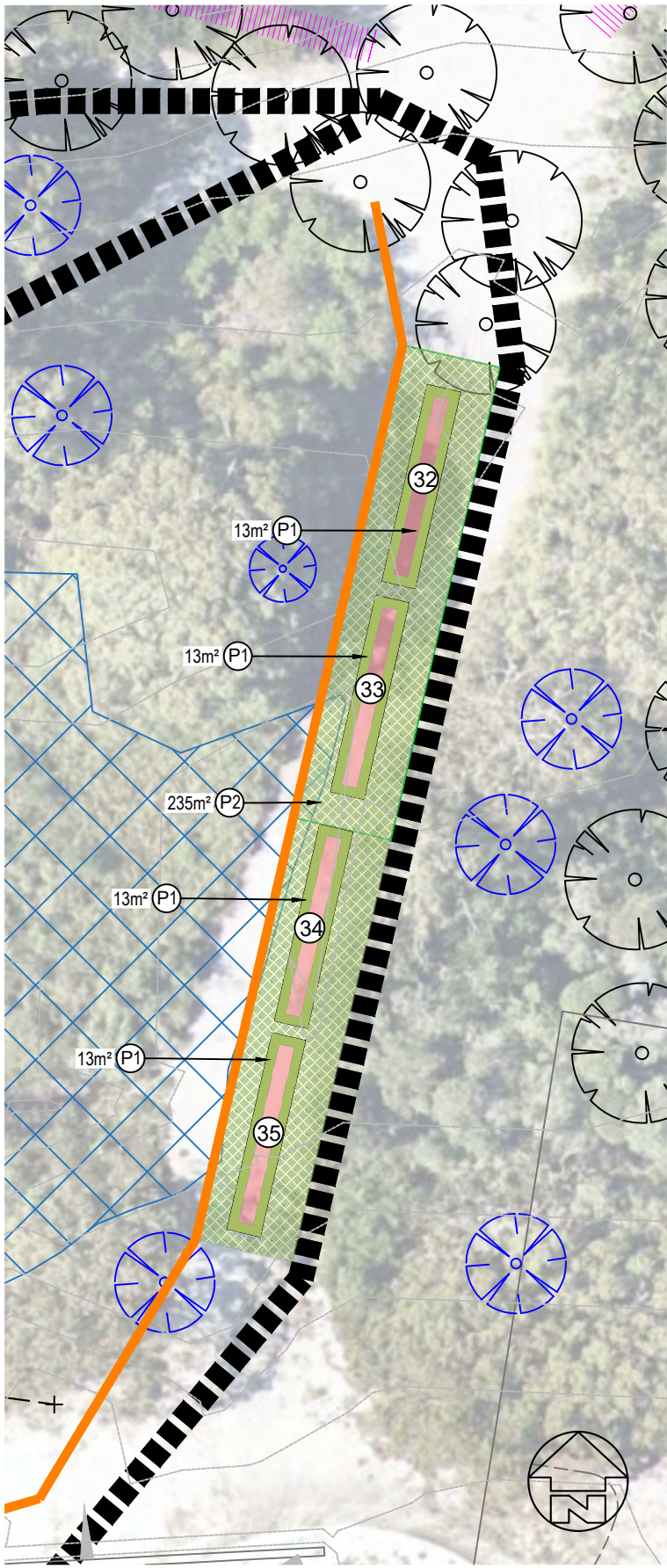
EASTERN PONDS 1 - 12 - PLANTING SCHEDULE							
Species Name	Common Name	P1 - Ephemeral Batter			P2 - Perimeter		
		Density plants/m²	% Prop	QTY	Density plants/m²	% Prop	QTY
<i>Baumea articulata</i> *	Jointed rush	4	25%	368	4	20%	585
<i>Balaskion pallens</i>	Bog Rush				4	15%	439
<i>Balaskion tetraphyllum</i>	Plume Rush						
<i>Baumea rubiginosa</i>	Slender twig rush	4	20%	294			
<i>Blechnum indicum</i>	Water Fern	4	20%	294			
<i>Gahnia clarkei</i>	Saw-sedge				4	15%	439
<i>Gahnia sieberiana</i>	Red-fruit Saw Sedge				4	15%	439
<i>Lepironia articulata</i> *	Grey Sedge	4	25%	368			
<i>Lomandra longifolia</i>	Spiny-headed mat-rush				4	15%	439
<i>Philydrium lanuginosum</i>	Frogsmouth	4	10%	147			
<i>Schoenus brevifolius</i>	Zig-zag bog rush				4	20%	585
TOTAL			100%	1472		100%	2924

\*Plant at bottom of batter ephemeral batter

LEGEND	
	TRANSLOCATED "LIVE SOIL"
	ZONE 1 - EPHEMERAL BATTER PLANTING DENSITY 4/m²
	ZONE 2 - PERIMETER PLANTING DENSITY 4/m²
	EXISTING TREES TO BE RETAINED
	ALLOCASUARINA LITTORALIS COCKATOO FEED TREE - 5m SPACING
	EUCALYPTUS ROBUSTA QTY KOALA FEED TREE - 10m SPACING
	RETAINED WF HABITAT
	NO GO ZONE FENCE
	SEDIMENT FENCE - REFER SHEET 08
	TEMPORARY ACCESS TRACK



02  
17  
EASTERN CONSTRUCTED WF BREEDING PONDS  
SCALE 1:200



03  
17  
EASTERN CONSTRUCTED WF BREEDING PONDS  
SCALE 1:400



EARTHWORKS

- REFER TO AWC\_1\_211400\_EW\_01-07 FOR EARTHWORKS DOCUMENTATION.
- THE EXTENT OF THE WORKS ARE SUSCEPTIBLE TO FINISHED CONSTRUCTION TOLERANCES. AS SUCH, A TOLERANCE OF +/-50MM APPLIES.

STOCKPILES

- THE POSITION OF ANY STOCKPILES MUST BE APPROVED BY THE SITE SUPERINTENDENT.
- ADEQUATE PROTECTION FOR PILED MATERIAL MUST BE SUPPLIED TO PREVENT WIND AND WATER EROSION.
- NOTHING MAY BE REMOVED FROM THE STOCKPILE EXCEPT NOXIOUS WEEDS THAT MAY GERMINATE DURING THE STORAGE PERIOD.
- ALL STOCKPILES SHALL BE ENCLOSED WITHIN A SEDIMENT FENCE.

NATURAL REGENERATION TECHNIQUE

TRANSLOCATED SLABS & 'LIVE' TOPSOIL SOURCED FROM IMPACTED WF HABITAT.

IT IS ANTICIPATED THAT SEED AND RHIZOME BANK WITHIN THE "LIVE" TOPSOIL AND TRANSLOCATED SLABS WILL STRIKE AND NATURALLY REGENERATE THE CREATED HABITAT.

INDICATIVE STOCKPILE LOCATIONS ARE IDENTIFIED ON SHEET AWC\_1\_211400\_EW\_01

WEED CONTROL

- WEEDS ARE LIMITED ON SITE. CONTRACTORS MUST BE CAREFUL NOT TO IMPORT WEEDS VIA INTRODUCED PLANT STOCK OR MACHINERY ETC.
- WHISKEY GRASS IS THE DOMINANT WEED SPECIES ON SITE, FOUND IN BOTH MZ1 AND MZ2.
- ONLY CONTRACTORS THAT ARE EXPERIENCED AND TRAINED IN PLANT IDENTIFICATION AND WEED REMOVAL TECHNIQUES SHALL BE EMPLOYED TO REMOVE VEGETATION AND WEEDS.

PLANTING EXTENTS

PERIMETER PLANTING IS TO BE IMPLEMENTED AROUND ALL CONSTRUCTED FROG PONDS. REFER SHEET OFFSET TREES ARE TO BE INSTALLED ARE PER SHEET AWC\_1\_211400\_EW\_12 & 16

PLANT ESTABLISHMENT

IF NATURAL REGENERATION IS POOR AND THE OVERALL PLANT COMMUNITY HEALTH IS LOW WITHIN THE CREATED WF BREEDING PONDS, PONDS MUST BE PLANTED.

IN THIS SCENARIO AN AUDIT WILL BE UNDERTAKEN OF ALL PONDS AND GUIDANCE FROM AWC WILL BE PROVIDED IN REGARDS TO PLANTING AREAS, DENSITIES AND SCHEDULE.

PRE-ORDERING

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ALL PLANT MATERIAL IS AVAILABLE TO SIZE AND SPECIES TYPE NOMINATED IN THE PLANT SCHEDULES.

FOR SPECIES IN LARGE QUANTITIES THIS WILL REQUIRE THE PRE ORDERING AND GROWING ON OF SPECIES

BY A SELECTED NURSERY. PROPOSED PRE ORDER PLANTS ARE TO BE SOURCED AND APPROVED IN CONSULTATION WITH THE DESIGNER. CONFIRM ANY CHANGES WITH THE DESIGNERS AND DOCUMENT THE CHANGE IN THE AS-CONSTRUCTED DRAWINGS. PLANT AVAILABILITY SHOULD BE DISCUSSED AT THE SITE INCEPTION MEETING. NO SUBSTITUTION OF PLANT SPECIES SHOULD BE MADE WITHOUT WRITTEN APPROVAL FROM THE DESIGNER OR AN ECOLOGIST.

PLANT STOCK

PLANT SPECIES REFER TO AWC\_1\_211400\_EW\_12-17

DAMAGED OR FAILED PLANTS MUST BE REPLACED WITH PLANTS OF THE SAME TYPE AND SIZE.

PLANTS

GENERAL: PROVIDE LOCAL PROVENANCE PLANTS WHERE AVAILABLE WITH LARGE HEALTHY ROOT SYSTEMS, NO EVIDENCE OF ROOT CURL, RESTRICTION OR DAMAGE. PLANTS SHOULD BE VIGOROUS, WELL ESTABLISHED, FREE FROM PEST AND DISEASE AND OF A FORM CONSISTENT WITH THE SPECIES OR VARIETY.

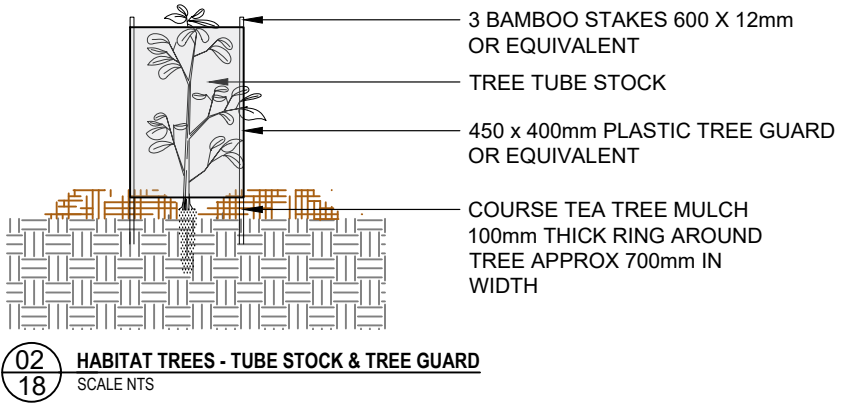
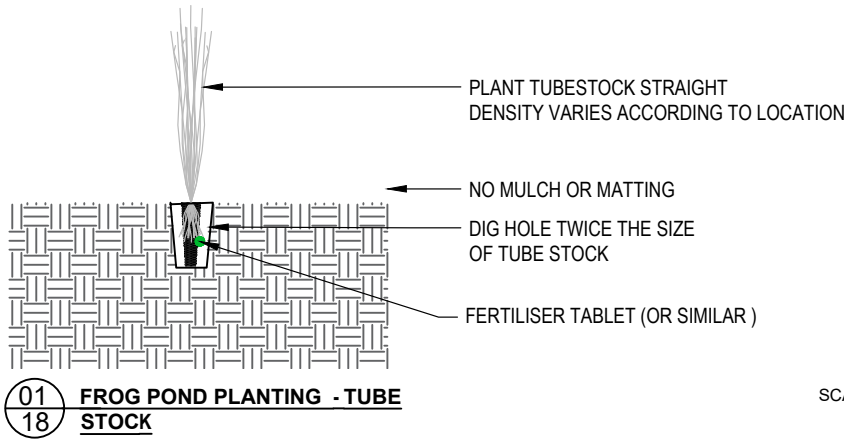
- PLANT STOCK SHOULD BE HARDENED OFF IN A NURSERY WITH CLIMATE SIMILAR TO THE SUBJECT SITE.
- PLANTS SHOULD BE AN AVERAGE 300-500MM HIGH INCLUDING POT AND NOT LESS THAN 200MM IN HEIGHT
- PLANT STOCK TO BE IN "TUBE STOCK" OR SIMILAR
- REPLACEMENT: REPLACE DAMAGED OR FAILED PLANTS WITH PLANTS OF THE SAME TYPES AND SIZE.

