# Coffs Harbour Local Environmental Plan 2013 (Amendment)

**Planning Proposal PP-2022-3059**
**Site Identification Map**
**Land Zoning Map - Part of map tile:**
1800_COM_LZN_005B_020_20130501

**Planning Proposal Area**

Lots 1 & 2 DP 1093448
218 Eastbank Road Coramba

**Land Zoning (Proposed)**

- C2 Environmental Conservation
- R5 Large Lot Residential

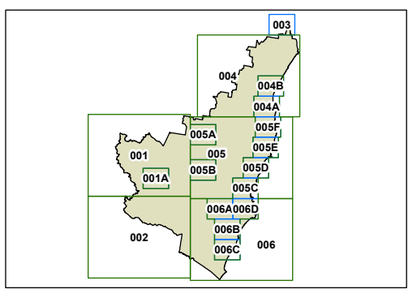
**Land Zoning (Existing)**

- C2 Environmental Conservation
- R2 Low Density Residential
- R5 Large Lot Residential
- RU2 Rural Landscape
- RU3 Forestry

**Cadastre**



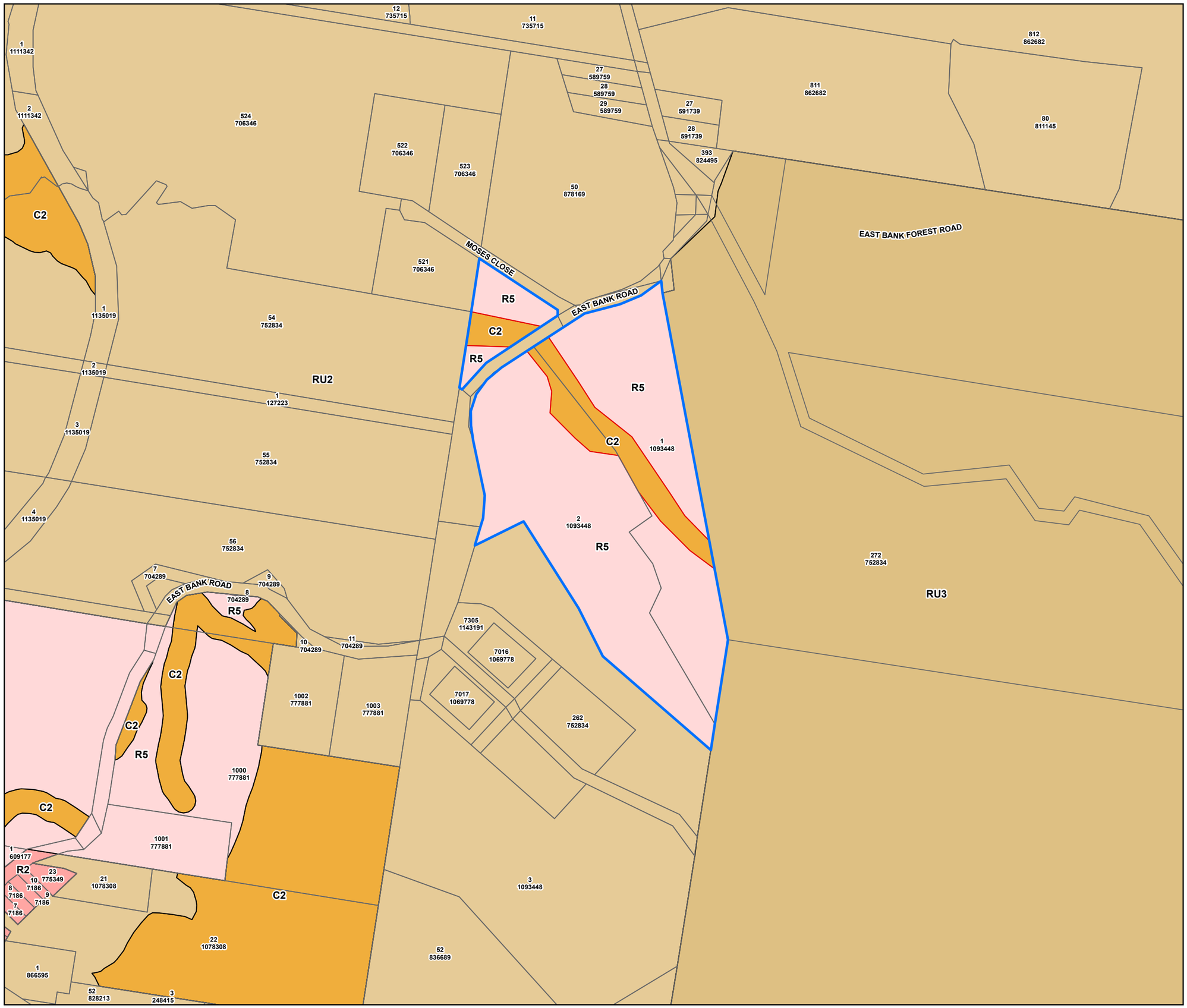
This map is for explanation purposes only.
This map is not a legal document.




N

Projection: GDA 1994
MGA Zone 56

Map identification number: 1800_COM_LZN_005B_020_20130501



# Coffs Harbour Local Environmental Plan 2013 (Amendment)

## Planning Proposal PP-2022-3059
## Site Identification Map
## Lot Size Map - Part of map tile:
1800_COM_LSZ_005B_020_20170720

**Planning Proposal Area**

Lots 1 & 2 DP 1093448
218 Eastbank Road Coramba

**Minimum Lot Size (sq m) (Proposed)**

- AB 40ha
- X3 8000m

**Minimum Lot Size (sq m) (Existing)**

- F 400m
- K 550m
- M 600m
- U1 1200m
- U2 1300m
- W 3000m
- X1 5000m
- X2 6000m
- X3 8000m
- Y 1ha
- Z 2ha
- AB 40ha

**Cadastre**

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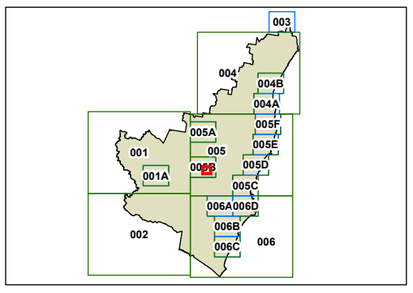


N

Projection: GDA 1994
MGA Zone 56

Scale: 1:1:6,000 @ A3

Map identification number: 1800_COM_LSZ_005B_020_20170720

# Coffs Harbour Local Environmental Plan 2013 (Amendment)

**Planning Proposal PP-2022-3059**
**Site Identification Map**
**Terrestrial Biodiversity Map -**
**Drinking Water Catchment Map -**
**Riparian Lands and Watercourses Map -**
**Part of map tile:**

1800_COM_CL2_005B_020_20130326

**Planning Proposal Area**

Lots 1 & 2 DP 1093448
218 Eastbank Road Coramba

**Terestrial Biodiversity (Proposed)**

Biodiversity

**Terestrial Biodiversity (Existing)**

Biodiversity

**Cadastre**

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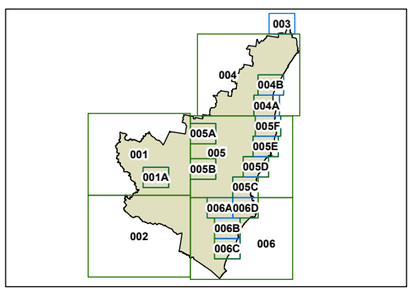


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Projection: GDA 1994
MGA Zone 56

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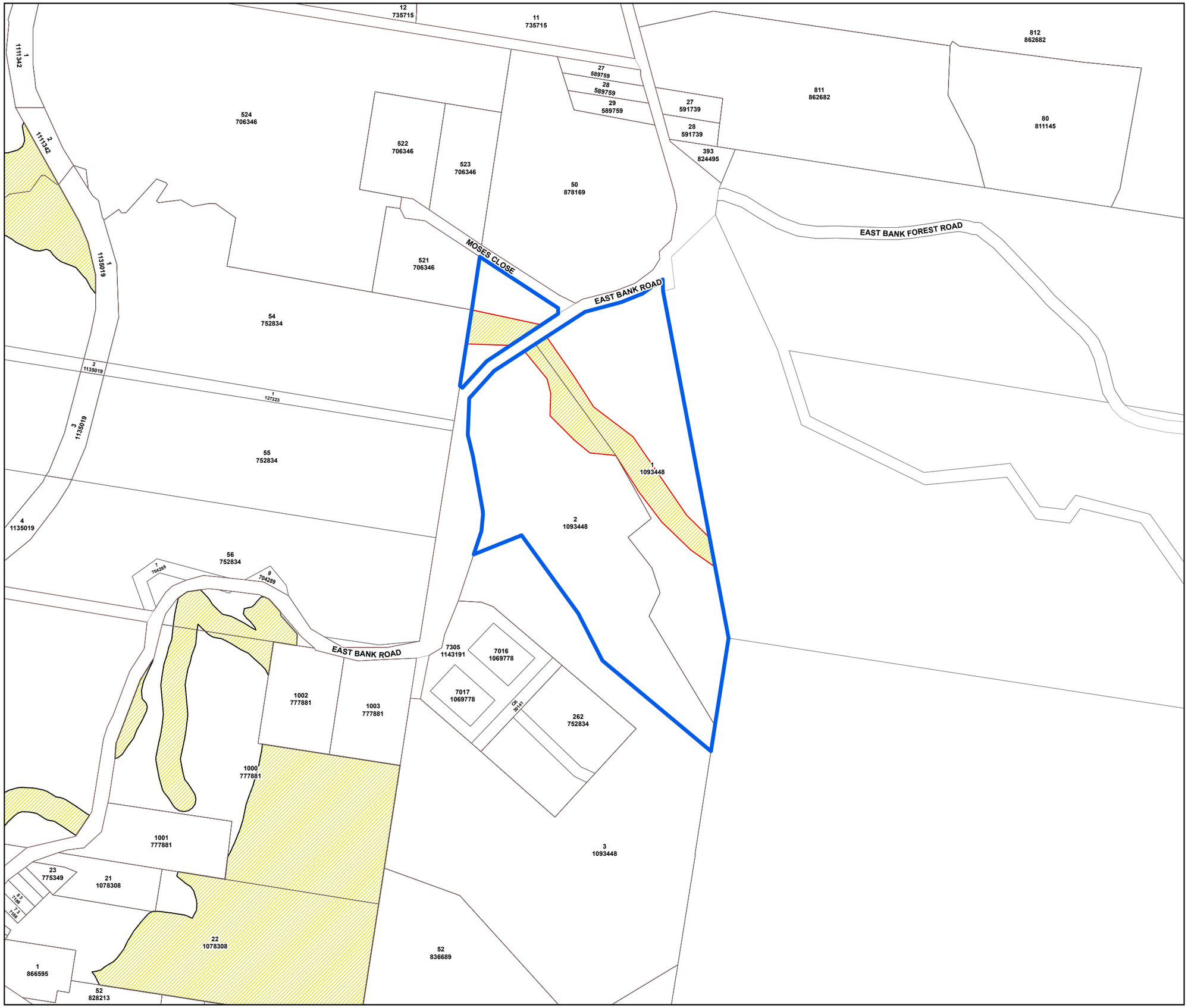
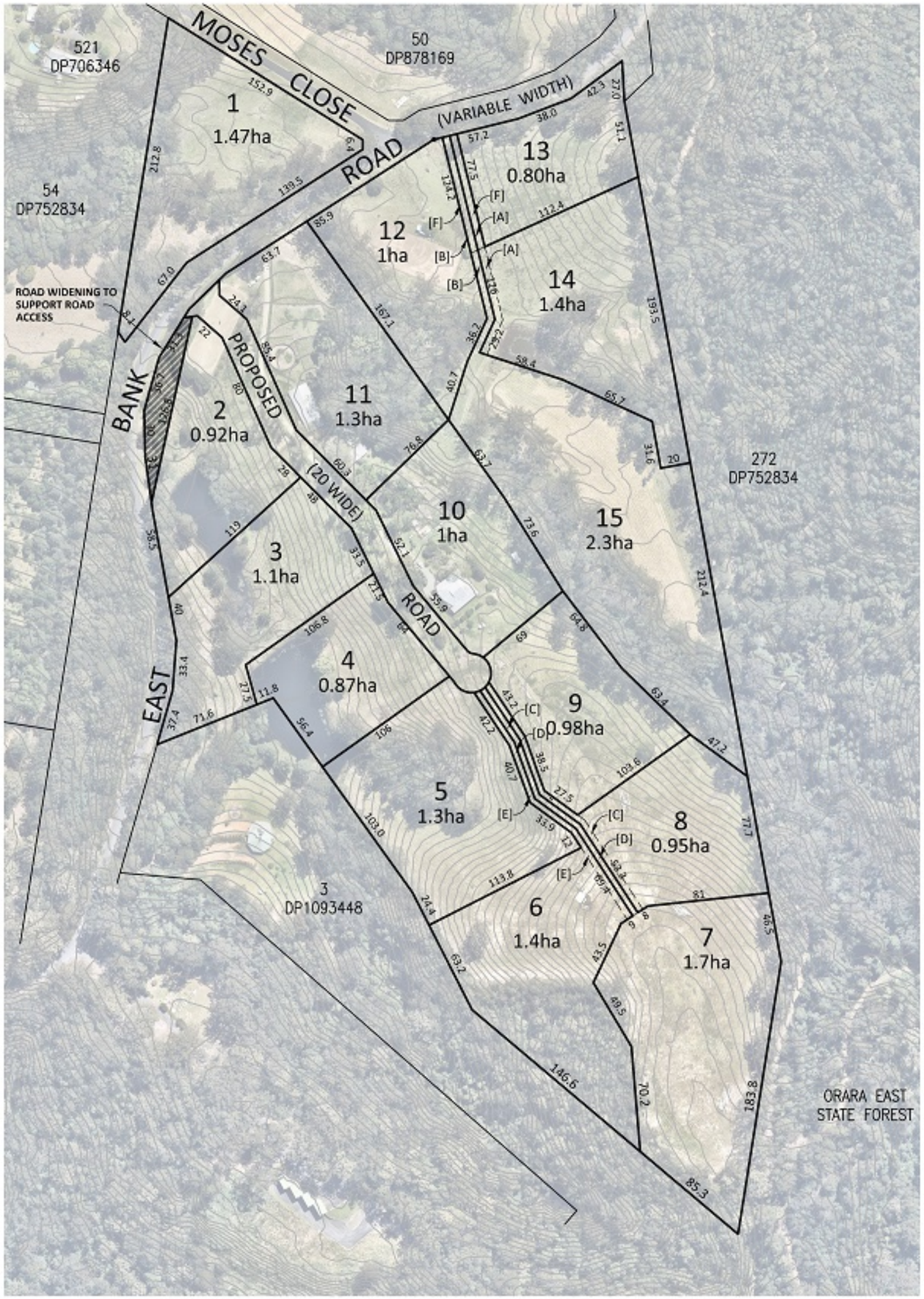