PLANTING TIMING

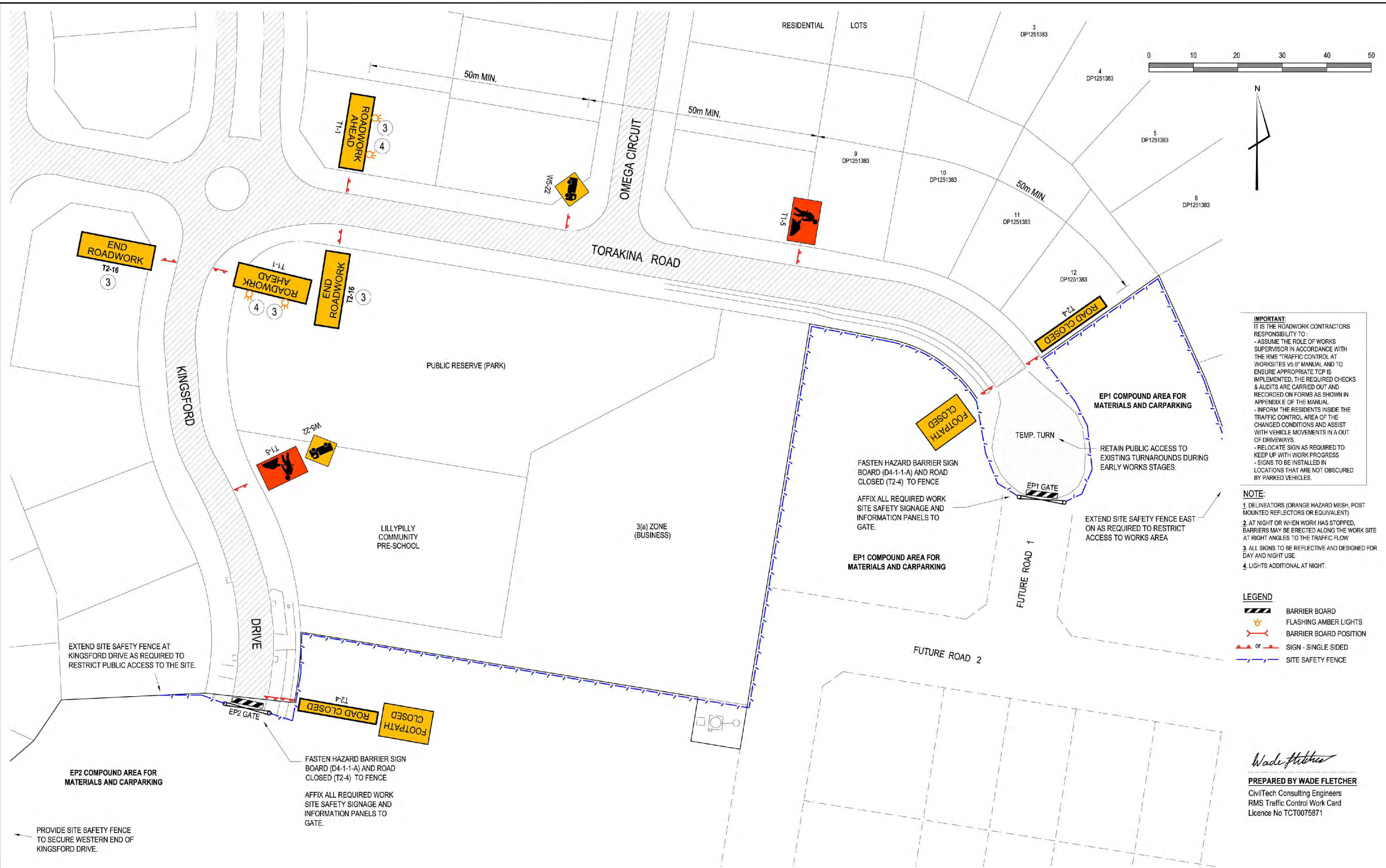
DO NOT PLANT IN UNSUITABLE WEATHER CONDITIONS SUCH AS EXTREME HEAT, COLD, WIND OR RAIN. IN OTHER THAN SANDY SOILS, SUSPEND EXCAVATION WHEN THE SOIL IS WET.

PLANTING TECHNIQUE

PLANT HOLES SHOULD BE TWICE THE SIZE OF THE TUBE STOCK. PLANTS SHOULD BE CAREFULLY REMOVED FROM THE TUBE TO ENSURE THEIR STEMS ARE NOT BROKEN FROM THE ROOT BALL. THE TOP OF THE ROOT BALL SHOULD BE SLIGHTLY LOWER THAN THE SURFACE LEVEL AFTER TOPSOIL HAS BEEN FIRMLY PLACED IN THE PLANTING HOLE AND AROUND THE PLANT. WATER CRYSTALS AND FERTILISER MAY BE USED TO ASSIST WITH ESTABLISHMENT; HOWEVER FERTILISER SHOULD NOT BE NECESSARY IN AMELIORATED SOILS.







**IMPORTANT:**  
IT IS THE ROADWORK CONTRACTORS RESPONSIBILITY TO :  
- ASSUME THE ROLE OF WORKS SUPERVISOR IN ACCORDANCE WITH THE RMS "TRAFFIC CONTROL AT WORKSITES V5.0" MANUAL AND TO ENSURE APPROPRIATE TCP IS IMPLEMENTED, THE REQUIRED CHECKS & AUDITS ARE CARRIED OUT AND RECORDED ON FORMS AS SHOWN IN APPENDIX E OF THE MANUAL.  
- INFORM THE RESIDENTS INSIDE THE TRAFFIC CONTROL AREA OF THE CHANGED CONDITIONS AND ASSIST WITH VEHICLE MOVEMENTS IN A OUT OF DRIVEWAYS.  
- RELOCATE SIGN AS REQUIRED TO KEEP UP WITH WORK PROGRESS  
- SIGNS TO BE INSTALLED IN LOCATIONS THAT ARE NOT OBSCURED BY PARKED VEHICLES.

**NOTE:**  
1. DELINEATORS (ORANGE HAZARD MESH, POST MOUNTED REFLECTORS OR EQUIVALENT)  
2. AT NIGHT OR WHEN WORK HAS STOPPED, BARRIERS MAY BE ERECTED TO RESTRICT ACCESS TO THE WORK SITE AT RIGHT ANGLES TO THE TRAFFIC FLOW  
3. ALL SIGNS TO BE REFLECTIVE AND DESIGNED FOR DAY AND NIGHT USE.  
4. LIGHTS ADDITIONAL AT NIGHT.

**LEGEND**  
[Symbol] BARRIER BOARD  
[Symbol] FLASHING AMBER LIGHTS  
[Symbol] BARRIER BOARD POSITION  
[Symbol] SIGN - SINGLE SIDED  
[Symbol] SITE SAFETY FENCE

*Wade Fletcher*  
**PREPARED BY WADE FLETCHER**  
CivilTech Consulting Engineers  
RMS Traffic Control Work Card  
Licence No TCT0075871

REV.	ISSUE / AMENDMENTS	DATE
A	FOR DISCUSSION	16.02.22
B	FOR REVIEW	12.04.22
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SCALE
DESIGNED IC/SS
DRAWN SS/TC
CHECKED DMC

REV.
E
CAD FILE No. <b>1-211400_EW.DWG</b>
DWG No. <b>1-211400_EW_19</b>



DA 10.2021.575.1 CONDITIONS

3. Vegetation Removal

This development consent does not authorise any native tree to be ringbarked, cut down, lopped, removed, or damaged, or caused to be ringbarked, cut down, lopped, removed or damaged beyond those in the area identified as “extent of works” on the Vegetation Management Plan (VMP). No native trees or vegetation may be cleared or removed until a Subdivision Certificate has been issued relevant to those trees and vegetation.

4. Discovery of Aboriginal Relics

Upon discovery of any Aboriginal relics within the meaning of the National Parks and Wildlife Act 1974, the developer shall immediately notify the NSW Department of Planning Industry and Environment (DPIE), Tweed Byron Local Aboriginal Land Council and the Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) and must immediately cease works within the vicinity until such time as the necessary permits have been obtained from DPIE to continue the work. The developer must comply with any further request made by DPIE to cease work for the purposes of archaeological assessment AND recording.

5. Integrated Approvals from other State Government Approval Bodies

This development consent includes an Integrated development approval under Sections 4.46 and 4.47 of the Environmental Planning and Assessment Act 1979, an authorisation under section 100B of the Rural Fires Act 1997 in respect of bush fire safety for subdivision for the purpose of creating residential land, and is subject to the General Terms of Approval from the RFS dated 23 December 2021 contained in **Schedule 1** of this Notice of Determination.

THE FOLLOWING CONDITIONS MUST BE COMPLIED WITH PRIOR TO COMMENCEMENT OF SUBDIVISION WORKS

The following conditions apply to all stages.

47. Prestart Meeting - ecological restoration works

The Environmental Manager must arrange a prestart site meeting with Council Ecologist/ Environmental Health Officer prior to commencement of any ecological restoration works.

*Advisory note:* A minimum 2 weeks' notice must be given to Council prior to the meeting.

48. CEMP - Reporting and Review

An independent environmental audit of CEMP implementation is to be undertaken by a suitably qualified person/s and submitted to Council for approval prior to the commencement of each Stage of the development. Any non-compliance/s are to be documented along with contingency measures undertaken with suggested alterations to future stages and the CEMP updated accordingly.

The review of compliance with the CEMP should include but not be limited to:

- a. Surface water quality monitoring and impacts;
- b. Adequacy of erosion and sediment control measures;
- c. Groundwater level and quality;
- d. Acid frog monitoring and habitat health;
- e. Threatened species monitoring and health;
- f. Vegetation rehabilitation and management progress;
- g. Mosquito management;
- h. Dust control;
- i. Noise and vibration management;
- j. Acid sulfate soil management; and
- k. Contaminated land management.

49. Trees to be retained and fenced

Trees to be retained are to be protected by a fence so as to minimise disturbance to existing ground conditions within the dripline of the trees. The fence is to be constructed:

- a. with a minimum height of 1.2 metres,
- b. outside the dripline of the tree,
- c. of steel star pickets at a maximum distance of 2 metres between pickets,
- d. using a minimum of 3 strands of steel wire,
- e. to enclose the tree, and
- f. with orange barrier mesh, or similar, attached to the outside of the fence and continuing around its perimeter

The fence is to be maintained for the duration of the site clearing, preparation and construction works.

50. Signs to be erected on building and demolition sites

A sign must be erected in a prominent position on the work site:

- a. stating that unauthorised entry to the work site is prohibited, and
- b. showing the name of the person in charge of the work site and a telephone number at which that person may be contacted outside working hours.

Any such sign is to be removed when the work has been completed.

51. Copies of Approved Plans

Copies of approved plans required by conditions of this consent including ASSMP, BPoM CEMP, SMP, SWGMP, UFP, VMP, and WFMP must be keep in a prominent location on site where they can be easily accessed by construction and operational personnel.

52. Approved Environmental Plans must be implemented

All controls and measures must be maintained in accordance with approved plans and reports. The Environmental Manager nominated by the applicant is required to ensure that the construction management and all construction staff are made aware of their responsibility to abide by the plans approved under this consent.

53. Acid Sulfate Soils

Acid sulfate soil controls, and management measures are to be in place in accordance with the approved Management Plans. All treatment and storage facilities be in place prior the commencement of any subdivision works.

54. Dewatering of Excavations

Dewatering of excavations must be conducted in accordance with the approved dewatering management plan. Only clean and unpolluted water is to be discharged to Council's stormwater drainage system or any watercourse to ensure compliance with the Protection of Environment Operations Act.

55. Subdivision Work

Subdivision work in accordance with the development consent must not be commenced until a Subdivision Works Certificate has been issued, a principal certifying authority has been appointed and at least 2 days' written notice for the intention to commence works has been made, in accordance with the requirements of the Environmental Planning and Assessment Act and Regulations. The written notice for the intention to commence works must also include names and contact details of the certifying engineer and principal contractor.

**Note.** Subdivision work means any physical activity authorised to be carried out under the conditions of this development consent for the subdivision of land, including earthwork, road work, stormwater drainage work, landscaping work, tree/vegetation removal, erosion and sediment control, traffic control, etc.

56. Public Liability Insurance

The developer and/or contractor must produce evidence to the Principal Certifying Authority of public liability insurance cover for a minimum of \$20 million. Council is to be nominated as an interested party on the policy.

57. Erosion and sediment measures

Erosion and sedimentation controls are to be in place in accordance with the approved Erosion and Sediment Control Plan.

No soil or fill material is to be placed within the dripline of a tree so as to cause changes in surface level by more than 50mm from the existing level and such soil is not to be compacted. Such soil fill must not be finer than that being covered in situ, e.g. clay must not be placed over loam soil.

**Note:** Council may impose on-the-spot fines for non-compliance with this condition.

58. Metered Stand Pipe required

Prior to the commencement of any civil works requiring water from Council water main, a metered Stand Pipe for temporary water supply must be supplied and installed by Council. Contact Council's Water and Recycling Department to arrange for this requirement on 02 6626 7000.

**Note:** Council may impose on-the-spot fines for non-compliance with this condition.

THE FOLLOWING CONDITIONS MUST BE COMPLIED WITH DURING CONSTRUCTION OF SUBDIVISION WORKS

THE CONTRACTOR IS TO READ THE DEVELOPMENT APPLICATION CONSENT DA10.2021.575 FOR A COMPLETE LIST OF CONDITIONS.



**AWC**  
Australian Wetlands Consulting Pty Ltd  
25 LESLIE ST, BANGALOW NSW 2479  
P (02) 6687 1550 | 1300 998 514  
www.awconsult.com.au

CLIENT:

**CLARENCE  
PROPERTY**

PARTNER

**CivilTech**  
Consulting Engineers

DRAWING:  
**DA 10.2021.575.1  
CONSTRUCTION CONDITIONS 01**

PROJECT:  
**WALLUM ESTATE  
EARLY ECO WORKS PACKAGE**

REV.	ISSUE / AMENDMENTS	DATE
A	FOR DISCUSSION	16.02.22
B	FOR REVIEW	12.04.22
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ENG CERT



Wade Fletcher  
CivilTech Consulting Engineers  
Chartered Professional Engineer  
EA ID: 2954545

ADDRESS

LOT 13  
DP 1251383,  
TORAKINA DR  
BRUNSWICK  
HEADS

SCALE

DESIGNED	IC/SS
DRAWN	SS/TC
CHECKED	DMC

CAD FILE No.  
**1-211400\_EW.DWG**

DWG No.  
**1-211400\_EW\_20**

REV.

**E**



DA 10.2021.575.1 CONDITIONS

THE FOLLOWING CONDITIONS MUST BE COMPLIED WITH DURING CONSTRUCTION OF SUBDIVISION WORKS

These conditions to apply to all stages of the development.

- 59. Protection of Native Trees**

All trees nominated to be retained by notation or condition as a requirement of the development consent shall be maintained and protected in accordance with AS 4970-2009 - Protection of Trees on Development Sites for the duration of the constriction works.
- 60. Care to be taken when placing services near trees**

To minimise root disturbance where services are to be laid in close proximity to trees, any excavation within the Tree Protection Zone (TPZ) for installation of underground services is to be done by directional drilling or in manually excavated trenches in accordance with Section 4.5.5 of AS4970-2009. Works must be conducted under the supervision of the project arborist (minimum AQF level 5 qualified arborist) and may include the use of pneumatic or hydraulic tools such as air knives.
- 61. Landscaping**

All landscaping on any part of the site must accord with the requirement to plant only appropriate local native species as marked on the stamped plans.
- 62. Protection of native fauna from disturbance**

a. Any clearing of native vegetation and/or earthworks ('works') as part of any development approval from Council must not commence until the area proposed for such works has been inspected for the presence of all fauna species using the site by a suitably qualified and experienced individual.

b. Works specified in (a) must be temporarily suspended within a range of 25m from any tree which is concurrently occupied by a koala and other native fauna and must not resume until the koala and other fauna has moved from the tree of its own volition.

c. Works must not commence until the area proposed for clearing has been inspected for the presence of koalas and other native fauna and approval given in writing by a suitably qualified individual.

d. Approval to proceed with the clearing of vegetation in accordance with this section is only valid for the day on which the inspection has been undertaken.

The individual referred to in (a and c) above, or a nominated representative, must remain on site during any approved clearing of vegetation.
- 63. Acid Sulfate Soils Management**

Acid sulfate soils must be managed and disposed of in accordance with the approved Construction Environmental Management Plan.
- 64. Unexpected Findings Protocol - Contamination & Remediation**

Construction works must be carried out in accordance with the approved Unexpected Findings Protocol (UFP).
- 65. Soil disturbance and excavation groundworks**

All soil disturbance and excavation groundworks must be carried out in accordance with the approved ASSMP, BPoM, CEMP, SMP, SWGMP, UFP, VMP, and WFMP
- 66. North South Drain Construction - Role of Environmental Manager**

The Environmental Manager must be on site at all times during excavation works for construction of the new north south drain. The approved CEMP must be implemented to ensure all measures and contingencies are upheld to protect the receiving environment beyond the drain excavation, including the Everitt's and Simpson Creek and native wallum frogs and their habitats.
- 67. Burning of felled trees prohibited**

The burning of trees and associated vegetation felled during clearing operations is not permitted. Where possible, vegetation is to be mulched and reused on the site.
- 68. Builders rubbish to be contained on site**

All builder's rubbish is to be contained on the site in a 'Builders Skips' or an enclosure. Footpaths, road reserves and public reserves are to be maintained clear of rubbish, building materials and all other items.

- 69. All excavated soils to be disposed of off-site**

All excavated soils to be disposed of off-site and in accordance with NSW EPA Waste Classification Guidelines (2014) and approved environmental management plans.
- 70. Removal of demolition and other wastes**

All wastes, including asbestos and lead-contaminated wastes, associated with these works are to be handled and disposed of in accordance with the requirements of the Work Cover Authority. The applicant/owner is to produce documentary evidence that this condition has been met. Wastes must be disposed of at a Licenced Waste Facility. All wastes removed from the site must be managed and disposed of in accordance with the NSW EPA Waste Classification Guidelines (2014) <https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines>
- 71. Excavated natural materials and demolition waste disposal**

Any and all excavated natural materials and demolition and builders waste transported from the site must be accompanied (a copy kept with the transporter) by a NSW Protection of The Environment Operations Act s143 Notice. Template s143 Notices are available at <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/wasteregulation/160095-notices143-form.docx>
- 72. Destination for all excavated materials during construction**

The works contractor responsible for the construction and excavation of the basement must develop and maintain a register of materials that will be taken off-site for treatment, disposal, or any other purpose. The register must accurately record the destination and volume of every load of material (including clean soil, recyclable material, acid sulfate or potential acid sulfate soil, radiological waste, asbestos containing materials, sludge from dewatering treatment tanks, etc.). Individual vehicle registrations associated with off-site transport of materials and excavation waste to be recorded in the register.

Council must be provided with a copy of the completed register prior to the issuing of the Subdivision Certificate.

Advisory note: No transporting of unclassified waste, hazardous materials or material contaminated by demolition waste is permitted to be delivered to unapproved private land within NSW. Heavy penalties apply under the Contaminated Land Management Act for any failure to manage site waste materials.
- 73. Prevention of water pollution**

Only clean and unpolluted water is to be discharged to Council's stormwater drainage system or any watercourse to ensure compliance with the Protection of Environment Operations Act.
- 74. Site Waste Minimisation and Management**

All works must comply with the objectives of waste minimisation and waste management of Part B8.1.2 of DCP 2014.
- 75. Access must be permitted to Council officers**

Access must be permitted to any authorised Council officers during normal business hours for the purpose of ensuring compliance with consent conditions.
- 76. Noise and Vibration Management Plan**

Operations must be undertaken in accordance with the Noise and Vibration Management Plan as approved by Council and any conditions of consent imposed to control operational noise.
- 77. Construction noise**

Construction noise is to be limited as follows:.

a)For construction periods of four (4) weeks and under, the L10 noise level measured over a period of not less than fifteen (15) minutes when the construction site is in operation must not exceed the background level by more than 20 dB(A).

b)For construction periods greater than four (4) weeks and not exceeding twenty\_six (26) weeks, the L10 noise level measured over a period of not less than fifteen (15) minutes when the construction site is in operation must not exceed the background level by more than 10 dB(A).

THE FOLLOWING CONDITIONS MUST BE COMPLIED WITH DURING CONSTRUCTION OF SUBDIVISION WORKS

- 78. Construction times**

Construction works must not unreasonably interfere with the amenity of the neighbourhood. In particular construction noise, when audible from adjoining residential premises, can only occur:

c) Monday to Friday, from 7 am to 6 pm.

d) Saturday, from 8 am to 1 pm.

No construction work to take place on Saturdays and Sundays adjacent to Public Holidays and Public Holidays and the Construction Industry Awarded Rostered Days Off (RDO) adjacent to Public Holidays.

**Note: Council may impose on-the-spot fines for non-compliance with this condition.**
- 79. Public safety requirements**

All care is to be taken to ensure the safety of the public in general, road users, pedestrians and adjoining property. Council is not held responsible for any negligence caused by the undertaking of the works.
- 80. Council Specification**

All works to be constructed to at least the minimum requirements of the "*Northern Rivers Local Government Design and Construction Manual*"
- 81. Approved Plans to remain on site**

A copy of the approved Subdivision Works Certificate including plans, details and specifications must remain at the site at all times during the construction of the subdivision.
- 84. Conservation Limits on Parts Lot 324 and Lot 402**

The eastern residual part of Lot 324 and south western residual part of Lot 402 must be managed to prohibit the following:

a. the destruction or removal of any local indigenous trees, shrubs, grasses or other vegetation, or the planting of any flora other than local indigenous flora,

b. any act or omission which may adversely affect any local indigenous flora or any indigenous fauna or their related habitats,

c. any act or omission which may result in the deterioration in the natural state or in the flow, supply, quantity, or quantity of any body of water or in the natural moisture regime of the area,

d. the creation or maintenance of any tracks through the area,

e. the removal, introduction or disturbance of any soil, rock, or other minerals,

f. any structures or dwellings,

g. the dumping of rubbish or refuse, including garden refuse and weed propagules, nor the use of any of the area for storage of any substance or material.

THE CONTRACTOR IS TO READ THE DEVELOPMENT APPLICATION CONSENT DA10.2021.575 FOR A COMPLETE LIST OF CONDITIONS.