**APPENDIX 4 - CONCEPT LOT LAYOUT**



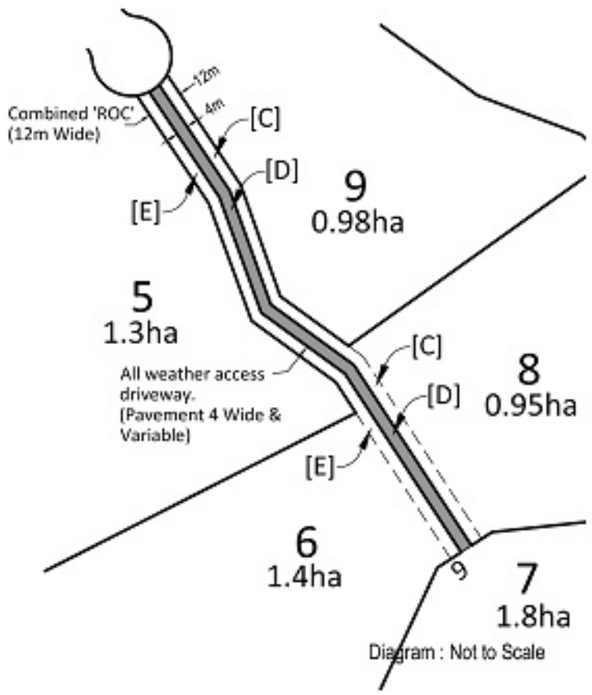

NOTE:

- The dimensions, areas and numbers of lots shown heron are approximate and are subject to verification by field survey.
- The location of all physical features relative to existing or proposed title boundaries shown hereon is approximate and subject to verification by field survey.
- No reliance should be placed on the information shown on this plan for any financial dealings or detailed engineering design involving the land.
- Land Metrics Pty Ltd disclaims any liability whatsoever for any loss or damage that is incurred arising from any individual or organisation who uses or relies upon this document for any financial dealing or any other purpose, including as a document which has been prepared to accompany a development application.
- This Plan is not a plan of an approved subdivision nor does it imply that the proposed boundary arrangement would be approved.
- Road Widening of East Bank Road as shown to support safe intersection site distance as per AS2890 for 80Km Speed Zone.
- This note remains an intrinsic part of this plan and this plan must not be reproduced without this note.

[A] PROPOSED 'ROC' BENEFITTING PROPOSED LOT 15
[B] PROPOSED 'ROC' BENEFITTING PROPOSED LOT 14
[C] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 6 & 7
[D] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 6 & 8
[E] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 7 & 8
[F] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 12

NOTES:
'ROC' - RIGHT OF CARRIAGEWAY

**DIAGRAM 'A'**




Scale - 1:3000 @ A3
0 50 100

218 EAST BANK ROAD
PLANNING PROPOSAL
CONCEPT SUBDIVISION
J. CLEARY
LOT 1 & 2 DP 1093448
EAST BANK ROAD, CORAMBA

Land Metrics
Land Development Consultants

Land Metrics Pty Ltd
PO Box 6511 Corindi Beach, NSW 2450
Ph. 0422 697 846
E: matt@landmetrics.net.au

| Surveyed | Drawn | |
|---|---|---|
| N/A | M.C. | |
| Checked | Date | |
| M.C. | 09/10/2023 | |
| Dwg No | Sheet | Rev |
| 2021-029 | 01 | |

# Addendum to Biodiversity Assessment, proposed rezoning of Lots 1 & 2 DP 1093448, 218 Eastbank Road Coramba

This Addendum was prepared for

**Keiley Hunter Urban Planner, Coffs Harbour**

by

G N Elks BSc MLitt.MECA Botanist and Plant Ecologist

21 Titans Close Bonville 2450

4 July 2023

## Summary

This Addendum to a Biodiversity Assessment for proposed rezoning of Lots 1 & 2 DP 1093448, 218 Eastbank Road Coramba, which was originally published on 5 December 2022 (**ATTACHMENT 1**) addresses issues associated with the location and extent of a proposed C2 Zone that were inadequately explained in the original document.

## Proposed C2 Zone

A proposed C2 Zone was identified that included the following:

- Approximately 99% of flood prone (CHCC mapped as 1% AEP) land associated with the secondary watercourse;
- A riparian corridor meeting the requirements of DPIE guidelines;
- Approximately 70% of CHCC mapped secondary Koala habitat, and
- Approximately 70% of the native vegetation associated with the secondary watercourse.

Council commented that *"it appears that the zoning layout has been drafted on the basis of lot yield (to consider the MLS) and not on the land/ecology constraints, i.e. the sharp corners in lot 11 do not align with the vegetation mapping which is also secondary koala habitat."*

There are two issues here:

1. C2 zone sharp corners (both in Lot 11 and generally) were generated by the ecologically highest priority *ie:* capturing the flood-prone riparian land, while maximising included forested land.
2. The secondary Koala habitat mapping was obtained from Council's online mapping. Field survey indicated that it is not an accurate characterisation of the quality of Koala habitat on this part of the property. Council Koala habitat mapping has therefore been removed from **Figure 1** (*cf* Figures 5 & 6 in Elks 2022).

As to the first issue, C2 zone sharp corners have now been smoothed, resulting in a minor reduction in area of flood-prone land and a minor increase in forested land as shown in **Figure 1**.

As to the second issue, the adequacy of the Koala habitat mapping on the property is addressed via consideration of the methodology adopted in the Coffs Harbour Koala Plan of Management (KPoM) Part B below.

On a related matter, Council also commented that *"Council's consistent approach has been to ensure koala habitat is zoned environmental while noting the need for a logical zoning layout. The zoning layout should more closely follow the koala habitat mapping – revised to the extent shown in the ecology report."*

This is addressed under Coffs Harbour Koala Plan of Management (KPoM) Part A further below.

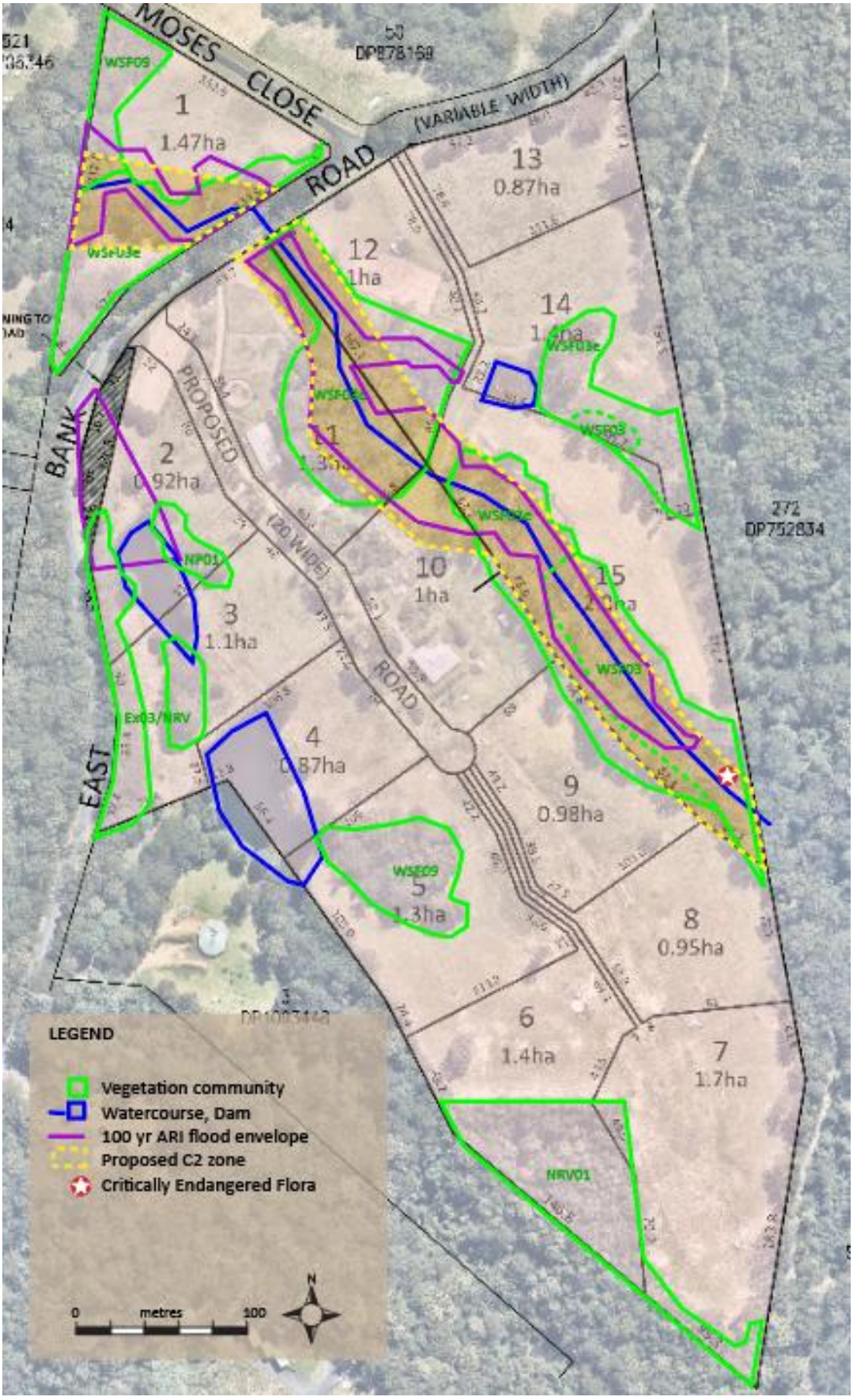



Figure 1. Vegetation, 100year ARI and proposed C2 Zone.

**Coffs Harbour Koala Plan of Management (KPoM) Part B**

Classification of Koala habitat in Coffs Harbour LGA as described in detail in Part B of the KPoM. In the Coramba locality (and outside of the most important South East Koala Planning Precinct, which is generally confined to coastal and near-coastal hinterland south from Korora), the three koala habitat planning categories were derived directly from the Koala Habitat Map as follows (KPoM p57, Table B4).

- Preferred Habitat Type A and B - Primary Koala Habitat
- Supplementary Habitat Type A and B1 - Secondary Koala Habitat
- Supplementary Habitat Type B2 - Tertiary Koala Habitat

Where they do not occur on quaternary sand and alluvium, both Blue Gum , Flooded Gum and Blackbutt dominated forests (such as those of the study area) are categorised as Supplementary B2 (Tertiary Koala habitat) (KPoM Part B Appendix B7).

The property occurs on the Ulong soil landscape, an erosional landscape of undulating to rolling low hills on Late Carboniferous metasediments, and no quaternary sand or alluvium is mapped as occurring.

However there may be some small areas of quaternary alluvium associated with the watercourse. Where Blue Gum , Flooded Gum and Blackbutt dominated forests occur on quaternary sand and alluvium they are categorised as Supplementary A (Secondary Koala habitat). Areas of quaternary alluvium are likely to occur only within the 1%AEP flood level and are therefore captured in the proposed C2 zone.

Classification of Koala habitat from field-based survey as undertaken for the KPoM placed vegetation with a lower percentage of preferred tree species (less than 35 % Tallowwood) and with a low level of use by koalas of the property in Field Rank 3 (KPoM p.43), equivalent to Tertiary Koala habitat. Vegetation field ranked 3 was largely concentrated in the west of the LGA including around the study area.

Of trees identified during the scat search only 10% were Tallowwood, with the percentage in any polygon ranging from 18% to zero, significantly less than the 35% identified as the minimium in field rank 3 vegetation.

Furthermore, Koala scat search undertaken using the Biodiversity Assessment Method detected no scats, indicating that forest vegetation on the property is in the Low Use category for Koalas.

Application of the KPoM classification methodology therefore supports classification of vegetation on the property as Tertiary Koala habitat.

**Coffs Harbour Koala Plan of Management (KPoM) Part A**

With the exception of primary koala habitat occurring on lands already zoned for urban, industrial or special purposes, or as open space, primary koala habitat was zoned 7(A) Environmental Protection - Habitat and Catchment in Coffs Harbour LEP 2000 (KPoM Part A p.9). Similarly, areas of Secondary Koala Habitat in the south-east of the LGA were zoned 7(A) Environmental Protection zone in LEP

2000 except where it occurs on lands zoned for urban, industrial or special purposes or as open space (KPoM Part A p.11).

7(A) zones have since been replaced by C2 zones, but it was not Council policy under the KPoM to include Secondary Koala Habitat in 7(A) zones except in the South East Koala Planning Precinct, which does not include the study area. Tertiary Koala habitat was not identified for inclusion in the 7(A) zone.

The exclusion of vegetation on the property from 7(A) (now C2) Zoning on the basis of Koala habitat characteristics is therefore consistent with Council's approach.

# ATTACHMENT 1.

# Biodiversity Assessment, proposed rezoning of Lots 1 & 2 DP 1093448, 218 Eastbank Road Coramba

Prepared for

## Keiley Hunter Urban PLanner, Coffs Harbour

G N Elks BSc MLitt. Botanist and Plant Ecologist

Idyll Spaces Environmental Consultants

21 Titans Close Bonville 2450

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5 December 2022

# Contents

## Figures and tables

# Introduction

## Background

Keiley Hunter engaged Greg Elks of Idyll Spaces Environmental Consultants to undertake a preliminary assessment of the potential impacts of subdivision on flora and fauna habitat.

The aim of the assessment is to identify flora and fauna constraints to development. The objectives of this assessment are to:

- undertake a Bionet search of records in the locality to identify potentially occurring threatened species.
- undertake a site transect survey to identify threatened flora, community, species composition, habitat attributes;
- Review and report on:
  - vegetation classification and mapping;
  - key habitat features such as watercourses, large trees, old trees, Koala feed trees, dens, roosts, nests, dense ground layer vegetation, nectar sources, fruit-bearing trees;
  - Koala habitat mapping, NSW Biodiversity values mapping, High Value Habitats mapping, Prescribed Vegetation, and
  - any key habitat features likely to be utilised by threatened species known to occur in the locality.

This assessment was completed in March 2022. A response from Coffs Harbour City Council (CHCC 24 October 2022) identified four issues for attention. These issues have been addressed in this final assessment report.

## Subject site, study area and locality

For the purposes of this assessment the locality is defined as the area within a square of approximately 10kmx10km centred on the study area (**Figure 1**). The locality includes rural areas and villages of Coramba and Karangi.

The study area is Lots 1 & 2 DP 1093448, 218 Eastbank Road Coramba (the property). It is zoned RU2 and adjoins part of Orara East State Forest.

The subject site is the area occupied by native vegetation on the Lot.

# Methods

## Map and data review

A search of Bionet Wildlife Atlas records was undertaken on 10/11/2022. Aerial orthophotographs and maps were inspected online to identify vegetation communities, Koala habitat mapping and other mapped features of interest at http://chccmaps.coffsharbour.nsw.gov.au.

Mapping on the Spatial Information Exchange at https://maps.six.nsw.gov.au/ was reviewed to ascertain the status of watercourses on the property.

## General field survey

The study area was surveyed by means of transects over 2.5 hours on 26 July 2021 to examine flora and fauna habitats, identify vegetation communities in the study area and conduct targeted searches for threatened flora and evidence of threatened fauna known to occur in the locality.

## Koala Scat search

A Koala scat search was undertaken over 6 hours using the Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method (Department of Planning and Environment 2022). Additional plant material collection wss undertaken to refine vegetation mapping, particularly regarding Koala habitat

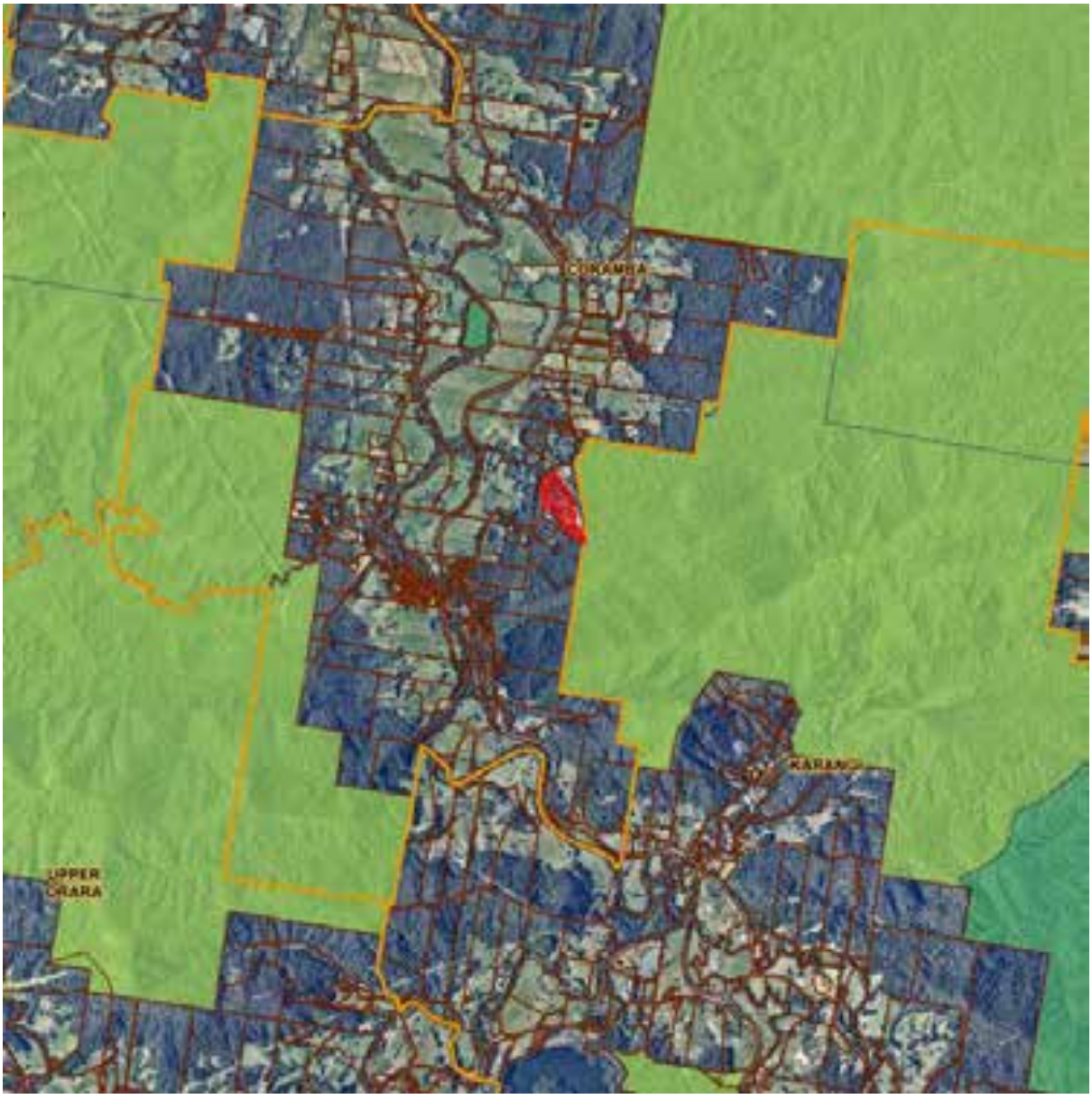


Figure 2. Study Area (outlined) and Locality


Figure 3. CHCC Class 5 vegetation mapping

Figure 5. CHCC Koala habitat

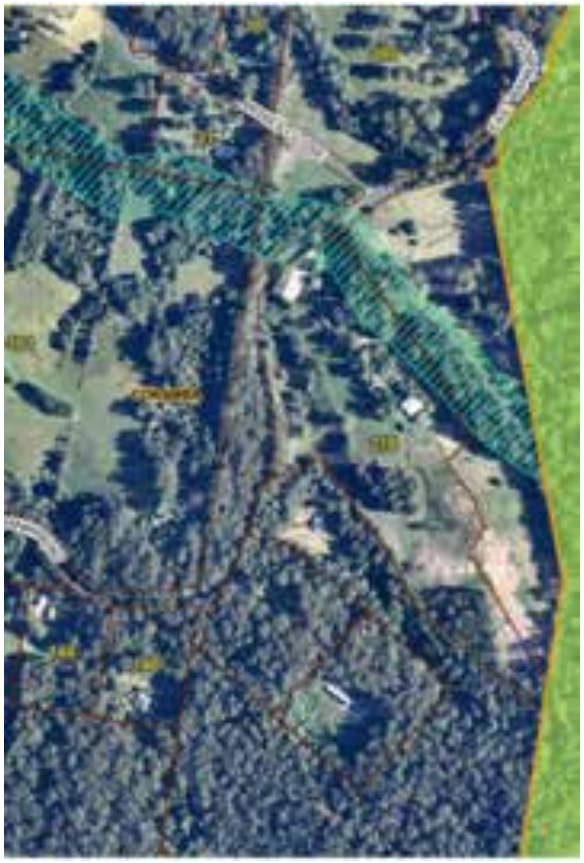

Figure 4. CHCC Local Corridor

# Results

## CHCC mapping

### Exclusions

The following are not mapped as occurring on the property:

- High Value Habitats
- Prescribed vegetation
- Biodiversity

### Class 5 Vegetation Mapping

CHCC vegetation mapping (**Figure 2**) indicates the presence of the following communities:

- CH_WSF01 Coast and Hinterland Riparian Flooded Gum Bangalow Wet Forest along the upper part of the watercourse running through the property;
- CH_WSF03 Foothills and Escarpment Blue Gum - Tallowwood -Turpentine Wet Shrubby Forest along the lower part of the watercourse running through the property;
- CH_WSF09 Northern Escarpment Blackbutt - Apple Wet Ferny Forest in most of the other vegetation on the property;
- CH_EX03 Exotic vegetation around the house in the central part of the property and
- CH_NRV01 Native remnant vegetation in the elevated south-western part of the property.

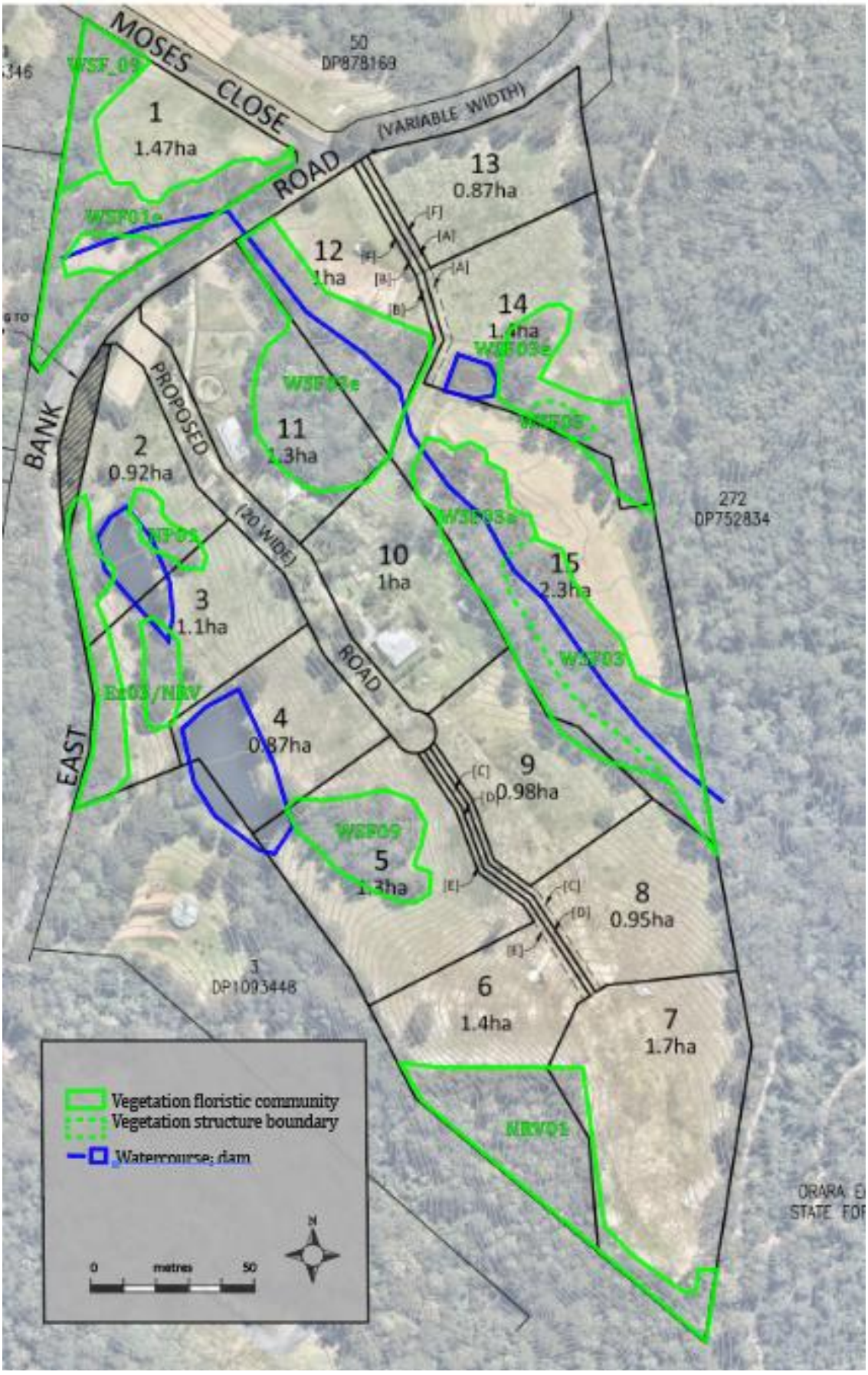


**Figure 6. Aerial imagery, vegetation communities and proposed lot layout**

### Koala Habitat mapping

CHCC mapping identifies native vegetation on the property as mostly Tertiary Koala Habitat, with Secondary Habitat along part of the watercourse (**Figure 3**).

### Habitat Corridors

A local corridor is mapped along the watercourse connecting Orara East State Forest to the Orara River (**Figure 4**).

## SIX mapping, watercourses

The main watercourse on the property is a second order watercourse. Other watercourses mapped as first order watercourses are on cleared and cultivated land and present as either farm dams or as drainage depressions, rather than as drainage lines with defined bed and banks.

## Vegetation communities identified in the field

### WSF03 Foothills and Escarpment Blue Gum - Tallowwood -Turpentine Wet Shrubby Forest

WSF03 extends along the second order watercourse running through the property. The community is dominated by Blue Gum and Bluegum - Flooded gum hybrids, with occasional Tallowwood, Turpentine, Brush Box, Pink Bloodwood and White Mahogany.

Intact areas of the community are confined to the upper (southern) part of the watercourse.

Most areas of the community have been modified by past clearing and the understorey is absent or dominated by exotic Privet, Camphor laurel, Japanese honeysuckle and/or exotic grasses such as Broadleaved paspalum. These areas are mapped as WSF03e.

### CH_WSF09 Northern Escarpment Blackbutt - Apple Wet Ferny Forest

WSF09 was mapped by CHCC in native vegetation in more elevated parts of the property, however the signature species Blackbutt and Smooth-barked apple are present only in a small area at the northern extremity of the property. Blackbutt is very rare to absent from the remainder of the property, however Smooth-barked apple is present in a small remnant at the head of the large farm dam in the west of the property, together with a range of other species including Grey ironbark, Tallowwood, Blue gum and White mahogany. This assemblage is difficult to categorise but has also been placed in WSF09.

### CH_EX03 Exotic vegetation

Includes all areas of exotic pasture and exotic garden areas around the house in the central part of the property.

An area of mixed Exotic and Native Remnant Vegetation has been mapped in the western part of the property. It includes *Acacia spp*, Blue Gum, Privet, Pine and Camphor Laurel.

### CH_NRV01 Native remnant vegetation

Confined to in the elevated south-western part of the property. This community is dominated entirely by regrowth Tallowwood, Turpentine and Forest oak between 10 and 20cm diameter.

### NP01 – Native Pioneers

A small area of this community, dominated by regrowth of *Acacia spp*, has been mapped adjoining the lower farm dam.

## Soil, ecology and disturbance

Most of the property is mapped as occurring on the Ulong landscape, with the Megan soil landscape occupying the area of elevated land in the south-western part of the site. There also seems to be a geological change across the watercourse, with coarser-grained metamorphic rocks to the east. These factors are probably driving some of the floristic variation across the property.

It is also likely that variation in dominant tree species across the site is associated with past disturbance, particularly selective logging of Tallowwood, which is uncommon to absent except in native remnant vegetation NRV01. Associated disturbance includes past episodes of heavy logging and of clearing, as indicated by the presence of canopy gaps, predominance of small trees and the absence of large trees, old trees, or large woody debris. There has also been underscrubbing, particularly in areas affected by Privet, and grazing by cattle and horses.

There is no evidence of recent fire.

## Threatened flora

There are 9 threatened flora species recorded as occurring in the locality (**Table 1**), 7 of which are assessed as unlikely to occur. Two Critically Endangered species, *Rhodamnia rubescens* and *Rhodomyrtus psidioides*, were detected in the study area.