## Appendix C: Management Action Summary



Table C1. Management actions and KPIs for VMZs (*Note: this is a replication of Table 7-2*)

Phase	Actions	Location*	Timing	KPIs	Adaptive Management	Responsibility
1 (Establishment phase)	Remove environmental weeds and implement ripping within degraded areas/ informal tracks.	MZ 1-4	Prior to construction works and be completed within one year.  YEAR 1	<ul style="list-style-type: none"> <li>90% of woody weeds and exotic groundcover removed.</li> <li>Ripping completed within all areas of degraded land/informal tracks.</li> <li>Existing and emergent weeds controlled by initial treatment following ripping.</li> <li>Rubbish removed (where relevant).</li> </ul>	<ul style="list-style-type: none"> <li>Review weed control methods if weed control KPI not met i.e., chemical use or mechanical methods.</li> <li>Increase number of site visits.</li> <li>Monitoring for dumping increased construction rubbish</li> </ul>	Appointed contractor
1 (Establishment phase)	Installation of 'no go' fencing prior to and during construction. Establish protective fencing for Pink Nodding Orchids in MZ1	MZ 1-4	Prior to construction works.  YEAR 1	<ul style="list-style-type: none"> <li>Vegetation management zones fenced off to restrict access by vehicle/plant and signage installed stating all MZs are 'no go' zones</li> <li>Established protective fencing for Pink Nodding Orchids.</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of fence condition and functionality</li> <li>Review fencing types and installation methods if fencing not successfully installed or maintained</li> </ul>	Project manager/developer
1 (Establishment phase)	Installation of fauna nest boxes, artificial habitats	MZ 1-4	Prior to construction works and be completed within one year.  YEAR 1	<ul style="list-style-type: none"> <li>All nest boxes/habitat installed in accordance with the Nest Box Management Plan in Appendix D</li> <li>Locations and orientation approved by the project ecologist</li> </ul>	<ul style="list-style-type: none"> <li>Review proposed nest box locations if previously identified locations deemed unsuitable in consultation with the project ecologist</li> </ul>	Project manager/developer
2 (Establishment phase)	Follow up removal of environmental weeds and monitor areas where ripping has been completed. Maintain protective fencing for all MZs, including the protective fencing for Pink Nodding Orchids in MZ1	MZ 1-4	To be continued during the second year of construction. Monitoring to be completed.  YEAR 2	<ul style="list-style-type: none"> <li>95% of woody weeds and exotic groundcover removed.</li> <li>Initial ripping of sandy areas produces a minimum native groundcover of 20% within monitoring plots,</li> <li>90% survival of planted trees.</li> <li>Any dead plants are replaced as required.</li> <li>All fencing maintained</li> </ul>	<ul style="list-style-type: none"> <li>Review weed control methods if weed control KPI not met i.e., chemical use or mechanical methods.</li> <li>Increase number of site visits.</li> <li>Replace dead plants at a 1:1 ratio respective of species lost. Review species selection.</li> </ul>	Appointed contractor



Phase	Actions	Location*	Timing	KPIs	Adaptive Management	Responsibility
				including the protective fencing for Pink Nodding Orchids in MZ1.	<ul style="list-style-type: none"> <li>Conduct brush matting or infill planting if ripped areas do not meet KPI.</li> <li>Monitor fencing for signs of degradation and loss of functionality. Replace and review fencing materials if signs of degradation observed.</li> </ul>	
<b>HOLD POINT – All the Phase One and Two Actions and associated KPIs are to be achieved prior to progressing to Maintenance Phase Three and Four</b>						
<b>3 (Maintenance phase)</b>	Follow up removal of environmental weeds and monitor areas where ripping has been conducted to assess required plant densities has been achieved.	MZ 1-4	To be continued during the third year of construction and completed prior to the end of second year of construction.  YEAR 3	<ul style="list-style-type: none"> <li>Native cover of 30% achieved within ripped areas.</li> <li>90% survival of planted trees.</li> <li>Emergent weeds controlled and comprise ≤5% total cover within all MZs.</li> <li>Any dead plants are replaced as required.</li> <li>Fencing maintained including protective fencing for Pink Nodding Orchids in MZ1.</li> </ul>	<ul style="list-style-type: none"> <li>Review weed control methods if weed control KPI not met i.e., chemical use or mechanical methods if weed control KPI not met.</li> <li>Increase number of site visits.</li> <li>Replace dead plants at a 1:1 ratio respective of species lost. Review species selection.</li> <li>Conduct brush matting or infill planting if ripped areas don't meet KPI.</li> <li>Monitor fencing for signs of degradation and loss of functionality. Replace and review fencing materials if signs of degradation observed.</li> </ul>	Appointed contractor



Phase	Actions	Location*	Timing	KPIs	Adaptive Management	Responsibility
<b>4 (Maintenance phase)</b>	Prescribed densities of plants from ripping and/or planting sandy areas are achieved as per monitoring requirements	MZ 1-4	All actions to be completed by the end of 4 <sup>th</sup> year from construction initiation date.  YEAR 4	<ul style="list-style-type: none"> <li>Native cover of 40% achieved within ripped areas.</li> <li>Minimum 90% native plant survivorship (plantings) achieved by end of 4<sup>th</sup> year of on ground works,</li> <li>Emergent weeds continue to be controlled and comprise ≤5% total cover within all MZs</li> <li>Any dead plants are replaced as required.</li> <li>Removal of tree guards.</li> </ul>	<ul style="list-style-type: none"> <li>Review weed control methods if weed control KPI not met i.e., chemical use or mechanical methods if weed control KPI not met.</li> <li>Replace dead plants at a 1:1 ratio respective of species lost. Review species selection.</li> <li>Conduct brush matting or infill planting if ripped areas don't meet KPI.</li> <li>Removal and appropriate disposal of all tree guards.</li> </ul>	Appointed contractor
<b>HOLD POINT – All the Phase Three and Four Actions and associated KPIs are to be achieve prior to progressing to the Completion Phase Five</b>						
<b>5 (Completion phase)</b>	Prescribed densities of plants from ripping and/or planting sandy areas are achieved as per monitoring requirements	MZ 1-4	All actions to be completed by the end of 4 <sup>th</sup> year from construction initiation date.  YEAR 5	<ul style="list-style-type: none"> <li>Native cover of 50% achieved within ripped areas.</li> <li>Minimum 90% native plant survivorship (plantings) achieved by end of 5<sup>th</sup> year of on ground works,</li> <li>Emergent weeds continue to be controlled and comprise ≤5% total cover within all MZs</li> <li>Any dead plants are replaced as required.</li> <li>Dense plantings around Pink Nodding Orchids established. Remove protective fencing.</li> </ul>	<ul style="list-style-type: none"> <li>Review weed control methods if weed control KPI not met i.e., chemical use or mechanical methods if weed control KPI not met.</li> <li>Replace dead plants at a 1:1 ratio respective of species lost.</li> <li>Conduct brush matting or infill planting if ripped areas don't meet KPI and areas of protective plantings not established</li> </ul>	Appointed contractor



Phase	Actions	Location*	Timing	KPIs	Adaptive Management	Responsibility
	<b>HOLD POINT – All the Phase Five Actions and associated KPIs are to be achieved prior to progressing to the Occupation Phase</b>					
<b>Occupation – vegetation management</b>	Removal of all non-heath vegetation within MZ 2a and MZ 3a/3b to maintain biodiversity values *refer Figure 5.1	MZ 2a, MZ 3a/3b	Annually	<ul style="list-style-type: none"> <li>MZ 2a <u>must</u> remain as a wetland/wet heath community (acid frog habitat). Any incursions of Eucalypts or other sclerophyllous trees which may close out the canopy must be removed. (ie. Intervention management).</li> <li>MZ 3a/3b <u>must</u> remain as heath which provides acid frog and threatened species habitat. Any incursions of Eucalypts or other sclerophyllous trees which may close out the canopy must be removed. (ie. Intervention management).</li> </ul>	<ul style="list-style-type: none"> <li>Increase site visits and review control methods of Eucalypts or other sclerophyllous trees.</li> <li>Conduct infill planting if large scale removal of Eucalypts or other sclerophyllous trees occurs in wetland/wet heath communities.</li> </ul>	MZ owner



## **Appendix D: Nest Box Management Plan**



**Wallum Estate  
Torakina Road, Brunswick Heads  
Lot 13 DP 1251383**

**Hollow and Nest Box Management Plan**

Client	: Clarence Property Pty Ltd
Prepared by	: Australian Wetlands Consulting Pty Ltd
Project #	: 1-211400
Date	: June 2023

*Leading environmental solutions...*







**Wallum Estate**  
**Torakina Road, Brunswick Heads**  
**Lot 13 DP 1251383**

Hollow and Nest Box Management Plan



## Project control

Project name: **Wallum Estate Torakina Road, Brunswick Heads**  
**Lot 13 DP 1251383**  
Hollow and Nest Box Management Plan

Job number: 1-211400  
Client: Clarence Property Pty Ltd  
Contact: James Fletcher

Prepared by: Australian Wetlands Consulting Pty Ltd

25 Leslie Street  
Bangalow, NSW, 2479

P | (02) 6687 1550  
E | admin@awconsult.com.au

Date:	Revision:	Prepared by:	Reviewed by:	Distributed to:
13/06/2023	A	Alec Willows	Damian McCann	James Fletcher



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# Table of Contents

Project control.....	i
Table of Contents.....	ii
<b>1 Introduction and Background .....</b>	<b>4</b>
1.1 Aims and Objectives.....	4
1.2 Subject Site.....	5
1.3 Methods.....	5
<b>2 Results.....</b>	<b>6</b>
2.1 Nest box installation specifications .....	11
2.1.1 Ecologist Supervision.....	11
2.1.2 Nest box attachment and orientation .....	11
2.1.3 Nest Box Specifications and Height.....	11
2.1.4 Timing .....	14
2.1.5 Nest box data.....	14
<b>3 Monitoring and Maintenance .....</b>	<b>15</b>
3.1 Monitoring .....	15
<b>4 Installation and Monitoring Timeframes.....</b>	<b>17</b>
<b>5 References.....</b>	<b>21</b>
<b>Appendix A – Detailed Design.....</b>	<b>1</b>
<b>List of Tables</b>	
Table 2.1 Nest box site assessment results.....	6
Table 2.2 Nest Box Specifications .....	13
Table 3.1 Nest boxes Key Performance Indicators .....	16
Table 4.1 Nest Box Monitoring Timeframes .....	18



**List of Figures**

Figure 2.1 Habisure system .....12

Figure 2.2 Anti-Myna Baffle .....12

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# 1 Introduction and Background

Australian Wetlands Consulting (AWC) has prepared this Hollow and Nest box Management Plan (HNBMP) to comply with the development application conditions of consent for DA 10.2021.575.1 (Byron Shire Council 2023). This HNBMP will facilitate the installation, monitoring and management of constructed hollows and nest boxes installed in Management Zone 1 (MZ1), Management Zone 2b (MZ2b) and Management Zone 4 (MZ4) of the Wallum estate as outlined in the revised Vegetation Management Plan (VMP) (AWC 2023).

The installation of the hollows and/or nest boxes is required to offset the removal of 22 hollow bearing trees that provide hollows suitable for Glossy Black-Cockatoo (*Calyptorhynchus latham*) and arboreal mammals, provide immediate habitat for displace fauna and minimise the Key Threatening Processes (KTPs) - *Loss of Hollow-bearing Trees* as a result of the development. The hollows and/or nest boxes will be installed as a part of the early works stage of the development (refer Wallum Estate Early Ecological Works Package (AWC 2023)).

The installation of constructed hollows using mechanical cavity drilling will be the preferred method of hollow offsetting due to the thermoregulatory benefit, decreased maintenance costs and increased hollow usage (Neils 2017). Nest boxes will be installed as an alternative where mechanical cavity drilling will not be feasible. A tree health assessment will be conducted by a suitably qualified Arborist (AQF 4 or 5).

## 1.1 Aims and Objectives

The Aim of this HNBMP is to facilitate the successful installation, monitoring and management of 50 hollows candidate species. Nest boxes will be utilised where mechanical cavity drilling will not be feasible. Hollows and/or nest boxes will be installed in accordance with the development application conditions of consent for DA 10.2021.575.1 (Byron Shire Council 2023). The hollows and/or nest boxes numbers and associated candidate species will include:

- 16 nest boxes for Glossy Black-Cockatoo (*Calyptorhynchus latham*)
- 7 nest boxes for Brush-tailed Phascogale (*Phascogale tapoatafa*)
- 6 nest boxes for Eastern Ringtail Possum (*Pseudocheirus peregrinus*)
- 6 nest boxes for Feathertail Glider (*Acrobates pygmaeus*)
- 2 nest boxes for Mountain Brushtail Possum (*Trichosurus caninus*)
- 5 nest boxes for Squirrel Glider (*Petaurus norfolkensis*)
- 8 nest boxes for Sugar Glider (*Petaurus breviceps*)

Whilst not stipulated in the schedule of development application conditions, 15 microbat boxes are proposed to be installed within MZ1, MZ2b and MZ4, with locations to be confirmed by the specialist contractor at time of installation. The microbat boxes will further offset any potential loss of habitat such as and hollows and reduce mosquito abundance (Rhodes 2015) within the development area in alignment with the Mosquito Risk Management Plan (AWC 2023).