Native guava is present as 1 small plant about 1 metre tall and one associated group of eight coppice stems to around 1 metre tall, and Brush turpentineas two small plants around one metre tall.

All are located at the location shown on **Figure 6**. They occur in an area of about 4mx5m that is within the vegetated riparian zone and the proposed C2 zone.

## Threatened Ecological Communities

Vegetation of the subject site is unlikely to meet either the floristic, edaphic, locational or topographic criteria for consideration as any EEC.

## Other Threatened Fauna habitat

There are 33 threatened fauna species recorded as occurring in the locality (**Table 2**). Many of those may use the subject vegetation for foraging on occasion; none were assessed as likely to utilise it as breeding habitat.

The property is identified as having wildlife corridor potential.

The following habitat elements were not detected in the subject site:

- Tree hollows;
- large trees, old trees, large woody debris;
- nests and roosts;
- latrine or den sites for spotted-tailed quolls;
- flying-fox camps;

- other potential bat roosts (caves, culverts, tunnels, disused mine shafts, fairy martin nests, staghorns, palms);
- large fleshy fruit-bearing trees or vines.

## Koala

The preferred Koala browse species (Lunney *et a*l 1999) Tallowwood occurs in the subject site. Tallowwood is common only in NRV01, occurs rarely in WSF03 and WSF09, and is absent elsewhere.

Blue gum and a hybrid population of Blue Gum – Flooded gum are very common in WSF03. Although Flooded gum is a preferred Koala browse species, the status of Blue Gum – Flooded gum hybrids is unknown but assumed to be as for Flooded gum.

*Allocasuarina* trees also occur occasionally in WSF03 and NRV01.

The Koala scat search undertaken using the Biodiversity Assessment Method sampled 128 trees in polygons centred at 5x150m grid points. No Koala scats were detected. Limitations of the search included very wet weather for some months preceding the survey and low numbers of trees at two of the polygons (**Appendix 3**).

## Likelihood of occurrence of threatened flora and fauna

The likelihood of occurrence of threatened flora, communities and fauna that are known to occur in the locality was assessed on the basis of the occurrence and condition of vegetation types and habitat elements on the subject site.

Assessment considered the presence, number and currency of species records in the locality, the species habitat requirements and habitat elements in the study area, as well as plant community types as outlined in the relevant Threatened Species profiles at
http://www.environment.nsw.gov.au/threatenedSpeciesApp/

The likelihood of occurrence of species in the subject site was defined as follows:

Known - the species, or evidence of its occurrence, has been observed in the subject site.

Likely - there is a medium to high probability that a species occupies the subject site, is dependent on habitat resources for important lifecycle events, or visits the subject site during regular seasonal movements or migration.

Possible - suitable habitat for a species potentially occurs in the subject site, or the species is unlikely to be dependent on site habitat resources for important lifecycle events but there is insufficient information to categorise the species as likely or unlikely to occur.

Unlikely - a low probability that suitable habitat for a species occurs in the subject site, or the species may be an occasional visitor but habitat similar to the subject site is widely distributed in the local area and the species is not dependent on habitat resources in the subject site for important lifecycle events.

Nil - habitat in the subject site is unsuitable for the species.

**Table 1. Likelihood of occurrence of Flora species**

| ***Scientific name*** | **Common name** | **NSW Status** | **Comm Status** | **No of record** | **Habitat requirements** | **Suitability of site habitat** | **Likelihood of occurrence** |
|---|---|---|---|---|---|---|---|
| *Boronia umbellata* | Orara Boronia | V,P | V | 100 | Lower slopes or gullies in eucalypt forest between Glenreagh and Lower Bucca | Suitable habitat within the broader locality but not detected within the site by targeted survey | Unlikely |
| *Marsdenia longiloba* | Slender Marsdenia | E1 | V | 3 | Subtropical and warm temperate rainforest, moist eucalypt forest adjoining rainforest, and rock outcrops | Suitable habitat within the broader locality but not detected within the site by targeted survey | Unlikely |
| *Niemeyera whitei* | Rusty Plum, Plum Boxwood | V | | 537 | Rainforest and the adjacent understorey of moist eucalypt forest | Suitable habitat within the broader locality but not detected within the site by targeted survey | Unlikely |
| *Parsonsia dorrigoensis* | Milky Silkpod | V | E | 3 | Rainforest or moist eucalypt forest | Suitable habitat within the broader locality but not detected within the site by targeted survey | Unlikely |
| *Quassia sp. Moonee Creek* | Moonee Quassia | E1 | E | 13 | Shrubby open eucalypt forest | Suitable habitat within the broader locality but not detected within the site by targeted survey | Unlikely |
| *Rhodamnia rubescens* | Scrub Turpentine | E4A | CE | 53 | littoral, warm temperate and subtropical rainforest and wet sclerophyll forest | Suitable | Known |
| *Rhodomyrtus psidioides* | Native Guava | E4A | CE | 2 | littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines | Suitabkle | Known |
| *Sarcochilus fitzgeraldii* | Ravine Orchid | V,P,2 | V | 1 | Moist rock faces in subtropical rainforest | No suitable habitat on site | Nil |
| *Sarcochilus hartmannii* | Hartman's Sarcochilus | V,P,2 | V | 1 | Cliff faces or rock outcrops or trees in eucalypt forest | Suitable habitat within the broader locality but not detected within the site by targeted survey | Unlikely |

**Table 2. Likelihood of occurrence of Fauna species**

| Class | Scientific Name | Common Name | NSW status | Comm. status | Records | Habitat Requirements | Suitability of site habitat | Likelihood of occurrence |
|---|---|---|---|---|---|---|---|---|
| Amphibia | *Assa darlingtoni* | Pouched Frog | V,P | | 5 | damp leaf litter, or under rocks and rotten logs in cool, moist rainforest | Unsuitable | Nil |
| Amphibia | *Mixophyes iteratus* | Giant Barred Frog | E1,P,2 | E | 30 | Second order or higher streams in subtropical or cool temperate forests, or wet sclerophyll forests | Marginal. Stream ephemeral. | Nil |
| Amphibia | *Philoria sphagnicolus* | Sphagnum Frog | V,P | | 7 | in high rainfall areas at high elevation in Sphagnum Moss beds or seepages on steep slopes | Unsuitable | Nil |
| Reptilia | *Hoplocephalus stephensii* | Stephens' Banded Snake | V,P | | 9 | shelters between loose bark and tree trunks, amongst vines, or in hollow trunks limbs, rock crevices or under slabs during the day | Unsuitable | Nil |
| Aves | *Calyptorhynchus lathami* | Glossy Black-Cockatoo | V,P,2 | | 38 | large hollow-bearing eucalypts | Unsuitable | Nil |
| Aves | *Ephippiorhynchus asiaticus* | Black-necked Stork | E1,P | | 8 | Live or dead tree within or near foraging habitat. Usually isolated, live, paddock trees in NSW, but also in paperbarks and occasionally low shrubs within wetlands. | Unsuitable | Nil |
| Aves | *Glossopsitta pusilla* | Little Lorikeet | V,P | | 10 | Hollow-bearing trees. Typically but not solely large old Eucalyptus, often smooth barked species. | Unsuitable | Nil |
| Aves | *Haliaeetus leucogaster* | White-bellied Sea-Eagle | V,P | | 1 | mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat; nest trees are large emergent eucalypts often with emergent dead branches or large dead trees nearby | Unsuitable | Nil |
| Aves | *Hieraaetus morphnoides* | Little Eagle | V,P | | 2 | open eucalypt forest, woodland or open woodland | Unsuitable | Nil |
| Aves | *Hirundapus caudacutus* | White-throated Needletail | P | V,C,J,K | 2 | nil | Unsuitable | Nil |
| Aves | *Ninox connivens* | Barking Owl | V,P,3 | | 2 | hollows of large, old trees | Unsuitable | Nil |
| Aves | *Ninox strenua* | Powerful Owl | V,P,3 | | 23 | Hollows >45 cm diameter that are 6 m or more above the ground in living or dead trees | Unsuitable | Nil |
| Aves | *Pandion cristatus* | Eastern Osprey | V,P,3 | | 2 | Emergent living or dead trees or artificial towers within 3 km of foraging habitat | Unsuitable | Nil |
| Aves | *Petroica boodang* | Scarlet Robin | V,P | | 1 | dry eucalypt forests and woodlands with open grassy understorey and scattered shrub | Unsuitable | Nil |
| Aves | *Ptilinopus magnificus* | Wompoo Fruit-Dove | V,P | | 43 | Rainforests or wet sclerophyll forest with foraging habitat nearby | Potentially suitable | Possible |
| Aves | *Ptilinopus regina* | Rose-crowned Fruit-Dove | V,P | | 7 | Wet sclerophyll forest or rainforest including remnants dominated by camphor laurel. Requires foraging habitat nearby. | Potentially suitable | Possible |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Aves | *Ptilinopus superbus* | Superb Fruit-Dove | V,P | | 3 | Wet schlerophyll forest or rainforest (including remnants dominated by camphor laurel) near foraging habitat | Potentially suitable | Possible |
| Aves | *Tyto novaehollandiae* | Masked Owl | V,P,3 | | 29 | Living or dead trees with hollows >40 cm diameter, cliffs or caves | Unsuitable | Nil |
| Aves | *Tyto tenebricosa* | Sooty Owl | V,P,3 | | 29 | Hollows >30 cm diameter that are >10 m above the ground in live or dead trees, or in caves | Unsuitable | Nil |
| Mammalia | *Aepyprymnus rufescens* | Rufous Bettong | V,P | | 1 | a variety of forests from tall, moist eucalypt forest to open woodland, with a dense cover of tall native grasses | Unsuitable | Nil |
| Mammalia | *Cercartetus nanus* | Eastern Pygmy-possum | V,P | | 2 | tree hollows, under the bark of eucalypts and in shredded bark in tree forks, near nectar and pollen supplies | Unsuitable | Nil |
| Mammalia | *Dasyurus maculatus* | Spotted-tailed Quoll | V,P | E | 6 | Hollow-bearing trees, fallen logs, small caves, rock crevices, boulder piles, rocky-cliff faces or animal burrows | Unsuitable | Nil |
| Mammalia | *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V,P | | 1 | in eucalypt hollows, under loose bark on trees, or in buildings. | Unsuitable | Nil |
| Mammalia | *Micronomus norfolkensis* | Eastern Coastal Free-tailed Bat | V,P | | 5 | Hollows in dead or alive trees | Unsuitable | Nil |
| Mammalia | *Miniopterus australis* | Little Bent-winged Bat | V,P | | 26 | Caves | Unsuitable | Nil |
| Mammalia | *Miniopterus orianae oceanensis* | Large Bent-winged Bat | V,P | | 5 | Caves | Unsuitable | Nil |
| Mammalia | *Myotis macropus* | Southern Myotis | V,P | | 3 | Live and dead hollow-bearing trees, under bridges or other artificial structures, in caves, or in dense foliage | Unsuitable | Nil |
| Mammalia | *Petauroides volans* | Greater Glider | P | E | 7 | Large trees with hollows > 10cm diameter | Unsuitable | Nil |
| Mammalia | *Petaurus australis* | Yellow-bellied Glider | V,P | V | 36 | Large trees with hollows > 10cm diameter | Unsuitable | Nil |
| Mammalia | *Petaurus norfolcensis* | Squirrel Glider | V,P | | 1 | Tree hollows or fissures >2 cm diameter/width in eucalypt forests and woodlands with fruit or nectar | Unsuitable | Nil |
| Mammalia | *Phascolarctos cinereus* | Koala | E1,P | E | 108 | eucalypt woodlands and forests with preferred feed trees | Potentially suitable | Possible |
| Mammalia | *Phoniscus papuensis* | Golden-tipped Bat | V,P | | 13 | Tree hollows or nests of Yellow-throated Scrubwren or Brown Gerygone | Unsuitable | Unlikely |
| Mammalia | *Pteropus poliocephalus* | Grey-headed Flying-fox | V,P | V | 32 | Canopy trees associated with rainforest, or coastal scrub or riparian or estuarine communities and with sufficient forage resources available within 40km. | Potentially suitable | Possible |


Figure 7. Constraints mapping

# Discussion & Conclusions

## Vegetation Clearing

No clearing of native vegetation is proposed for the subdivision or subsequent development. The proposal does not therefore exceed the Biodiversity Offset Clearing Threshold.

## Impacts on Threatened flora

There would be no direct impacts on threatened flora, which are located within a small part of the vegetated riparian zone and the proposed C2 zone. Indirect impacts associated with the development are likely to be limited to positive impacts on threatened flora habitat associated with rehabilitation of vegetation in the riparian zone proposed for rezoning to C2 Environmental Conservation.

## Impacts on Threatened fauna

There would be no direct impacts on Threatened fauna and Indirect impacts are assessed as unlikely to be of sufficient magnitude or extent to impact the survival of any subject species in the locality.

## Biodiversity Offsets Scheme

The proposal does not exceed the Biodiversity Offset Clearing Threshold. Significant impact on threatened species or ecological communities, or their habitats is unlikely. Entry to the Biodiversity Offsets Scheme would not therefore be required.

## State Environmental Planning Policy (SEPP) Koala Habitat Protection 2021

Koalas are a Threatened fauna species potentially dependent on existing habitat in the study area.

No scats were detected by Koala scat search undertaken using the Biodiversity Assessment Method. Limitations of the method resulting from wet weather mean that the presence of Koalas from time to time cannot be excluded, but do indicate that Koala habitat on the Property is not currently occupied. The habitat is therefore in the low use category and the likelihood of breeding habitat on the Property has been assessed as unlikely.

Mapped Secondary and Tertiary Koala habitat occurs on the property. The extent of secondary habitat is mapped on **Figure 6**. Tertiary habitat consists of other remnant vegetation mapped as WSF03e, WSF09 and NRV01.

The requirements of the Coffs Harbour Koala Plan of Management (1999) at https://www.coffsharbour.nsw.gov.au/environment/Plants-and-Animals/Documents/KPOM_a.pdf will be satisfied by the Proposal. There will be no loss of Secondary Koala habitat. Tallowwood or Flooded gum/Blue gum hybrids (or any other listed species) will not be removed for the proposal.

The proposal would not result in barriers to Koala movement, local roads will be designed to limit traffic speeds, threats to Koalas by dogs is likely to be low and bushfire asset protection zones are generally located outside of secondary Koala habitat.

## Riparian Corridor

The riparian corridor for a second order stream extends 20 metres either side of the high bank of the stream (https://www.dpie.nsw.gov.au/__data/assets/pdf_file/0003/367392/NRAR-Guidelines-for-controlled-activities-on-waterfront-land-Riparian-corridors.pdf. )

The average width from bank to bank on the Property is estimated at 7 metres, and the average total width of the corridor would be 47 metres (**Figure 6**). An averaging scheme permits areas in the outer half (10m) of the riparian corridor to be relocated to other areas of the property adjoining the riparian zone.

The proposed C2 zone includes a riparian corridor that meets the requirements of the riparian corridor guidelines. On the Property most of that corridor is forested but weed control and bush regeneration planting would be required to restore the riparian zone to fully structured native vegetation.

## Proposed C2 Zone

A proposed C2 Zone has been identified that includes the following:

- Approximately 99% of flood prone (CHCC mapped as 1% AEP) land associated with the secondary watercourse;
- A riparian corridor meeting the requirements of DPIE guidelines;
- Approximately 70% of mapped secondary Koala habitat, and
- Approximately 70%native vegetation associated with the secondary watercourse.

## DCP 2015 clearing offset requirements

As no area of existing native vegetation would be removed, there are no clearing offset requirements under the DCP.

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## Photographs

Photo 1. WSF03e adjoining Eastbank Road

Photo 2. WSF03e east of dwelling

Photo 3. WSF03 adjoining Critically Endangered plants

Photo 4. NRV01regrowth native vegetation

Photo 5. WSF09 at the head of the large farm dam

Photo 6. Native pioneers NP01 (rhs) & mixed NRV01 and Exotic vegetation (lhs)

# Appendix 1. Flora inventory

| *Scientific name* | Common name | Status | Ex/NRV | NP01 | NRV01 | WSF03 | WSF03e | WSF09 |
|---|---|---|---|---|---|---|---|---|
| *Acacia binervia* | two veined hickory wattle | n | | | | | | 1 |
| *Acacia irrorata* | green wattle | n | 1 | 1 | 1 | | 1 | |
| *Acacia melanoxylon* | blackwood wattle | n | 1 | 1 | | 1 | 1 | |
| *Adiantum formosum* | black maiden-hair fern | n | | | | 1 | | |
| *Adiantum hispidulum* | harsh maiden-hair fern | n | | | | 1 | | |
| *Ageratina adenophora* | crofton weed | eA | | | | | 1 | |
| *Ageratum houstonianum* | billygoat weed | n | | | | | 1 | |
| *Alectryon subcinereus* | native quince | n | | | | 1 | | |
| *Allocasuarina torulosa* | forest oak | n | | | 1 | 1 | | |
| *Alpinia caerulea* | native ginger | n | | | | 1 | | |
| *Angophora costata* | smooth-barked apple | n | | | | | | 1 |
| *Aphanopetalum resinosum* | gum vine | n | | | | 1 | | |
| *Arachniodes aristata* | a fern | n | | | | 1 | | |
| *Archirhodomyrtus beckleri* | rose myrtle | n | | | | | | 1 |
| *Archontophoenix cunninghamiana* | bangalow palm | n | | | | 1 | | |
| *Billardiera scandens* | apple berry | n | | | | | 1 | |
| *Blechnum cartilagineum* | gristle fern | n | | | 1 | 1 | 1 | 1 |
| *Breynia oblongifolia* | dwarves apple | n | | | | 1 | | |
| *Callicoma serratifolia* | blackwattle | n | | | | 1 | 1 | 1 |
| *Calochlaena dubia* | rainbow fern | n | | | 1 | | 1 | |
| *Carex maculata* | a sedge | n | | | | | 1 | |
| *Choricarpia leptopetala* | brown myrtle | n | | | | 1 | | |
| *Christella dentata* | binung | n | | | | 1 | | |
| *Cinnamomum camphora* | camphor laurel | eC | 1 | | | 1 | 1 | |
| *Cinnamomum virens* | red-barked sassafras | n | | | | 1 | | |
| *Corymbia intermedia* | pink bloodwood | n | | | | 1 | 1 | |
| *Croton verrauxii* | green cascarilla | n | | | | 1 | | |
| *Cryptocarya microneura* | murrogun | n | | | | 1 | | |
| *Cryptocarya rigida* | forest maple | n | | | | 1 | 1 | 1 |
| *Cuttsia viburnea* | native hydrangea | n | | | | 1 | | |
| *Cyperus filipes* | a sedge | n | | | | 1 | | |
| *Dianella spp* | flax lily | n | | | | | 1 | |
| *Dioscorea transversa* | native yam | n | | | | | 1 | 1 |
| *Doodia aspera* | rasp fern | n | | | | 1 | | |
| *Dubiosia myoporoides* | corkwood | n | | | | | 1 | |
| *Elaeocarpus reticulatus* | blueberry ash | n | | | | | 1 | |
| *Endiandra muelleri subsp muelleri* | green-leaved rose walnut | n | | | | 1 | | |
| *Entolasia stricta* | wire grass | n | | | | | | 1 |
| *Eucalyptus acmenoides* | | | | | | 1 | | 1 |
| *Eucalyptus grandis x saligna* | a hybrid eucalypt | n | 1 | 1 | | 1 | 1 | |
| *Eucalyptus microcorys* | tallowwood | n | | | 1 | 1 | | 1 |
| *Eucalyptus pilularis* | | | | | | 1 | | 1 |

| *Scientific name* | Common name | Status | Ex/NP | NP01 | NRV01 | WSF03 | WSF03e | WSF09 |
|---|---|---|---|---|---|---|---|---|
| *Eucalyptus saligna* | blue gum | n | | | | 1 | 1 | 1 |
| *Eucalyptus siderophloia* | grey ironbark | n | | | | | | 1 |
| *Eupomatia laurina* | bolwarra | n | | | | 1 | | |
| *Euroschinus falcata* | ribbonwood | n | | | | | | 1 |
| *Ficus coronata* | sandpaper fig | n | | | | 1 | | |
| *Gahnia aspera* | sawsedge | n | | | 1 | | | |
| *Glochidion ferdinandi* | cheese tree | n | | | | 1 | 1 | |
| *Gonocarpus tetragynus* | raspwort | n | | | | | 1 | |
| *Grevillea robusta* | silky oak | n | | 1 | | | | |
| *Guioa semiglauca* | guioa | n | | | | 1 | 1 | |
| *Gynochthodes jasminoides* | sweet morinda | n | | | | 1 | | |
| *Hibbertia dentata* | toothed guinea-flower | n | | | | | 1 | |
| *Hibbertia scandens* | climbing guinea-flower | n | | | | | 1 | |
| *Hibiscus splendens* | pink native hibiscus | n | | | | 1 | | |
| *Imperata cylindrica* | blady grass | n | | | 1 | | 1 | |
| *Lantana camara* | lantana | eC | 1 | | | 1 | 1 | 1 |
| *Lepidosperma laterale* | sawsedge | n | | | 1 | 1 | | |
| *Ligustrum lucidum* | privet | eA | 1 | | | 1 | 1 | |
| *Ligustrum sinense* | small-leaved privet | eA | 1 | | | 1 | 1 | |
| *Lobelia trigonocaulis* | forest lobelia | n | | | | 1 | | |
| *Lomandra longifolia* | mat-rush | n | | | 1 | 1 | 1 | |
| *Lonicera japonica* | japenese honeysuckle | eA | | | | 1 | 1 | |
| *Lophostemon confertus* | brush box | n | | | | 1 | | |
| *Neolitsea dealbata* | white bolly gum | n | | | | 1 | | |
| *Ozothamnus diosmifolius* | sago bush | n | | | | | 1 | |
| *Paspalum mandiocanum* | broadleaved paspalum | e | 1 | | | | 1 | |
| *Persoonia spp* | geebung | n | | | | | | 1 |
| *Pilidiostigma glabrum* | black plum | n | | | | | 1 | |
| *Pinus spp* | pine tree | eA | 1 | | | | | |
| *Pittosporum revolutum* | pittosporum | n | | | | | 1 | |
| *Polygala paniculata* | polygala | e | | | | | 1 | |
| *Polyscias sambucifolia* | elderberry panax | n | | | | | 1 | |
| *Pteridium esculentum* | common bracken | n | | | | 1 | 1 | |
| *Rhodamnia rubescens* | brush turpentine | E4A | | | | 1 | | |
| *Rhodomyrtus psidioides* | native guava | E4A | | | | 1 | | |
| *Ripogonum fawcettianum* | small ripogonum | n | | | | 1 | 1 | |
| *Rubus moorei* | native raspberry | n | | | | 1 | | |
| *Rubus rosifolius* | rose-leaf raspberry | n | | | | | | 1 |
| *Scolopia braunii* | flintwood | n | | | | 1 | | |
| *Setaria sphacelata* | setaria | e | | | | | 1 | |
| *Smilax australis* | prickly smilax | n | | | | | 1 | |
| *Sporobolus fertilis* | parramatta grass | eA | | | | | 1 | |
| *Syncarpia glomulifera* | turpentine | n | | | 1 | 1 | 1 | 1 |

| ***Scientific name*** | **Common name** | **Status** | **Ex/NP** | **NP01** | **NRV01** | **WSF03** | **WSF03e** | **WSF09** |
|---|---|---|---|---|---|---|---|---|
| *Syzygium crebrinerve* | purple cherry | n | | | | 1 | | |
| *Tabernaemontana pandacqui* | banana bush | n | | | | | 1 | |
| *Themeda triandra* | kangaroo grass | n | | | | | 1 | |
| *Tripladenia cunninghamii* | tripladenia | n | | | | 1 | | |
| *Tristaniopsis laurina* | water gum | n | | | | 1 | 1 | |
| *Trochocarpa laurina* | tree heath | n | | | | 1 | | |
| *Vernonia cinerea* | a daisy | n | | | | 1 | | |
| *Viola hederacea* | native violet | n | | | | 1 | | |
| *Wilkiea hugeliana* | veiny wilkiea | n | | | | 1 | | |

Status:
n native
e exotic
E4A Critically Endangered species
eA biosecurity obligation - Asset Protection
eC biosecurity obligation - Control

# Appendix 2. 5-Part Tests

The following threatened fauna species identified in **Table 2** are 'subject species' and tests of significance ('five-part tests') under Section 7.3 of the BC Act have been completed.

Birds:

- Wompoo Fruit-Dove *Ptilinopus magnificus*
- Rose-crowned Fruit-Dove *Ptilinopus regina*
- Superb Fruit-Dove *Ptilinopus superbus*

Mammals:

- Koala *Phascolarctos cinereus*
- Grey-headed Flying-fox *Pteropus poliocephalus*

**(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,**

## Direct impacts

There would be no direct impacts on threatened fauna habitat.

## Indirect impacts

Indirect impacts are likely to be limited to those associated with increased human presence, such as noise. There are few published studies of the impacts of noise on fauna in Australia and they mostly involve the impact of traffic noise on birds (reviewed in Dawe & Goosem 2008) At least in some species, traffic noise can have deleterious impacts on bird species through interference with communication, requiring an adjustment of song frequency, which has the potential to alter energy budgets, increase predation risk and reduce success in reproduction. However, the increase in traffic noise generated by the proposal is unlikely to be significant.

Noise such as gunshots may initially scare birds, but studies indicate that they quickly become habituated unless harassed with real or simulated danger to develop a fear of the gun, for example by shooting to scare using pyrotechnic cartridges as well as other scaring practises used in rotation (Black Cockatoo/Fruit Protection Technical Advisory Committee 2006).

As to other Australian vertebrate fauna, similar habituation is likely. There was no detectable impacts of noise from the Ranger uranium mine on vertebrate fauna assemblages when compared to fauna assemblages in the adjoining national park (ERA 2014).

Reviews of the impacts of noise on fauna overseas examine the impacts of a range of noise including those associated with aircraft (including helicopters), snowmobiles, dune buggies, motor boats, sonic booms and military weapons on a wide range of marine, aquatic and terrestrial fauna (eg: Radle 2007, Kull & McGarrity 2003, Larkin 2003).

Habituation is a kind of learning ubiquitous in the animal kingdom and benefits an individual by avoiding wasted energy expenditures on a repeated stimulus. Although habituation to noise has not

been investigated to a great extent, it is known that acoustic harassment devices do not work if the animal has investigated the sound and determined it is benign.

In this case, indirect impacts of the proposal are assessed as unlikely to be of sufficient magnitude or extent to affect the life cycle of any species such that a viable local population of that species would be placed at risk of extinction.

**(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

**(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Not applicable – threatened ecological communities do not occur in or near the study area.

**(c) in relation to the habitat of a threatened species or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**

**(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**

Habitat for any of the subject species would not be removed; habitat modification would be limited to those indirect impacts discussed in (a) above, and would not be fragmented or isolated. Retained areas of adjacent forest vegetation would continue to provide foraging, breeding and dispersal resources for the subject species. The Proposal is therefore unlikely to impact the long-term survival of the species in the locality.

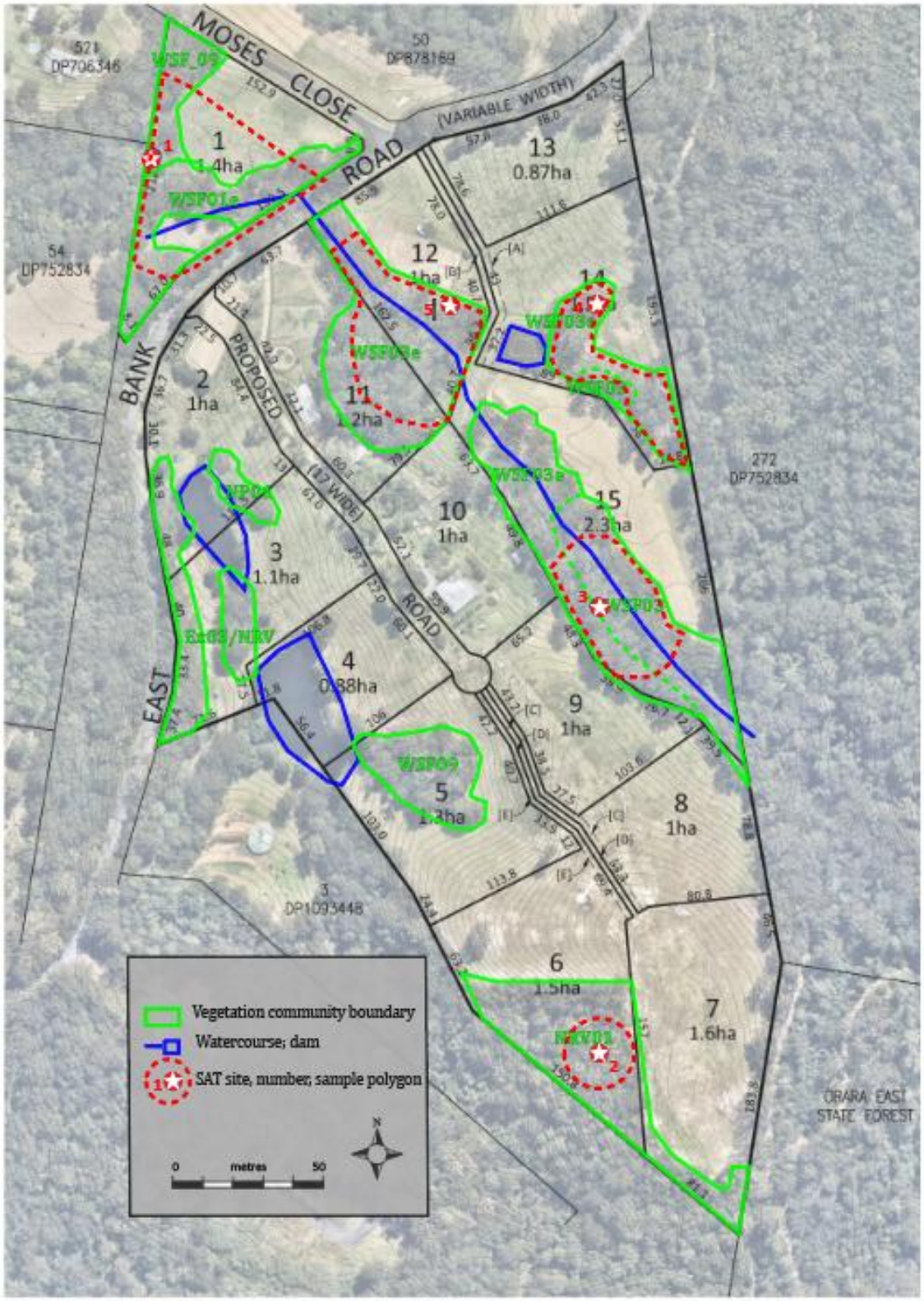
**(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),**

No declared area of outstanding biodiversity value occurs in the region.