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The objectives of this HNBMP will specifically include:

- To determine suitable hollow or nest box locations within MZ1, MZ2b and MZ4 and candidate species specifications including nest box dimensions, tree heights and diameters, orientations and nest box distribution.
- To outline a 6 monthly monitoring schedule that is to be conducted over the seven stages of the development in order determine species occupancy including numbers, breeding individuals and pest animals and condition of the nest boxes (as required).
- To provide mitigation measures in relation to replacing damaged or fallen nest boxes, occupancy of hollows or nest boxes by pest vertebrate and invertebrates and adaptive management strategies.

## 1.2 Subject Site

This HNBMP will be implemented across MZ1, MZ2b and MZ4 as determined by the VMP (hereafter referred to as the 'Subject Site'). These management zones will be utilised due to the habitat values such as connectivity, foraging, breeding and sheltering habitat present and distance from increased disturbances as a result of the construction activities.

## 1.3 Methods

A site assessment was conducted on the 7<sup>th</sup> of June 2023 to determine preliminary locations for hollows and nest boxes within the subject site and specifically consisted of:

- Identifying tree species, diameter at breast height (DBH), approximate tree height.
- Appropriate locations, available habitat and tree species for candidate species.
- Potential increases in territorial species such as Mountain Brushtail Possums.
- Orientation of the hollows and nest boxes based of suitable tree limbs for support.
- Feasibility of nest box installation i.e., access and potential strength of supporting tree limbs.



## 2 Results

The results of the preliminary site assessment are outlined in Table 2.1. The results of the site assessment are indicative and require a more detailed site assessment to determine the feasibility of each hollow or nest box location. Trees considered suitable for nest boxes have been tagged and GPS data taken however further ground truthing will be required in conjunction with a suitably qualified Ecologist, Arborist or Bush Regenerator during the installation.

Table 2.1 Nest box site assessment results

Nest Box No.	Candidate Species	Tree Species	DBH (cm)	Approximate Tree Height (m)	Orientation
NB1	SUGAR GLIDER	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	40	8	NE
NB2	BRUSH-TAILED PHASCOGALE	Brush Box ( <i>Lophostemon confertus</i> )	34	9	NE
NB3	SUGAR GLIDER	Brush Box ( <i>Lophostemon confertus</i> )	33	9	NE
NB4	FEATHERTAIL GLIDER	Brush Box ( <i>Lophostemon confertus</i> )	21	8	NE
NB5	RINGTAIL POSSUM	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	52	9	SE
NB6	GLOSSY BLACK COCKATOO	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	61	15	E
NB7	SQUIRREL GLIDER	Brush Box	31	8	SW



Nest Box No.	Candidate Species	Tree Species	DBH (cm)	Approximate Tree Height (m)	Orientation
		( <i>Lophostemon confertus</i> )			
NB8	BRUSH-TAILED PHASCOGALE	Brush Box ( <i>Lophostemon confertus</i> )	29	7	W
NB9	GLOSSY BLACK COCKATOO	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	49	10	E
NB10	SUGAR GLIDER	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	38	8	SE
NB11	FEATHERTAIL GLIDER	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	22	6	SW
NB12	RINGTAIL POSSUM	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	43	10	NE
NB13	GLOSSY BLACK COCKATOO	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	32	8	NE
NB14	SQUIRREL GLIDER	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	40	8	NE
NB15	FEATHER TAIL GLIDER	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	58	10	NE
NB16	SUGAR GLIDER	Swamp mahogany ( <i>Eucalyptus robusta</i> )	23	8	SE



Nest Box No.	Candidate Species	Tree Species	DBH (cm)	Approximate Tree Height (m)	Orientation
NB17	GLOSSY BLACK COCKATOO	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	97	12	NW
NB18	GLOSSY BLACK COCKATOO	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	81	10	SE
NB19	GLOSSY BLACK COCKATOO	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	97	10	SE
NB20	BRUSH-TAILED PHASCOGALE	Brush Box ( <i>Lophostemon confertus</i> )	32	8	NW
NB21	SUGAR GLIDER	Pink Bloodwood ( <i>Corymbia intermedia</i> )	27	7	SE
NB22	RINGTAIL POSSUM	Pink Bloodwood ( <i>Corymbia intermedia</i> )	32	8	SE
NB23	MOUNTAIN BRUSHTAIL POSSUM	Brush Box ( <i>Lophostemon confertus</i> )	45	12	NW
NB24	GLOSSY BLACK COCKATOO	Pink Bloodwood ( <i>Corymbia intermedia</i> )	45	10	NE
NB25	FEATHERTAIL GLIDER	Pink Bloodwood ( <i>Corymbia intermedia</i> )	38	12	E
NB26	BRUSH-TAILED PHASCOGALE	Pink Bloodwood ( <i>Corymbia intermedia</i> )	40	10	NE
NB27	SQUIRREL GLIDER	Pink Bloodwood ( <i>Corymbia intermedia</i> )	36	8	SE
NB28	RINGTAIL POSSUM	Pink Bloodwood	30	7	E



Nest Box No.	Candidate Species	Tree Species	DBH (cm)	Approximate Tree Height (m)	Orientation
		( <i>Corymbia intermedia</i> )			
NB29	SUGAR GLIDER	Brush Box ( <i>Lophostemon confertus</i> )	32	7	E
NB30	MOUNTAIN BRUSHTAIL POSSUM	Pink Bloodwood ( <i>Corymbia intermedia</i> )	49	12	NW
NB31	BRUSH-TAILED PHASCOGALE	Pink Bloodwood ( <i>Corymbia intermedia</i> )	40	10	NE
NB32	RINGTAIL POSSUM	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	56	8	NW
NB33	GLOSSY BLACK COCKATOO	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	33	7	SW
NB34	GLOSSY BLACK COCKATOO	Swamp mahogany ( <i>Eucalyptus robusta</i> )	47	10	NE
NB35	GLOSSY BLACK COCKATOO	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	45	8	NE
NB36	GLOSSY BLACK COCKATOO	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	46	10	SW
NB37	GLOSSY BLACK COCKATOO	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	64	12	SW
NB38	BRUSH-TAILED PHASCOGALE	Swamp mahogany ( <i>Eucalyptus robusta</i> )	46	12	NE
NB39	SQUIRREL GLIDER	Swamp mahogany	63	13	W



Nest Box No.	Candidate Species	Tree Species	DBH (cm)	Approximate Tree Height (m)	Orientation
		( <i>Eucalyptus robusta</i> )			
NB40	SUGAR GLIDER	Swamp mahogany ( <i>Eucalyptus robusta</i> )	38	12	NE
NB41	BRUSH-TAILED PHASCOGALE	Swamp mahogany ( <i>Eucalyptus robusta</i> )	32	10	W
NB42	RINGTAIL POSSUM	Swamp mahogany ( <i>Eucalyptus robusta</i> )	41	10	E
NB43	GLOSSY BLACK COCKATOO	Swamp mahogany ( <i>Eucalyptus robusta</i> )	48	8	E
NB44	FEATHER TAIL GLIDER	Swamp mahogany ( <i>Eucalyptus robusta</i> )	34	8	W
NB45	SQUIRREL GLIDER	Swamp mahogany ( <i>Eucalyptus robusta</i> )	31	8	E
NB46	RINGTAIL POSSUM	Swamp mahogany ( <i>Eucalyptus robusta</i> )	39	9	E
NB47	GLOSSY BLACK COCKATOO	Brush Box ( <i>Lophostemon confertus</i> )	39	8	E
NB48	SUGAR GLIDER	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	32	7	E
NB49	FEATHER TAIL GLIDER	Brush Box ( <i>Lophostemon confertus</i> )	31	7	E
NB50	GLOSSY BLACK COCKATOO	Narrow-leaved Scribbly Gum ( <i>Eucalyptus racemosa</i> )	86	8	E
NB51	MICROBAT	TBC	TBC	TBC	TBC



## 2.1 Hollow/Nest box installation specifications

A total of 50 nest boxes will be installed in MZ1, MZ2b and MZ4 for candidate species including:

- 16 nest boxes for Glossy Black-Cockatoo (*Calyptorhynchus lathamii*)
- 7 nest boxes for Brush-tailed Phascogale (*Phascogale tapoatafa*)
- 6 nest boxes for Eastern Ringtail Possum (*Pseudocheirus peregrinus*)
- 6 nest boxes for Feathertail Glider (*Acrobates pygmaeus*)
- 2 nest boxes for Mountain Brushtail Possum (*Trichosurus caninus*)
- 5 nest boxes for Squirrel Glider (*Petaurus norfolkensis*)
- 8 nest boxes for Sugar Glider (*Petaurus breviceps*)

An additional 15 Microbat boxes are proposed to be installed in addition to the 50 nest boxes to further offset any potential loss of habitat such as and hollows and reduce mosquito abundance.

### 2.1.1 Ecologist Supervision

The project manager and/or environmental manager is to engage a suitably qualified Ecologist to supervise the installation of the hollows and/or nest boxes in accordance with this plan. Supervision will include precise locations for the hollows or nest boxes within the subject site and include:

- Positioning of Microbat boxes in flyways and in areas likely to have high mosquito abundance.
- Selecting longer lived tree species such as *Eucalyptus*, *Lophostemon* and *Corymbia* sp.
- Selecting tree limbs and trunks that will suitably support the nest boxes and with an appropriate orientation.

### 2.1.2 Nest box attachment and orientation

Nest boxes must be attached utilising the Habisure system (Franks and Franks, 2006) (Figure 2.1) to a structurally sound tree limb preferably facing north-east, north-west or south-east where possible to avoid extreme weather impacts such as high temperatures and severe storms. Microbat boxes may benefit from westerly orientations in order to provide thermoregulatory benefits from the afternoon, however they should be orientated away from proposed and existing buildings to avoid light impacts.

### 2.1.3 Hollow and Nest Box Specifications and Height

Preferred nest box specifications heights for each of the candidate species are outlined in Table 2.2 (Nest Boxes – Technical Information, Birdlife Australia \*undated). Anti-Myna baffles are detailed in Figure 2.2 and will be included on the nest box where applicable.