**(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.**

The proposal may possibly contribute to the impact of the key threatenening process Anthropogenic Climate Change. The degree to which the Proposal would contribute to any threatening process is not considered likely to place the local population of any of the subject species at significant risk of extinction.

## Appendix 3. Koala Scat Search

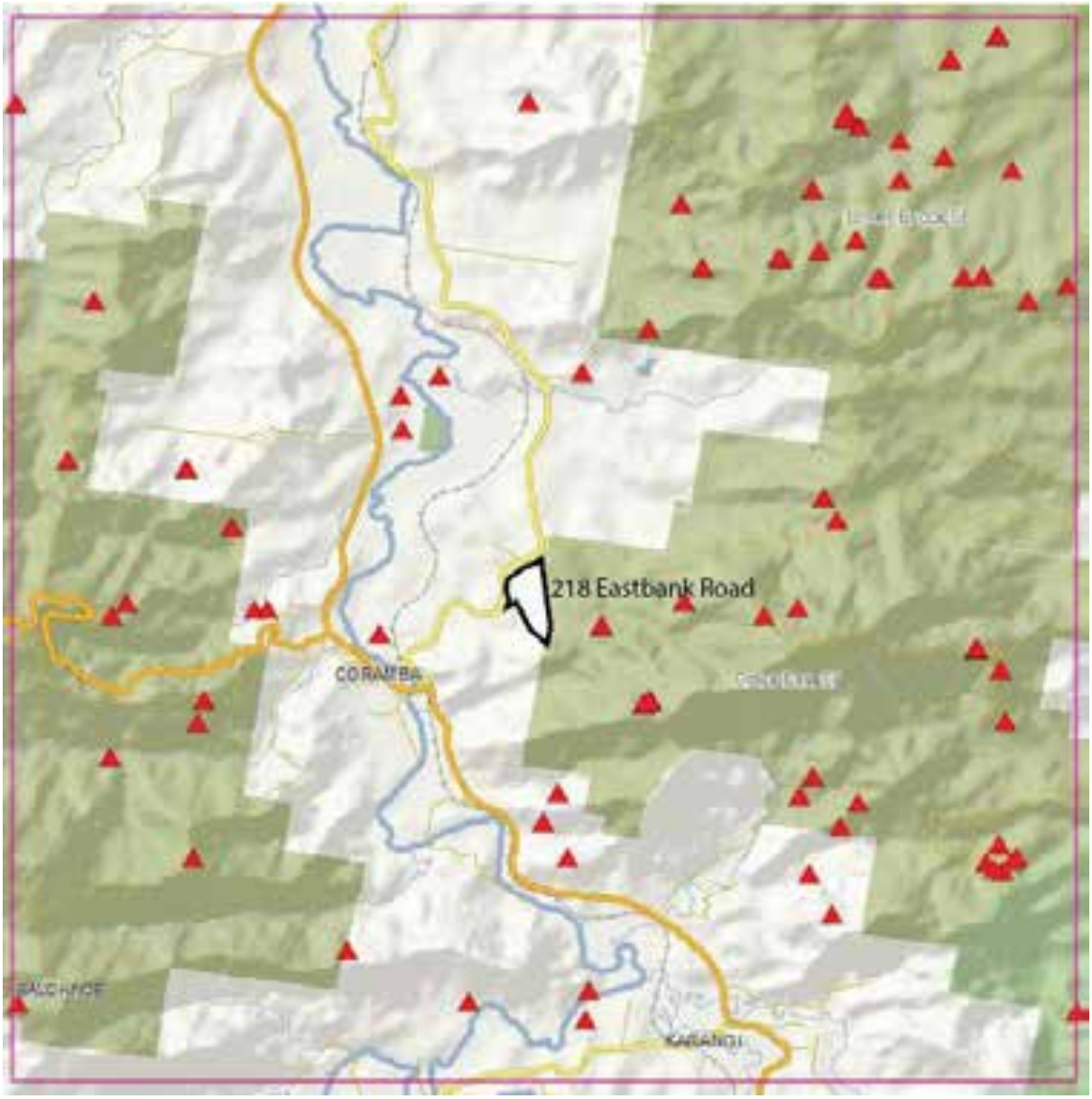



## Location and extent of Koala scat searches

## Results of Koala scat searches

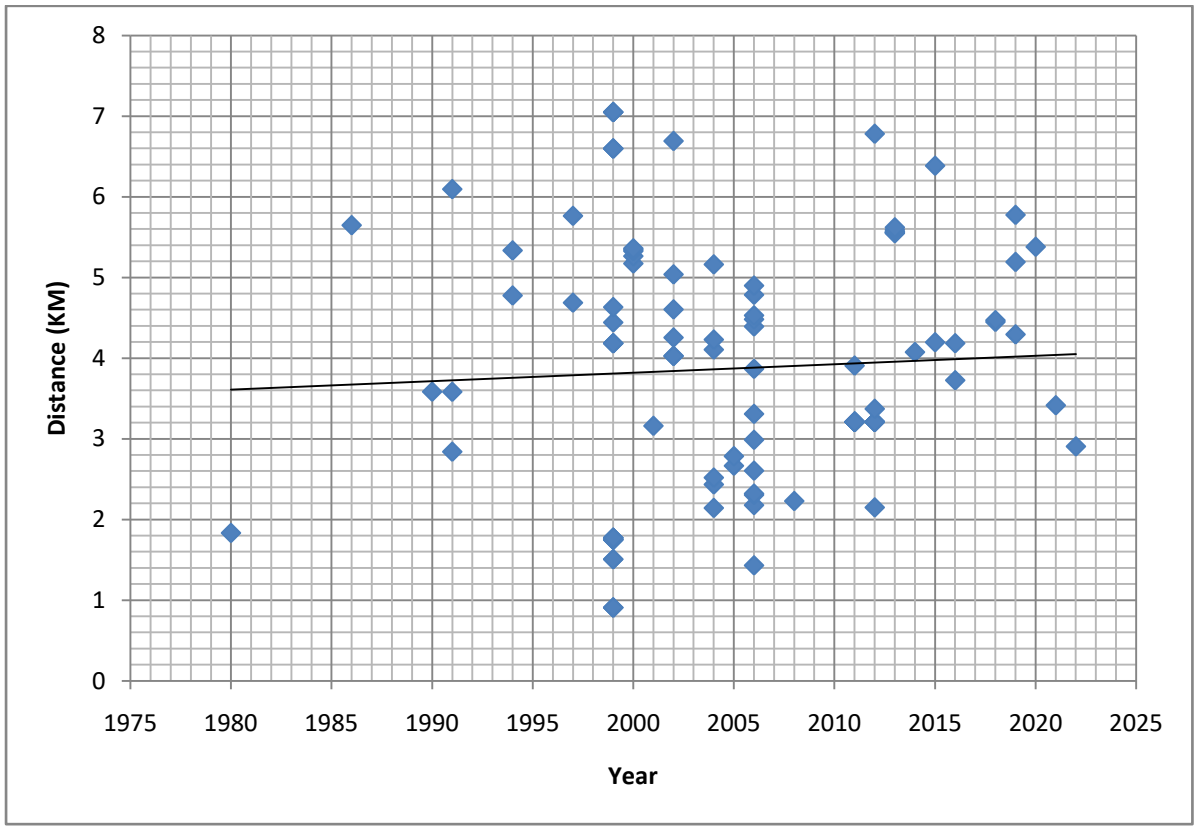
Area of Koala habitat: approx 11ha.
No of sites required: 5 @ 150 metre grid.
Date of search: 27/10/22
Rainfall in preceding 72 hrs: 2mm on 24/10/22

| Site No | GPS | Sample size (no of trees) | Scats detected |
|---|---|---|---|
| | -30.2107059 153.0261555 | 30 | 0 |
| | -30.2162866 153.0294489 | 30 | 0 |
| | -30.2135977 153.0290761 | 30 | 0 |
| | -30.2118764 153.0292711 | 17 | 0 |
| | -30.2118625 153.0283323 | 22 | 0 |




## Bionet Koala Records Map

## Distance from Subject Site to Koala sightings x Year



# Coffs Harbour & District Local Aboriginal Land Council

Cnr Pacific Highway & Arthur Street, Coffs Harbour NSW 2450
PO Box 6150, Coffs Harbour Plaza NSW 2450
Phone (02) 6652 8740 Fax: (02) 6652 5923


## CLIENT DETAILS

| | |
|---|---|
| **Client Name:** | Jim Cleary |
| **Site for inspection** | 218 Eastbank Rd, Coramba |
| **Client contact name** | Jim Cleary |

## COFFS HARBOUR AND DISTRICT LOCAL ABORIGINAL LAND COUNCIL

| | |
|---|---|
| **Site officer name** | Daniel Flanders |
| **Date** | Tuesday 10th August 2021 |
| **Start Time** | 9:30am – 11:30am |
| **Nature of the works** | Rezoning |

## SITE OFFICER OBSERVATIONS

| Artefacts | Dreaming site | Midden material | Campsite | Ceremony ground |
|---|---|---|---|---|
| 1 | None | None | Possibility | None |

| Scar trees | Skeletal remains | Increase site | Men/Women's area | Other (specify) |
|---|---|---|---|---|
| None | None | None | N/A | Possible Campsite Trail |

| Notes – Sites Officer only |
|---|
| • The area of interest was fully examined by the Senior Cultural Site Officer.<br>• The site in general has been highly disturbed due to past logging operations.<br>• One hand-held worked stone axe was identified onsite within the proposed D.A. works area.<br>• The potential for further artefacts to be uncovered and harmed in this area is high for proposed further ground disturbance based activities. |
| **Recommendations** |
| 1. Once available provide D.A. plans and full extent of ground disturbance based activities to Coffs Harbour and District Local Aboriginal Lands Council.<br>2. Shall further earthworks (Excavation) within the D.A. zone be required, please contact the Land Council with at least 2 weeks written notice , the Lands Council will review applicable information and may appoint a Cultural Sites Officer to perform site monitoring during ground disturbance works to ensure the protection of cultural items and to ensure cultural safety of workers onsite.<br>3. Unexpected finds procedure to be implemented to any future ground disturbance works as per relevant cultural heritage protection legislation.<br>4. Contact the Land Council or Heritage Division should any unexpected finds be uncovered. |

Observations compiled by Senior Sites Officer, Daniel Flanders.

# Coffs Harbour & District Local Aboriginal Land Council

Cnr Pacific Highway & Arthur Street, Coffs Harbour NSW 2450
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Phone (02) 6652 8740 Fax: (02) 6652 5923


Report approved and signed off by:

Matthew Smith
Programs Coordinator
CH&DLALC
27th October 2021

**Holiday Coast Bushfire Solutions**
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# BUSHFIRE STRATEGIC STUDY

| | |
|---|---|
| REPORT PREPARED IN RELATION TO: | **PLANNING PROPOSAL AND RURAL SUBDIVISION** |
| PROPERTY DESCRIPTION: | **LOTS 1 & 2 in DP 1093448, 218 EAST BANK ROAD, CORAMBA.** |
| REPORT COMMISSIONED BY: (my Client) | **James and Linda Cleary.** |
| | DATE ISSUED: 2/03/2022 |

| VERSION | REVISION |
|---|---|
| 1 | Initial / Draft |
| 2 | Amended lot layout |

Date saved: 2/03/2022
Date printed: 2/03/2022

## IMPORTANT NOTICE

Site inspections, and the results found herein, are carried out generally in accordance with the methodology as set out in the document ***"Planning for Bushfire Protection 2019"***, but also having regard for the wider 'reach' of the criteria set out for a Bushfire Strategic Study.

The results of the site inspections and their correlation with ***PBP-2019*** are based on information provided by the "Reference Documents" and information provided by the Client (or his/her agents). **Holiday Coast Bushfire Solutions Pty Ltd** will not be held liable for the omission to provide, or restrict access to, critical information (such as restrictions on property Title, easements, relevant consultant reports, etc) relevant to this development proposal.

The author of this Study, S. Ellis possesses industry-relevant qualifications including Graduate Diploma in Design for Bushfire Prone Areas (UWS) and Certificate 2 & 3 in Firefighting Operations and Certificate 4 in Firefighting Supervision.



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# GLOSSARY

| | |
|---|---|
| Acceptable solution | Measures which have been deemed to meet the specified performance criteria. |
| Assembly point | An area or building/structure that is used to assemble people for evacuation or that have evacuated from a site in an emergency situation. |
| Asset protection zone (APZ) | A fuel-reduced area surrounding a built asset or structure which provides a buffer zone between a bushfire hazard and an asset. The APZ includes a defendable space within which firefighting operations can be carried out. The size of the required asset protection zone varies with slope, vegetation and Fire Danger Index (FDI). |
| Australian Standard AS 3959 (AS 3959) | AS 3959:2009 *Construction of buildings in bushfire-prone areas*, Standards Australia, 2009. |
| BAL certificate | A certificate issued to identify the bushfire attack level (BAL) of a proposed development in the Complying Development process under State Environmental Planning Policy (Exempt and Complying Development Codes) 2008. |
| BFCC | Bush Fire Coordinating Committee |
| BFMC | Bush Fire Management Committee |
| Bushfire assessment report | A report submitted with the development application (DA) which establishes compliance with PBP. The report determines the extent of bushfire attack and the proposed mitigation measures. Appendix 1 sets out the information requirements for a bushfire assessment. See also clause 44 of the *Rural Fires Regulation 2013*. |
| Bushfire attack level (BAL) | A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. In the Building Code of Australia, the BAL is used as the basis for establishing the requirements for construction to improve protection of building elements. |
| Bushfire | An unplanned fire burning in vegetation; also referred to as wildfire. |
| Bushfire attack | Attack by burning embers, radiant heat or flame generated by a bushfire. |
| Bushfire hazard | Any vegetation that has the potential to threaten lives, property or the environment. |
| Bushfire prone land (BPL) | An area of land that can support a bushfire or is likely to be subject to bushfire attack, as designated on a bushfire prone land map. |
| Bushfire prone land map (BPLM) | A map prepared in accordance with NSW RFS requirements and certified by the Commissioner of the NSW RFS under section 10.3(2) of the *Environmental Planning and Assessment Act 1979*. |
| Bushfire protection measures (BPMs) | A range of measures (controls) used to minimise the risk arising from a bushfire. BPMs include asset protection zones (APZs), construction standards, suitable access, water and utility services, emergency management and landscaping. |
| Bushfire risk | Is the likelihood and consequence of a bushfire igniting, spreading and causing damage to assets of value to the community. Risk may be rated as being extreme, major, moderate, minor or insignificant and is related to the vulnerability of the asset. |
| BRMP | Bushfire Risk Management Plan |
| Bushfire safety authority (BSA) | An approval by the Commissioner of the NSW RFS that is required for a subdivision for residential or rural residential purpose or for a SFPP development listed under section 100B (6) of the *Rural Fires Act 1997*. |
| Certifying authority | As defined in the *Environmental Planning and Assessment Act 1979,* those with authority to issue Part 6 certificates and Complying Development Certificates (CDCs). |
| Complying development | Complying development is a combined planning and construction approval for straightforward development that can be determined through a fast track assessment by a council or private accredited certifier. |
| Consent authority | As defined in the *Environmental Planning and Assessment Act 1979*, in relation to development consents, usually the local council. |
| Defendable space | An area adjoining an asset that is managed to reduce combustible elements and is free from constructed impediments. It is a safe working environment in which active firefighting can be undertaken to defend the structure, before and after the passage of a bushfire. |
| Development | As defined in the *Environmental Planning and Assessment Act 1979*. |
| Development application (DA) | An application for consent to carry out development such as building, subdivision, or the use of a building or land. Applications are normally made to the local council. |
| Development footprint | The building envelope or area shown on a plan over which any buildings and associated asset protection zones may be constructed. |

| | |
|---|---|
| Ecologically sustainable development | As defined in section 6 of the *Protection of the Environment Administration Act (NSW) 1991*. |
| Effective slope | The land beneath the vegetation which most significantly affects fire behaviour, having regard to the vegetation present. |
| Exit | A doorway opening to a road or open space, as defined in the National Construction Code (NCC). |
| Fire Danger Index (FDI) | The chance of a fire starting, its rate of spread, its intensity and the difficulty of its suppression, according to various combinations of air temperature, relative humidity, wind speed and both the long- and short-term drought effects.<br>Note: FDI in PBP refers to the Forest Fire Danger Index calculated by the McArthur Mk 5 Forest Fire Danger Meter using the equations published by Noble, I.R., Bary, G.A.V., and Gill, A.M., 1980.<br>Grassland Fire Danger Index (GFDI) values are calculated by the McArthur Mk 4 Grassland Fire Danger Meter using the equations published by Purton, C.M., 1982. |
| Flame zone | The distance from a bushfire at which there is deemed to be significant potential for sustained flame contact to a building. The flame zone is determined by the calculated distance at which the radiant heat from the design fire exceeds 40kW/m$^2$. |
| Grasslands | Grassed areas capable of sustaining a fire. Under Australian Standard 3959, this is identified as low open shrubland, hummock grassland, closed tussock grassland, tussock grassland, open tussock, sparse open tussock, dense sown pasture, sown pasture, open herbfield, and sparse open herb field. Grass, whether exotic or native, which is regularly maintained at or below 10cm in height (including maintained lawns, golf courses, maintained public reserves, parklands, nature strips and commercial nurseries) is regarded as managed land. |
| Grassland deeming provision | An acceptable solution applying to properties in grassland hazard areas which replaces the site assessment procedure in AS 3959. |
| Infill development | Refers to the development of land by the erection of or addition to, a building (or buildings), which is within an existing allotment and does not require the spatial extension of services. Existing services may include public roads, electricity, water or sewerage. |
| Inner protection area (IPA) | The component of an asset protection zone which is closest to the asset (measured from drip line). It consists of an area maintained to minimal fuel loads so that a fire path is not created between the hazard and the building. |
| Integrated development | As referred to under s4.46 (formerly S91) of the *Environmental Planning and Assessment Act 1979*, an integrated development is one that requires development consent and approval from one or more government agencies, and is not a state significant development (SSD) or complying development. |
| Isolated development | Development which is located predominantly in native bushland or is considered to be within a remote area. Access and evacuation may be challenging due to distances that are required to be travelled through bushfire prone areas. |
| Local Environmental Plan (LEP) | An environmental planning instrument prepared under Part 3 of the *Environmental Planning and Assessment Act 1979*. Local environmental plans guide planning decisions and the ways in which land is used through zoning and development controls. |
| Managed land | Land that has vegetation removed or maintained to a level that limits the spread and impact of bushfire. It may include existing developed land (residential, commercial or industrial), roads, golf course fairways, playgrounds, sports fields, vineyards, orchards, cultivated ornamental gardens and commercial nurseries. Most common will be gardens and lawns within curtilage of buildings. These areas will be managed to meet the requirements of an asset protection zone. |
| National Construction Code (NCC) | The National Construction Code, published by the Australian Building Codes Board, comprising the Building Code of Australia as Volumes One and Two, and the Plumbing Code of Australia as Volume Three. |
| Outer protection area (OPA) | The outer component of an asset protection zone, where fuel loads are maintained at a level where the intensity of an approaching bushfire would be significantly reduced. Applies to forest vegetation only. |
| Performance-based solution | A method of complying with the Performance Criteria other than by an acceptable solution. |
| Primitive camping | A predetermined site which is part of a commercially operated venture where there may already be a site for a tent and a fire pit. |

| | |
|---|---|
| Setback | The distance required through planning provisions to separate a building from the bushfire hazard, street frontage or from adjacent buildings or property boundary. |
| Short fire run | A fire run which has a single point of ignition and a short distance to travel, where the calculated resultant head width is less than 100 metres. |
| Special fire protection purpose (SFPP) developments | Developments where the vulnerable nature of the occupants means a lower radiant heat threshold is required in order to allow the evacuation of occupants, and emergency services to operate in support of those occupants. |
| State Environmental Planning Policy (SEPP) | An environmental planning instrument prepared under Part 3 of the *Environmental Planning and Assessment Act 1979*. |
| Subdivision | As defined in the *Environmental Planning and Assessment Act 1979*. |
| Tourist accommodation | A building or place that provides temporary or short-term accommodation on a commercial basis including backpackers accommodation, bed and breakfast accommodation, farm stay accommodation, hotel or motel accommodation and serviced apartments. |
| Vegetation classification | Vegetation type identified using the formations and classifications within *Ocean Shores to Desert Dunes: The Native Vegetation of New South Wales and the ACT (Keith, 2004)*. |

# 1.0 FRAMEWORK

Below are relevant extracts of the document "*Planning for Bushfire Protection 2019*" (*PBP*). Sections have been suitably modified to reflect the scope of this proposed development and its relationship with the relevant legislation.

## 1.1 Legal Framework

*The Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Rural Fires Act 1997* (RF Act) were amended on 1 August 2002 to enhance bushfire protection in the development assessment process.

The NSW land use planning framework provides, in broad terms, two main phases: strategic planning and development assessment.

PBP provides the foundation for the application of bushfire protection during both of these phases of development. Appropriate consideration of bushfire hazards at the strategic planning phase is required by the EP&A Act s.9.1(2) and PBP should be considered in applying the Section 9.1 Direction.

At the development assessment phase, development on land that is identified as being bushfire prone must comply with PBP. Some types of development on BPL can be undertaken as Complying Development and must also comply with PBP.

A bushfire safety authority (BFSA) is required from the NSW RFS for residential and rural residential subdivision and SFPP developments on BPL. An application for a BFSA must address the extent to which the development complies with PBP.

Building work on BPL must also comply with the requirements of the National Construction Code (NCC). The NCC contains the technical provisions for the design and construction of buildings. Under the Deemed to Satisfy provisions of the NCC, building work on BPL must comply with *Australian Standard 3959:2018 Construction of buildings in bushfire-prone areas* (AS 3959) or the *National Association of Steel Framed Housing (2014) Steel Framed Construction in Bushfire Areas* (NASH Standard). This does not apply however in Bushfire Attack Level - Flame Zone (BAL-FZ), or where modified by the specific conditions of the relevant development consent.

## 1.2 Bushfire Prone Land Mapping

The identification of Bushfire Prone Land in NSW is required under the EP&A Act s.10.3. BPL Maps provide the trigger for the various development assessment provisions.

The Commissioner of the NSW RFS designates what constitutes BPL and how it is to be mapped. Each council prepares a map in accordance with the guidelines and submits the map to the NSW RFS for certification by the Commissioner. These maps are required to be recertified at least every five years and the Commissioner may make direct changes to a BPL Map at any time.

Guidelines for the mapping of BPL can be found on the NSW RFS website at www.rfs.nsw.gov.au.

You can determine whether a site is mapped as being bushfire prone by referring to the BPL Map which is held by the local council, or on the NSW RFS website.

The BPL Map is a trigger for the consideration of BPL Maps for new development. It is not intended as a detailed measure of risk. The map does not form part of the site assessment process, which must be carried out in accordance with Appendix 1. A consent authority can refer a development application (DA) to the NSW RFS under the provisions of EP&A Act s.4.15, even where it is not mapped as BPL.

The subject property has been identified as BPL by the Coffs Harbour City Council's BPL map, an extract of which is provided below.

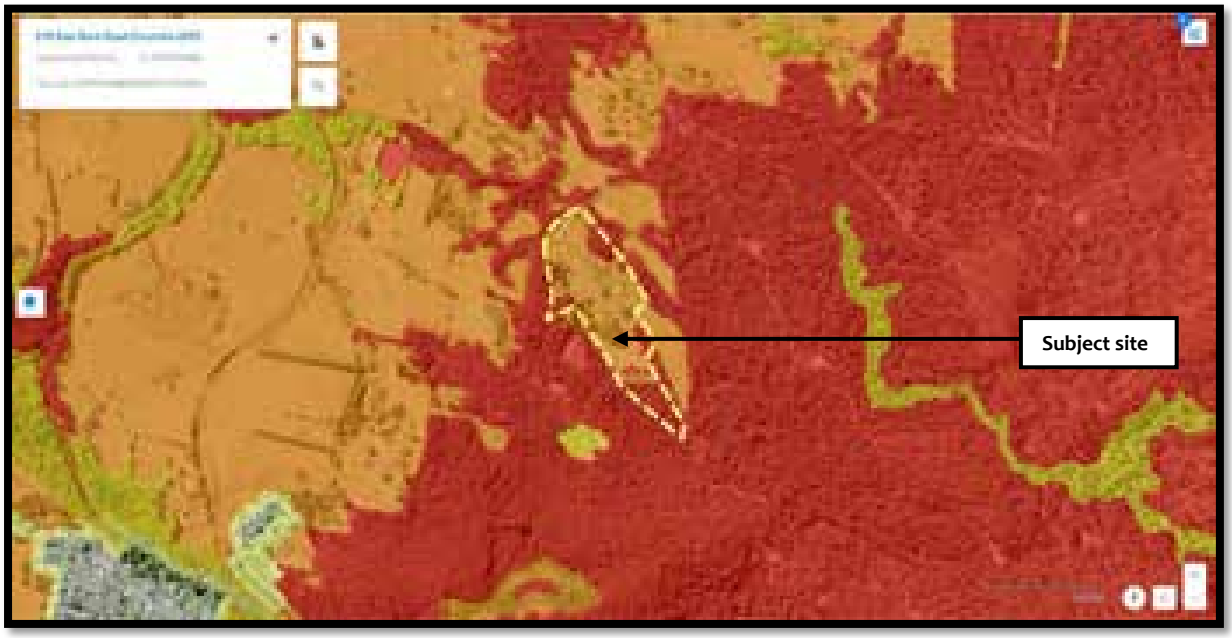



Figure 1: extract of CHCC's BPLM
(©NSW Crown Copyright – Department of Planning, Industry and Environment)

## 1.3 Strategic planning

Strategic planning is the preparation of planning instruments and policies and includes the making of Local Environmental Plans (LEPs), Development Control Plans (DCPs), housing strategies and other planning instruments that identify proposed uses and land zonings. This also includes any associated strategic proposals and studies.

The strategic planning phase of development is particularly important in contributing to the creation of safer and sustainable communities (COAG 2011). It is an effective way of achieving bushfire protection objectives in new developments.

Strategic bushfire planning and studies are needed to avoid high risk areas, ensure that zoning is appropriate to allow for adequate emergency access, egress, and water supplies, and to ensure that future compliance with this document is achievable.

The most important objective for strategic planning is to identify whether new development is appropriate subject to the identified bushfire risk on a landscape scale. An assessment of proposed land uses and potential for development to impact on existing infrastructure is also a key element of the strategic planning process in bushfire prone areas. Land use planning policies can be introduced to limit the number of people exposed to unacceptable risk.

Planning instruments and policies can ensure bushfire management principles are given appropriate consideration at all stages of the planning and development process.

Once development has been assessed as being appropriate in its bushfire prone context, it will need to be capable of complying with PBP. The ability of proposed land uses and associated future developments to comply with PBP will be assessed at the strategic planning stage. The expectation will be that the development will be able to comply with PBP at the DA stage.

## 1.4 Development assessment

The provisions of this document apply to all development on land which is bushfire prone (see section 2.2 of this document). This document may also apply where proposals are referred to the NSW RFS under other referral instruments such as EP&A Act s.4.15.