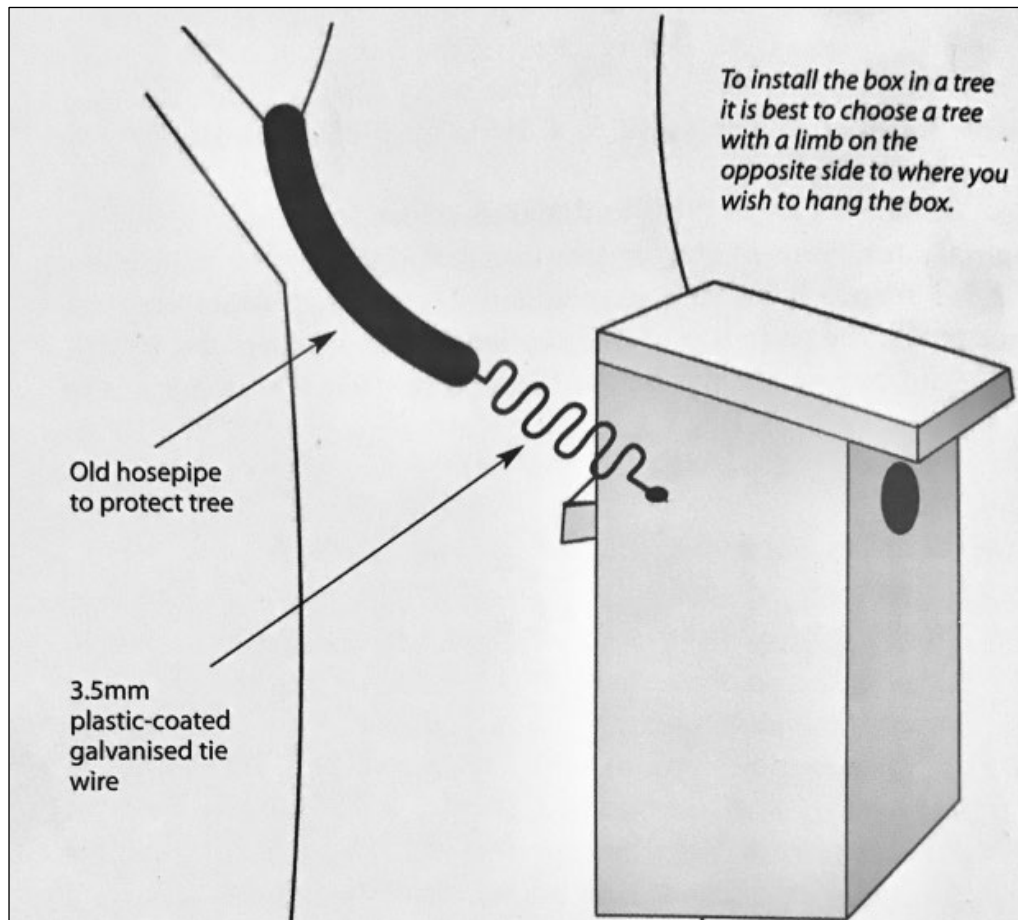


Figure 2.1 Habisure system

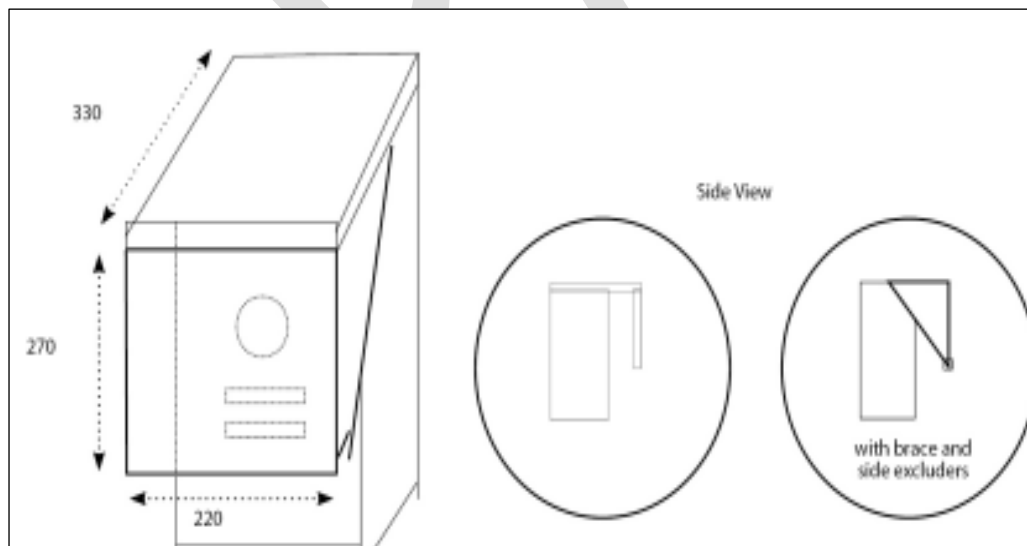


Figure 2.2 Anti-Myna Baffle



Table 2.2 Hollow and or Nest Box Specifications

Candidate species	Internal diameter (mm)	Depth/length (mm)	Entrance Diameter (mm)	Height(m)	Comments
Glossy Black-Cockatoo	300	870-1000	160 x 200	>6	Nest box should be reinforced with PVC around the entrance to prevent being chewed. Install an Anti-Myna Baffle the same diameter as the entrance dimensions. A 'ladder' should also be provided to allow the Glossy Black-Cockatoo's to grip.
Brush-tailed Phascogale	200-250	300-450	25-50	4-8	-
Eastern Ringtail Possum	250	350-400	60-90	4-8	-
Feathertail Glider	Top = 150 x 150 Bottom = 150 x 20	300	30	3-6	Wedge-shaped nest box with a bottom entry hole or slot.
Mountain Brushtail Possum	250 x 250	300	100	2-4	-
Squirrel Glider	150 x 250	300	45	3-6	Position entrance to face
Sugar Glider	150 x 200	300	40	3-6	Position entrance to face
Microbat	200 x 200	400	20-30	3-5	-



### **2.1.4 Timing**

All nest boxes will be installed prior to removal of vegetation, as part of the ecological early works.

### **2.1.5 Nest box/Hollow data**

In order to facilitate the monitoring of the hollows nest boxes, a unique number should be assigned to each tree using a tree tag and written on the bottom of the nest box and/or front so that it is visible to the data collector conducting the monitoring. Information to establish the monitoring must include:

- Identification number
- Nest box/ Hollow type
- GPS location
- Tree species
- DBH
- Hollow or Nest Box height
- Orientation



## 3 Monitoring and Maintenance

A monitoring and maintenance schedule must be implemented in order to outline the success of the nest box installation and prescribe adaptive management measures as required.

### 3.1 Monitoring

Hollow and nest box monitoring should be conducted by a suitably qualified Ecologist and assessed and checked utilising an inspection camera on a pole or a ladder (ensuring working at heights and ladder safety is adhered to).

The following data will be collected during the nest box monitoring:

- Time and dates, weather conditions and person(s) conducting the monitoring.
- Nest box number
- Species utilising the nest boxes – both native and invasive/introduced and including, number of individuals, maturity and health condition.
- Indirect evidence of occupancy such as scats, guano, pellets, fur or nesting material
- Signs of degradation and damage to nest boxes
- Any adaptive management measures such as maintenance required and controls to limit invasive species utilising the next boxes.

Key Performance Indicators (KPIs) relating to the hollow and nest box monitoring are outlined in Table 3.1.



Table 3.1 Nest boxes Key Performance Indicators

KPI	Adaptive management	Responsibility	Outcome
Hollow or nest box not being used by target candidate species	Review the location, type and number of hollows or nest boxes used and site observations, consider if relocation is appropriate	Development project manager and consulting ecologist	Increased occupancy of candidate species during the next monitoring periods.
Hollow or nest box being used by invasive vertebrates of invertebrates	<ul style="list-style-type: none"> <li>Review the hollow location, or location, type and number of nest boxes used.</li> <li>Research into pest control methods.</li> <li>Potential removal and destruction of nest box affected.</li> </ul>	Development project manager, consulting ecologist and pest animal contractor.	Reduction in hollows and nest boxes being utilised by invasive species.
Nest box fallen from tree	<ul style="list-style-type: none"> <li>Review the location and type of nest boxes used.</li> <li>Repair nest box and re-attached to tree</li> </ul>	Consulting ecologist.	Increase in repaired nest box reattached to trees.
Nest boxes deteriorating rapidly and requiring maintenance or replacing	<ul style="list-style-type: none"> <li>Review the location nest boxes used.</li> <li>Research into alternative nest box materials or measures to slow deterioration.</li> <li>Repair or replace nest boxes that cannot be repaired</li> </ul>	Development project manager, consulting ecologist.	Decrease in the deterioration of nest box and increased longevity, preferably to 20 years.

## 4 Installation and Monitoring Timeframes

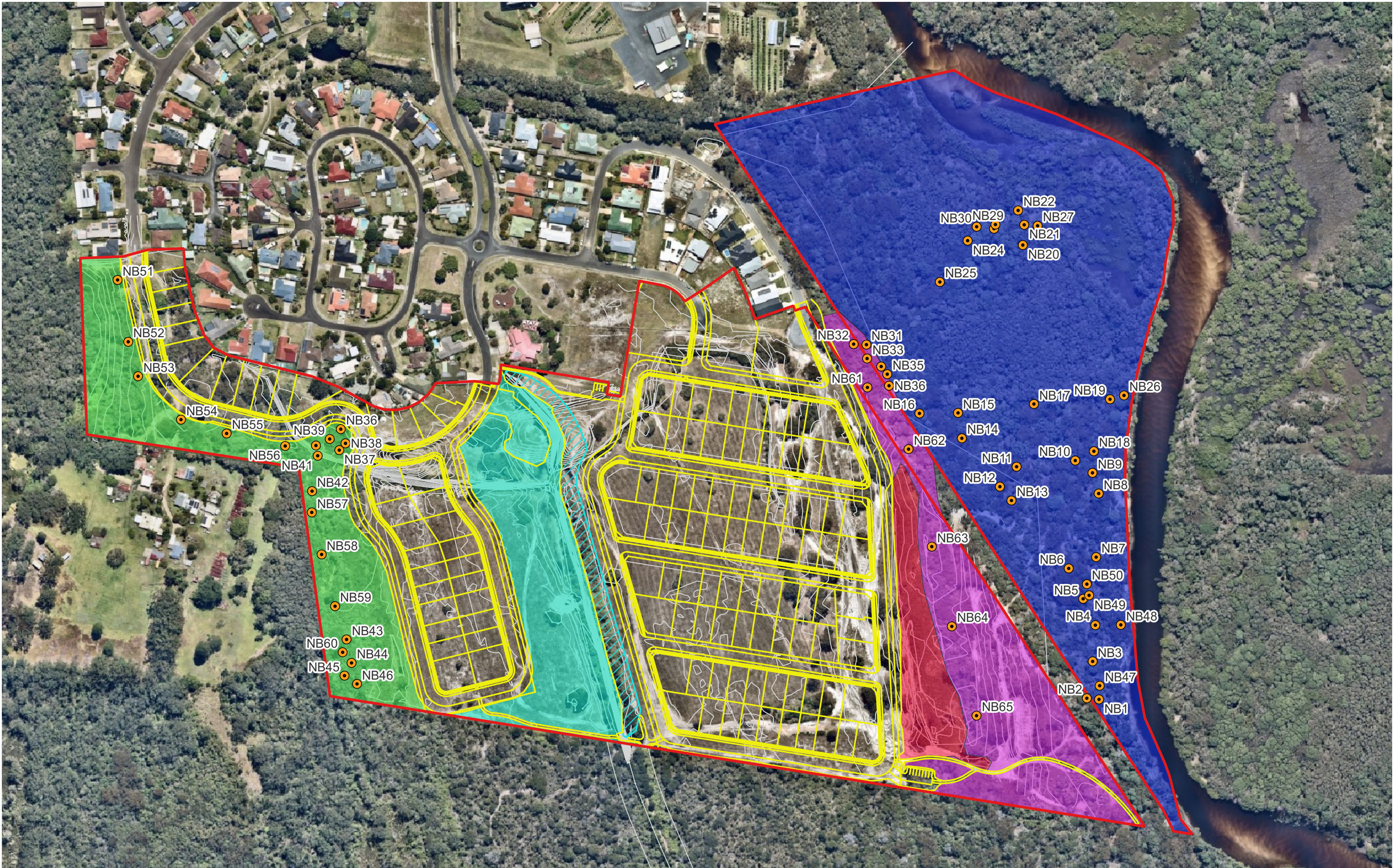
Timeframes for nest box installation, monitoring and maintenance are outlined in Table 4.1. Nest box locations within each MZ are outlined in Table 4.1, noting that locations may be adjusted in consultation with the nest box supplier and an updated locations map provided.



Table 4.1 Nest Box Monitoring Timeframes

Task	Early works stage 1	Early works stage 2	Construction Stage 1	Construction Stage 2	Construction Stage 3	Construction Stage 4	Construction Stage 5
<b>Installation</b>							
Hollow and nest box installation – pre-clearing 70% / post clearing 30%	✓	-	-	-	-	-	
<b>Monitoring</b>							
Spring	-	✓	✓	✓	✓	✓	✓
Winter	-	✓	✓	✓	✓	✓	✓
<b>Maintenance</b>							
Nest boxes fallen down deteriorating rapidly and requiring maintenance or replacing.	-	✓	✓	✓	✓	✓	✓
							✓



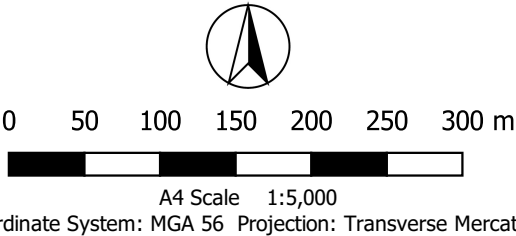


**Source:**

Imagery: Nearmaps 2023  
Nest box locations: AWC 2023  
Management Zones: AWC 2023

**Disclaimer:**

Care was taken in the creation of this map. AWC should be consulted as to the suitability of the information shown herein prior to the commencement of any works based on the information provided. AWC cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties expressed or implied as to the suitability of this map for a particular purpose. However, notification of any errors will be appreciated.



**Legend**

- Site
- 22.08.18\_Wallum\_Base\_Layout entities
- Nest Boxes

- VMZs
- 1
  - 2a
  - 2b
  - 3a
  - 3b
  - 4

**Figure: 4.1 Nest box locations**

Job No:211400

Drawn: AW

Checked:DM

Date:9-6-23



## 4.1 Reputable Suppliers and Technicians

Reputable suppliers and technicians suitable for mechanical cavity drilling nest box supply and installation and tree health assessments have been consulted in preparing this plan. The following companies are considered appropriate for completing the works:

- HollowHog – <https://www.hollowhog.com.au/about-us/>
- WildBnB - <https://wildbnb.com.au/>
- Arborspec - <https://www.arborspec.com.au/>

## 5 References

Australian Wetlands Consulting (2023) *FINAL Wallum Estate Revised VMP June 2023*. Prepared for Clarence Property Pty Ltd.

Australian Wetlands Consulting (2023) *Wallum Estate Early Ecological Works Package, Revision C, 13<sup>th</sup> June 2023*. Prepared for Clarence Property Pty Ltd.

Australian Wetlands Consulting (2023) *Wallum Estate Mosquito Risk Management Plan June 2023*. Prepared for Clarence Property Pty Ltd.

Birdlife Australian (\*undated) Nest Boxes – Technical Information

[https://direct.birdlife.org.au/images/uploads/education\\_sheets/INFO-Nestbox-technical.pdf](https://direct.birdlife.org.au/images/uploads/education_sheets/INFO-Nestbox-technical.pdf)

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Franks, A and Franks, S (2006). Nest Boxes for Wildlife: A Practical Guide. Blooming Books, M

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Neils, R (2017) *Artificial tree hollow creation for cavity-using wildlife – Trialing an alternative method to that of nest boxes*, Forest Ecology and Management, Volume 405, 2017

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[http://www.cwcnc.org.au/images/Microbats\\_Inner\\_West\\_Survey\\_Report\\_b.pdf](http://www.cwcnc.org.au/images/Microbats_Inner_West_Survey_Report_b.pdf)



## Appendix A – Detailed Design

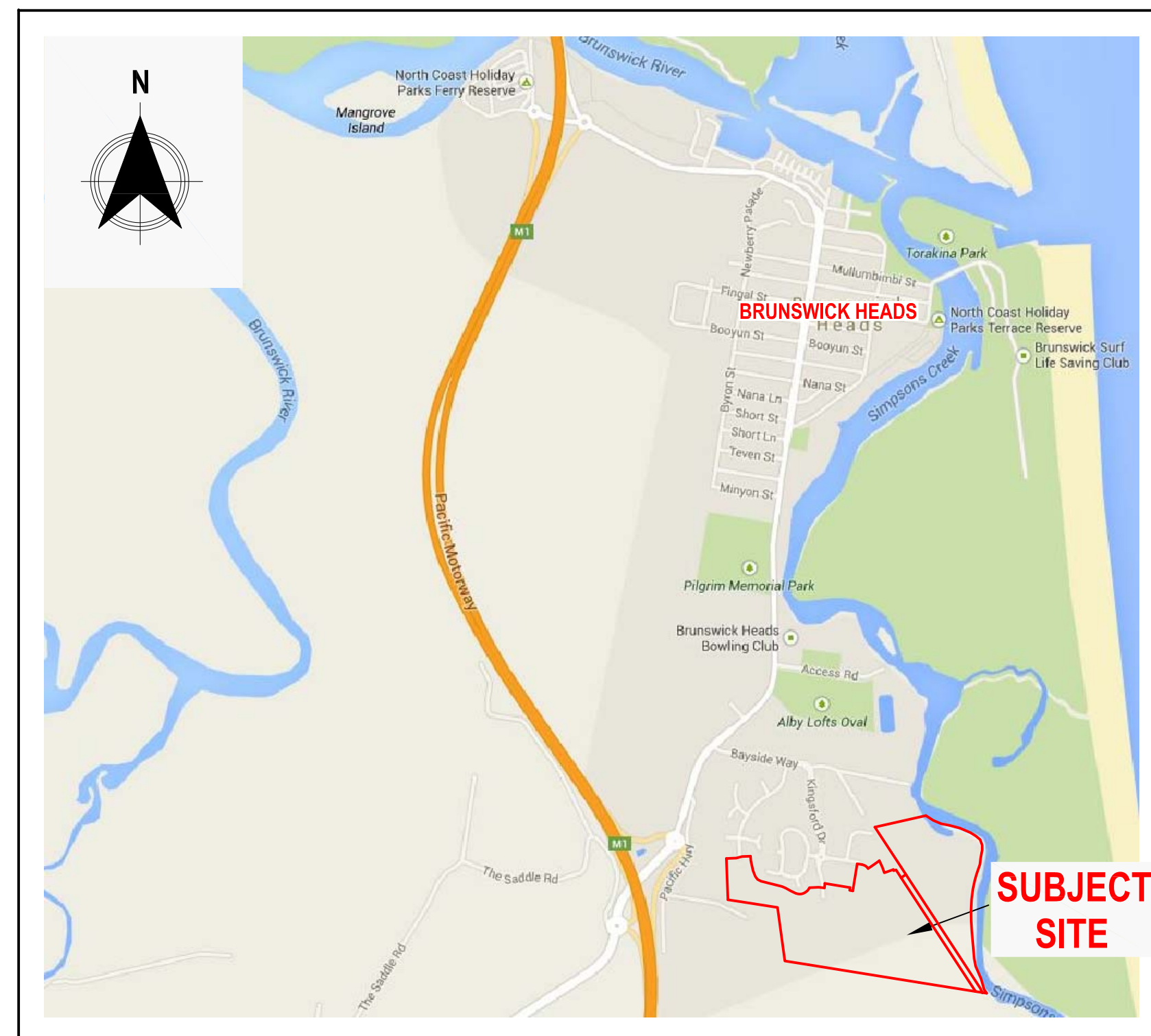
DRAFT



● Subdivision Design ● Civil Engineering ● Town Planning ● Project Management

CivilTech Consulting Engineers  
Ph. 0431 065 645  
PO BOX 4285  
Goonellabah NSW 2480

### LOCALITY PLAN:



BYRON SHIRE COUNCIL  
Development Application  
APPROVED PLAN  
DA No. 10.2021.575.1  
Date: 16 May 2023

# BAYSIDE BRUNSWICK

## 126 Lot Residential Subdivision

### 15 Torakina Road, Brunswick Heads

### Lot 13 DP 1251383

for  
**BAYSIDE BRUNSWICK Pty Ltd**

### INDEX:

ROADS & DRAINAGE	
SHEET 1	DA1 DRAWING COVER SHEET
SHEET 2	DA2 SUBJECT SITE AERIAL OVERLAY
SHEET 3	DA3 SUBDIVISION LAYOUT PLAN
SHEET 4	DA4 STAGING PLAN
SHEET 5	DA5 BULK EARTHWORKS CUT FILL PLAN
SHEET 6	DA6 ROADWORKS PLAN
SHEET 7	DA7 STORMWATER DRAINAGE LAYOUT PLAN
SHEET 8	DA8 STORMWATER DRAINAGE CATCHMENT PLAN
SHEET 9	DA9 GRAVITY SEWER & LPS CONCEPT LAYOUT
SHEET 10	DA10 WATER, ELEC & COMMS SCHEMATIC CONCEPT
SHEET 11	DA11 N-S DRAIN REALIGNMENT PLAN AND SECTIONS
SHEET 12	DA12 LOCAL AREA TRAFFIC MANAGEMENT PLAN
SHEET 13	DA13 ROAD 1 LONG SECTION & CROSS SECTIONS
SHEET 14	DA14 ROAD 2 LONG SECTION - START TO CH600
SHEET 15	DA15 ROAD 2 LONG SECTION - CH600 TO END
SHEET 16	DA16 ROAD 2 CROSS SECTIONS - START TO CH500
SHEET 17	DA17 ROAD 2 CROSS SECTIONS - CH550 TO END
SHEET 18	DA18 ROAD 3 LONG SECTION & TYPICAL SECTION
SHEET 19	DA19 ROAD 3 CROSS SECTIONS
SHEET 20	DA20 ROAD 4 LONG SECTION & TYPICAL SECTION
SHEET 21	DA21 ROAD 4 CROSS SECTIONS
SHEET 22	DA22 ROAD 5 LONG SECTION & TYPICAL SECTION
SHEET 23	DA23 ROAD 5 CROSS SECTIONS
SHEET 24	DA24 ROAD 6 LONG SECTION & TYPICAL SECTION
SHEET 25	DA25 ROAD 6 CROSS SECTIONS
SHEET 26	DA26 ROAD 7 LONG SECTION & TYPICAL SECTION
SHEET 27	DA27 ROAD 7 CROSS SECTIONS
SHEET 28	DA28 FILTER MEDIA PROFILES & ENGINEERING DETAILS
SHEET 29	DA29 TYPICAL SECTIONS & HYDRAULIC CALCULATIONS
SHEET 30	DA30 INTERSECTION TREATMENT DETAILS & CALCS
SHEET 31	DA31 TYPICAL STORMWATER INFILTRATION DETAILS

# CIVIL ENGINEERING

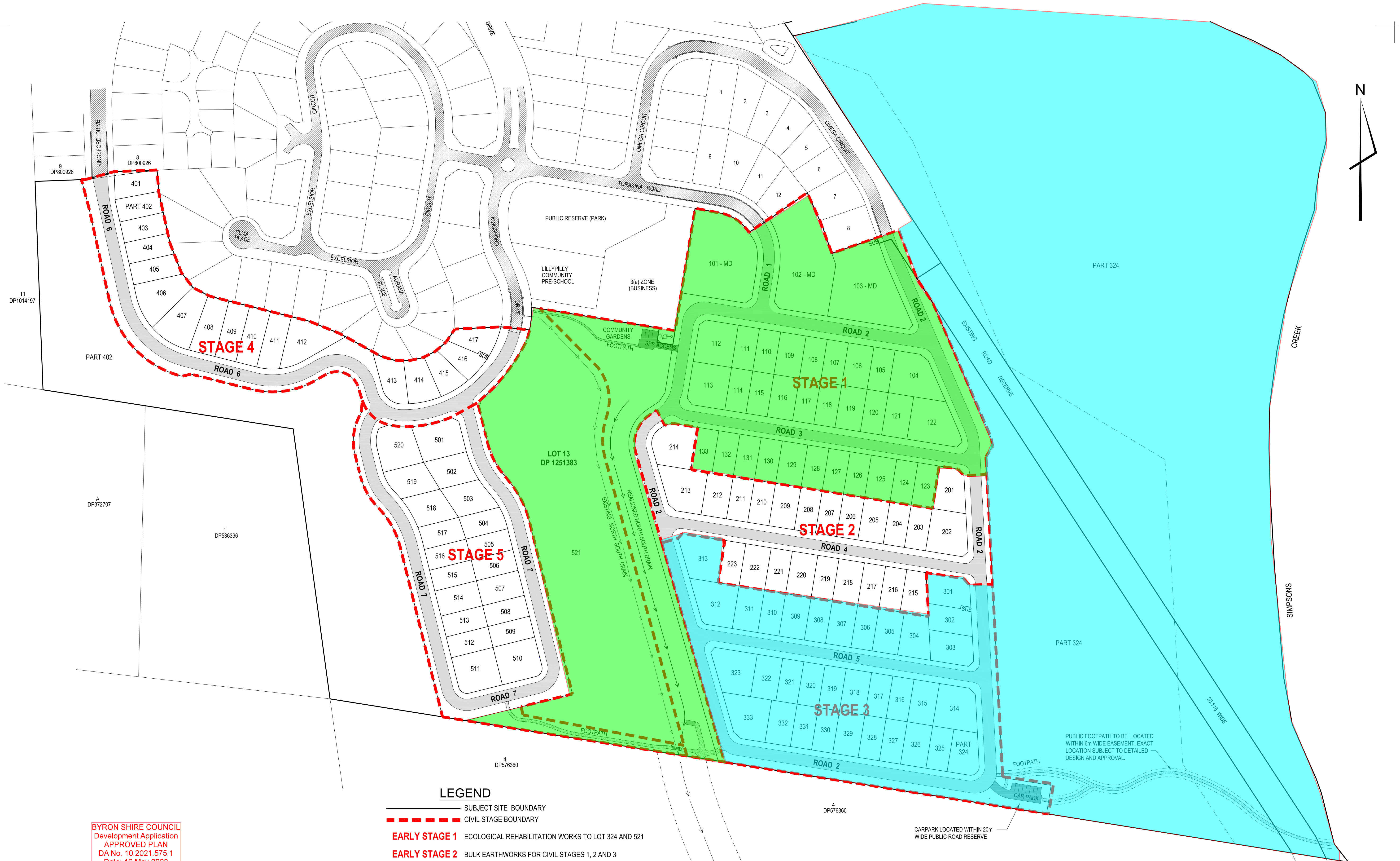
## DEVELOPMENT APPLICATION

### INDEX SHEET

### 1133-DA1D

February 2023





BYRON SHIRE COUNCIL  
Development Application  
APPROVED PLAN  
DA No. 10.2021.575.1  
Date: 16 May 2023

LEGEND	
	SUBJECT SITE BOUNDARY
	CIVIL STAGE BOUNDARY
<b>EARLY STAGE 1</b>	ECOLOGICAL REHABILITATION WORKS TO LOT 324 AND 521
<b>EARLY STAGE 2</b>	BULK EARTHWORKS FOR CIVIL STAGES 1, 2 AND 3
<b>CIVIL STAGE 1</b>	30 LOTS + 3 M.D. LOTS
<b>CIVIL STAGE 2</b>	23 LOTS
<b>CIVIL STAGE 3</b>	33 LOTS
<b>CIVIL STAGE 4</b>	17 LOTS
<b>CIVIL STAGE 5</b>	20 LOTS + LOT 521
EASTERN PRECINCT EARTHWORKS & N-S DRAIN TO BE CONSTRUCTED IN EARLY STAGE 2	
WESTERN PRECINCT EARTHWORKS TO BE CONSTRUCTED IN CIVIL STAGE 4 & 5	

<div>2010020406080100</div> <div>SCALE 1:1,250 AT A1, 1:2,500 AT A3</div> <div>D FOR RE-SUBMISSIONWF WF 10.02.2023</div> <div>C UPDATE LOT NUMBERSWF WF 16.11.2022</div> <div>B FOR RE-SUBMISSIONWF WF 01.08.2022</div> <div>A FOR SUBMISSIONWF WF 01.09.2021</div> <div>IssDescriptionDesDrwDateAppd</div>					
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**BAYSIDE BRUNSWICK Pty. Ltd.**  
**ENGINEERING PLANS FOR D.A.**  
**126 LOT SUBDIVISION OF LOT 13 DP 1251383**  
**15 TORAKINA ROAD, BRUNSWICK HEADS**

**SUBDIVISION STAGING PLAN**

Scale: 1:2,500 at A3  
Datum: AHD  
CAD file: 1133-DA4D.dwg  
CivilCAD file: 1133-ENG

**CivilTech**  
Consulting Engineers

Subdivision Design • Civil Engineering • Town Planning • Project Management

CivilTech Consulting Engineers  
Ph. 0431 065 645  
PO BOX 4285  
Gosnellabah NSW 2480  
www.civiltech.net.au

Sheet No.  
**4 of 31**

Dwg. No.  
**1133-DA4**

Issue  
**D**

## Appendix E: Native flora species recorded on site.

(refer to Table 3.2 for exotic species)

Species Name	BC Act listing	EPBC Act listing
<i>Acacia pulchella</i>	-	-
<i>Acacia spp</i>	-	-
<i>Acacia ulicifolia</i>	-	-
<i>Acacia suaveolens</i>	-	-
<i>Allocasuarina littoralis</i>	-	-
<i>Aotus ericoides</i>	-	-
<i>Austromyrtus dulcis</i>	-	-
<i>Baeckea linifolia</i>	-	-
<i>Baloskion pallens</i>	-	-
<i>Baloskion tetraphyllum</i>	-	-
<i>Banksia serrata</i>	-	-
<i>Baumea rubiginosa</i>	-	-
<i>Blandfordia grandiflora</i>	-	-
<i>Blechnum cartilagineum</i>	-	-
<i>Boronia ledifolia</i>	-	-
<i>Callistemon pachyphyllus</i>	-	-
<i>Callitris collumellaris</i>	-	-
<i>Cassytha pubescens</i>	-	-
<i>Caustis recurvata</i>	-	-
<i>Calochaena dubia</i>	-	-
<i>Cinnamomum camphora</i>	-	-
<i>Commesperma sphaerocarpum</i>	-	-
<i>Cryptostylis erecta</i>	-	-



Species Name	BC Act listing	EPBC Act listing
<i>Cupaniopsis anarcardioides</i>	-	-
<i>Cyperus polystachyos</i>	-	-
<i>Dianella caerulea</i>	-	-
<i>Dillwynia spp</i>	-	-
<i>Dodonea triquetra</i>	-	-
<i>Drosera spp</i>	-	-
<i>Elaeocarpus reticulatus</i>	-	-
<i>Entolasia marginata</i>	-	-
<i>Epacris pulchella</i>	-	-
<i>Eucalyptus racemosa</i>	-	-
<i>Eucalyptus robusta</i>	-	-
<i>Melicope ellryana</i>	-	-
<i>Gahnia sieberiana</i>	-	-
<i>Gleichenia dicarpa</i>	-	-
<i>Geodorum densiflorum</i>	Endangered	-
<i>Goodenia spp</i>	-	-
<i>Guioa semiglauca</i>	-	-
<i>Hakea spp</i>	-	-
<i>Hibbertia scandens</i>	-	-
<i>Hibbertia spp</i>	-	-
<i>Jagera pseudohorhus</i>	-	-
<i>Lepironia articulata</i>	-	-
<i>Lepidosperma laterale</i>	-	-
<i>Leptocarpus tenax</i>	-	-
<i>Leptospermum juniperinum</i>	-	-
<i>Leptospermum lanceolatus</i>	-	-
<i>Leptospermum liversidgei</i>	-	-
<i>Leptospermum polygalifolium</i>	-	-

Species Name	BC Act listing	EPBC Act listing
<i>Leptospermum spp</i>	-	-
<i>Leucopogon spp</i>	-	-
<i>Leucopogon spp 1</i>	-	-
<i>Lomandra longifolia</i>	-	-
<i>Lycopodium fastigatum</i>	-	-
<i>Lygodium microphyllum</i>	-	-
<i>Marsdenia linifolia</i>	-	-
<i>Melaleuca nodosa</i>	-	-
<i>Melaleuca quinquenervia</i>	-	-
<i>Monotoca elliptica</i>	-	-
<i>Nematolepis squamea</i>	-	-
<i>Notolea spp</i>	-	-
<i>Pandorea pandorana</i>	-	-
<i>Paspaladium distans</i>	-	-
<i>Paspalum spp</i>	-	-
<i>Parsonsia straminea</i>	-	-
<i>Patersonia sericea</i>	-	-
<i>Persoonia pinifolia</i>	-	-
<i>Persoonia stradbokensis</i>	-	-
<i>Pimelea linifolia</i>	-	-
<i>Pomax umbellata</i>	-	-
<i>Pteridium esculentum</i>	-	-
<i>Pultenaea spp</i>	-	-
<i>Schoenus brevifolius</i>	-	-
<i>Smilax australis</i>	-	-
<i>Sphagnum australe</i>	-	-
<i>Sporadanthus interruptus</i>	-	-
<i>Tetratheca thymifolia</i>	-	-



Species Name	BC Act listing	EPBC Act listing
<i>Xanthorrhoea spp</i>	-	-
<i>Xyris gracilis</i>	-	-

## **Appendix F: NPWS Checklist For Bush Regeneration In Threatened Species Habitat or Threatened Ecological Community**



## NPWS Checklist For Bush Regeneration In Threatened Species Habitat or Threatened Ecological Community

Management Planning:	Yes	No	More Information Attached
The proposed activities will be in accordance with a management plan or site plan (map). Please attach the plan or relevant sections of the plan or strategy to the licence application.			
The project has been discussed with the relevant Landcare coordinator. If not, provide details of any other professional advice you have sought, e.g. from a qualified bush regenerator.			
A NPWS Wildlife Atlas database search of a 5km radius of the site has been undertaken to identify threatened flora/fauna species known or likely to occur on the site. <i>The Wildlife Atlas is accessible on the NPWS Web Site <a href="http://www.npws.nsw.gov.au">www.npws.nsw.gov.au</a>.</i>			
Prior to commencing any works on site, a permit or permission will be obtained from the relevant landowner(s) or land manager(s).			
<b>Training and supervision:</b>			
(Training and supervision by qualified person to be arranged – land manager participation will be vital to the success of the project)			
All activities by workers will be regularly checked and approved by the co-ordinator.			
All workers will be informed of any threatened species or threatened ecological communities known from the area or which may occur in the area and the potential impacts of activities on these species/communities. <i>e.g. vines on the edge of a littoral rainforest remnant may protect the remnant from salt-bearing winds.</i>			
All workers have adequate weed and native plant identification skills. i.e. all workers can identify and differentiate between weeds and native plants that occur on the site.			
Workers will be familiar with the identifying features of threatened flora that are known or likely to occur in the project area. Where threatened species known from the area are similar to weed species, the distinguishing features between these will be understood prior to commencing the work.			
<b>Access to sites</b>			
All vehicular access to sites will be restricted to formed roads.			
Unnecessary damage to sites will be avoided. e.g. avoid working in wet weather to lessen soil compaction.			
To reduce the possibility of introducing plant diseases and weeds the following measures will be applied: 1. Secateurs will be sharp and cleaned with methylated spirits. 2. Footwear will be cleaned of loose soil and preferably treated with bleach between sites.			
<b>Impacts on flora:</b>			
Prior to any works being undertaken, the presence or absence of threatened flora will be determined by a thorough walking search of the area.			
All threatened flora will be tagged with highly visible flagging tape before work commences. If a number of individuals occur in a clump, the area should be marked out with flagging tape.			
Cutting or damaging of threatened flora will be avoided.			
All plants will be positively identified before they are removed (pulled, cut, poisoned etc.).			
Weed removal within 2m of a threatened species will be undertaken by hand.			
<b>Impacts on fauna:</b>			
All workers will be aware of any threatened fauna that are known or likely to occur on site, and the potential impacts of the proposed activities on those species.			
The habitat and refuge potential of weeds and rubbish will be considered prior to removal. <i>e.g. Lantana can provide cover for threatened fauna such as the Bush-hen. Dead Lantana and poisoned Camphor Laurels should, where possible, be left in situ.</i>			
Weeds will be removed gradually in areas where an infestation is extensive. <i>Ideally, 50% of weeds that may provide habitat should be left until native plant species have re-established and provide alternative refuge.</i>			

## NPWS Checklist For Bush Regeneration In Threatened Species Habitat or Threatened Ecological Community

Impacts on fauna:	Yes	No	More Information Attached
Disturbance to, and removal of rocks, logs and other potential refuge sites will be avoided.			
A herbicide registered for use near waterways will be used within 5m of waterways.			
Herbicide spraying will be restricted to a distance greater than 5 metres from watercourses where threatened frogs are known or likely to occur and within a 10m radius of records of threatened frogs.			
A buffer of 1m along other watercourses will be maintained in which no herbicide will be sprayed.			
Care will be taken to minimise disturbance to shy or cryptic species. <i>e.g. the Marbled Frogmouth roosts in vine 'curtains'.</i>			
Care will be taken to minimise disturbance to the leaf litter layer.			
<b>Reconstruction through revegetation:</b> <i>This section does <b>not</b> address propagation or planting of threatened species – this activity would need to be separately addressed.</i>			
Seed collection or cuttings will be from species, populations or ecological communities other than those listed as threatened (unless licensed)			
Prior to collecting any seed or cuttings permission will be obtained from the relevant landholder or manager of the site. <i>e.g. a licence is required to collect native plants on National Parks estate.</i>			
Seed collection from any one species will be limited to less than 10% of the available crop at that site.			
Seed collection from any individual plant will be limited to less than 10% of the available crop.			





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Bangalow

25 Leslie Street  
Bangalow NSW 2479  
P 02 6687 1550  
[info@awconsult.com.au](mailto:info@awconsult.com.au)

[www.awconsult.com.au](http://www.awconsult.com.au)