If a development of a type not specifically addressed in this document is proposed on BPL, the development must meet the Aim and Objectives of PBP and the consent authority can refer the proposal to the NSW RFS for advice. The NSW RFS will advise which specific standards apply to that development. In these circumstances, the development proposal will be a performance based solution and in more complex cases, this may be achieved collaboratively through the BFDB process.

The vast majority of DAs in NSW are assessed by local councils. Councils may assess DAs for certain developments on BPL that are compliant with this document without the need to refer the proposal to the NSW RFS.

In certain cases building work may not require development consent and can proceed through the Exempt or Complying Development process if the development type is covered by a State Environmental Planning Policy (SEPP) or the relevant LEP.

For further information on development types, please contact the local council or the NSW Department of Planning, Industry and Environment (DPIE).

### 1.4.1 Development requiring a BSA

Proposals for subdivision and SFPP development on BPL require an approval from the NSW RFS in the form of a BFSA under RF Act s.100B.

Development requiring a BFSA is considered Integrated Development under EP&A Act s.4.46.

The BFSA is critical in ensuring these key developments are designed and located in a manner that is suitable to protect human life and facilitate appropriate operational firefighting arrangements. This is a means by which the NSW RFS Commissioner fulfills their statutory obligation to ensure the protection of the community, including firefighters from the impacts of bushfire.

### 1.4.2 State significant development and infrastructure

In September 2011, EP&A Act pt. 3A was repealed, leading to the creation of two new major project development categories: state significant infrastructure (SSI) and state significant development (SSD).

Because of their size, complexity, importance and/or potential impact, DPIE is predominantly responsible for assessing these DAs. The Minister for Planning and Public Spaces is the consent authority for SSI and SSD applications.

Applications under the now-repealed Part 3A of the EP&A Act and state significant projects are exempt from requiring a BFSA and are not required to be assessed under EP&A Act s4.14.

Given the scale of SSI and SSD projects, the requirements of this document should still be applied, and seeking advice from the NSW RFS is encouraged. Even where comments have been provided by the NSW RFS at the strategic planning stage, future DAs may benefit from further advice from the NSW RFS.

### 1.4.3 Streamlining development assessment

The NSW Government has provided a pathway for streamlined assessment to occur under the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) cl.273 for new lots in Urban Release Areas (URAs) that are located on BPL.

The streamlining process allows the assessment of bushfire provisions at subdivision stage within URAs and may exempt the lots from reassessment of bushfire issues when land owners are ready to develop their lots. Post-Subdivision Bushfire Attack Level Certificates may be issued assigning BALs to all individual lots within the subdivision. An applicant can rely on this Post-Subdivision BAL Certificate for Complying Development up to and including BAL-29.

The option to use Complying Development also allows for a streamlined process for developing on BPL.

### 1.4.4 Infill and other development

The EP&A Act s.4.14 requires that the consent authority be satisfied that the relevant specifications and requirements of this document are complied with for development on BPL. This applies to any development other than subdivision of land that could lawfully be

used for residential purposes or development for a SFPP. This can be achieved by the following means:

a. the consent authority is satisfied that the development conforms to the specifications and requirements of PBP; or

b. the consent authority has been provided with a certificate by a person who is recognised by the NSW RFS as a qualified consultant in bushfire risk assessment stating that the development conforms to the relevant specifications and requirements; or

c. If the consent authority is satisfied that the development does not conform to the relevant requirements of PBP, it may still grant consent to the development but only after it has consulted with the Commissioner of the NSW RFS concerning measures to be taken with respect to the development to protect persons, property and the environment from danger that may arise from a bushfire.

### 1.4.5 Exempt and Complying Development

Some straightforward residential, commercial and industrial development can be undertaken as Exempt or Complying Development under various SEPPs and LEPs.

Exempt Development is minor building works that can be carried out without development approval, such as decks, garden sheds, carports and fences.

Complying Development can be undertaken on lower risk BPL up to and including BAL-29 where the appropriate construction requirements and all other relevant development standards have been met. Complying Development is not permitted on higher risk BPL (BAL-40 or BAL-FZ) and a DA is required in these circumstances.

Specified development requirements and standards apply to new development, including alterations and additions, to ensure the relevant provisions of this document are met. This allows for Complying Development on BPL, while maintaining an appropriate assessment regime for managing bushfire risk.

In certain circumstances, a BAL Certificate must be obtained from the local council or a person recognised by the NSW RFS as a suitably qualified consultant in bushfire assessment, stating that the development is not located in BAL-40 or BAL-FZ.

The development must also meet the identified development standards within the relevant SEPP or LEPs.

## 1.5 Construction provisions: the National Construction Code (NCC) and bushfire standards

The NCC is a performance based code which comprises the Building Code of Australia (BCA) as Volumes 1 and 2 and the Plumbing Code of Australia as Volume 3.

The NCC contains Performance Requirements and Deemed-to-Satisfy provisions relating to the construction of buildings in bushfire prone areas. In NSW, these provisions apply to

Class 1, 2 and 3 buildings, Class 4 parts of a building, Class 9 buildings that are SFPPs, and associated class 10a buildings and decks.

The construction requirements of AS 3959 and the National Association of Steel-framed Housing (NASH) Standard are a Deemed-to-Satisfy solutions in the NCC, as varied in NSW, for buildings in designated bushfire prone areas.

## 1.6 Planning for Bushfire Protection

### 1.6.1 Aim and objectives

All development on BPL must satisfy the aim and objectives of Planning for Bushfire Protection (PBP).

The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bushfire, while having due regard to development potential, site characteristics and protection of the environment.

The objectives are to:

- afford buildings and their occupants protection from exposure to a bushfire;
- provide for a defendable space to be located around buildings;
- provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
- ensure that appropriate operational access and egress for emergency service personnel and occupants is available;
- provide for ongoing management and maintenance of BPMs; and
- ensure that utility services are adequate to meet the needs of firefighters.

### 1.6.2 Bushfire protection principles

Bushfire protection can be achieved through a combination of strategies which are based on the following principles:

- control the types of development permissible in bushfire prone areas;
- minimise the impact of radiant heat and direct flame contact by separating development from bushfire hazards;
- minimise the vulnerability of buildings to ignition and fire spread from flames, radiation and embers;
- enable appropriate access and egress for the public and firefighters;
- provide adequate water supplies for bushfire suppression operations;
- focus on property preparedness, including emergency planning and property maintenance requirements; and
- facilitate the maintenance of Asset Protection Zones (APZs), fire trails, access for firefighting and on site equipment for fire suppression.

## 1.6.3 How to use PBP

Applications for development on BPL should include a bushfire assessment report. This report must demonstrate that the proposal satisfies the requirements of PBP. All applications must meet the Aim and Objectives of PBP.

PBP uses a performance based approach, and identifies objectives and detailed performance criteria to satisfy desired outcomes and meet the Aim and Objectives. Ultimately, any performance based approach must demonstrate that bushfire protection is afforded to a proposed development commensurate with the assessed level of bushfire risk and the characteristics of the occupants.

This can be achieved by either applying the identified acceptable solutions, or by preparing a performance based solution.

A performance based solution must be designed to achieve the appropriate level of protection by tailoring a package of measures which meet the intent and performance criteria relevant to the proposed development.

BPMs are set out in Chapter 3 of BPB. Performance criteria and acceptable solutions are shown for each specified development type in Chapters 5-8.

### *1.6.3.1 Bushfire protection measures*

BPM's are the relevant specifications and requirements that need to be satisfied to improve life safety, property protection and community resilience to bushfire attack.

They include:

- APZs;
- Access;
- Construction, siting and design;
- Landscaping;
- Services; and
- Emergency and evacuation planning.

### *1.6.3.2 Intent*

For each BPM, a broad intent is outlined. The ensuing performance criteria and acceptable solutions are designed to ensure that the general intent for each BPM is met.

### *1.6.3.3 Performance criteria*

Performance criteria are the outcomes that need to be achieved to satisfy the intent. The performance criteria can be satisfied in one of the following ways:

- acceptable solutions; or
- performance based solution; or
- the combination of the above.

#### *1.6.3.4 Acceptable solutions*

Chapters 5-8 identify acceptable solutions which are considered by the NSW RFS as meeting the performance criteria.

#### *1.6.3.5 Performance based solutions*

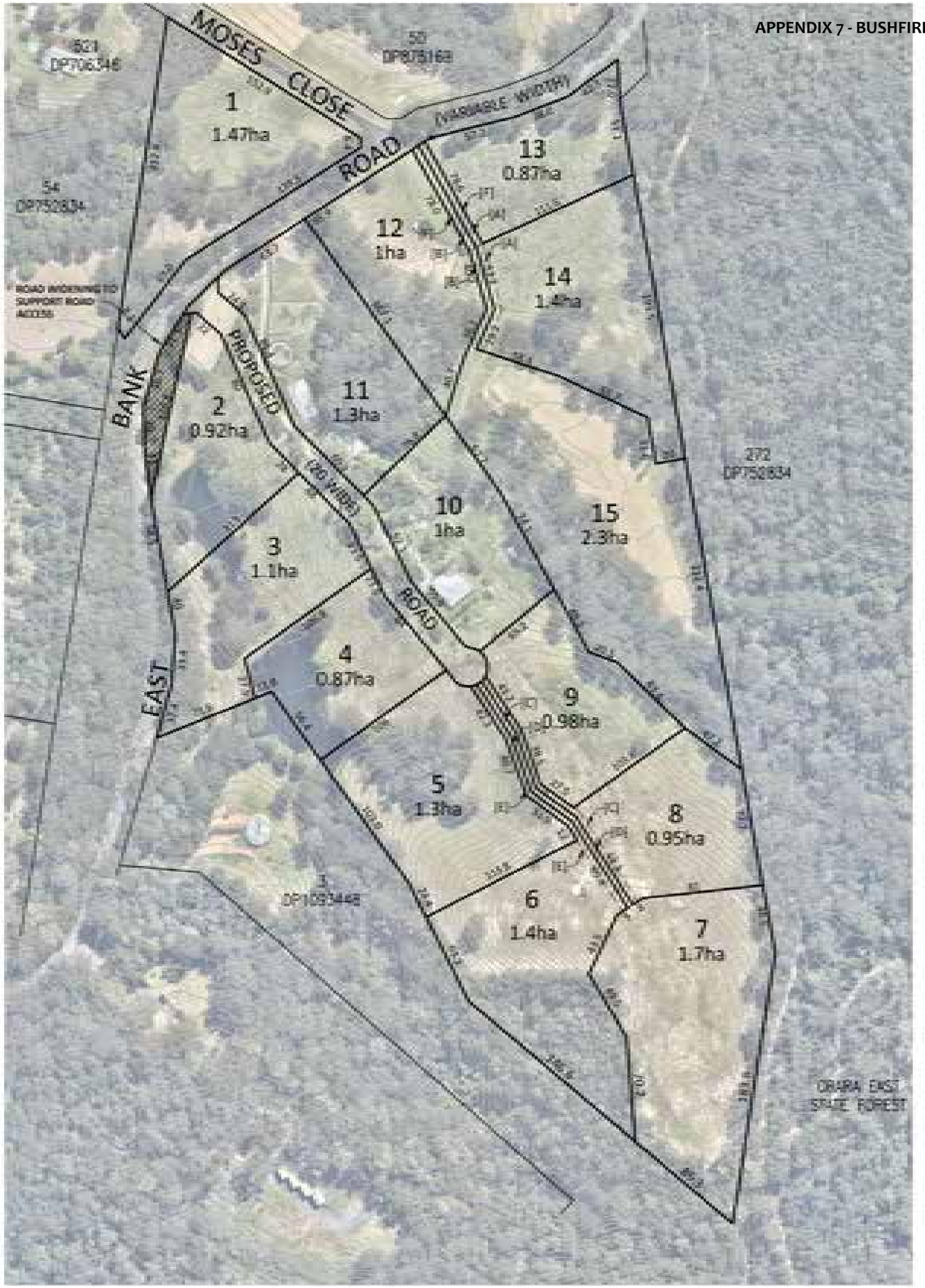
Performance based solutions allow flexibility and innovation in responding to site-specific opportunities and constraints while still meeting the identified performance criteria. They also allow the consideration of a broad range of issues and information, including bushfire risk, community expectations, environmental protection and the application of new science, processes and technologies.

Performance based solutions must provide substantiated evidence and clearly demonstrate how the specific objectives and performance criteria are to be satisfied.

When performance based solutions are proposed, they will be assessed on their merits and individual circumstances. In these circumstances, a Bushfire Design Brief (BDB) process can be undertaken which would involve early agreement on the key elements and acceptance criteria from all stakeholders including the NSW RFS.

Performance based solutions may be undertaken for any of the BPMs detailed in Chapter 3 and supported in accordance with the submission requirements in Appendix 2 of PBP.

# ILLUSTRATION 1.5 CONCEPT SUBDIVISION PLAN



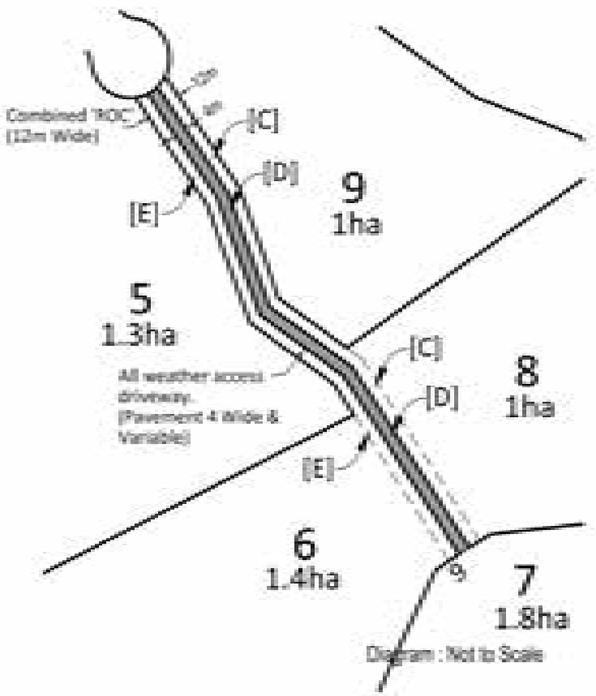

NOTE:

- The dimensions, areas and numbers of lots shown heron are approximate and are subject to verification by field survey.
- The location of all physical features relative to existing or proposed title boundaries shown hereon is approximate and subject to verification by field survey.
- No reliance should be placed on the information shown on this plan for any financial dealings or detailed engineering design involving the land.
- Land Metrics Pty Ltd disclaims any liability whatsoever for any loss or damage that is incurred arising from any individual or organisation who uses or relies upon this document for any financial dealing or any other purpose, including as a document which has been prepared to accompany a development application.
- This Plan is not a plan of an approved subdivision nor does it imply that the proposed boundary arrangement would be approved.
- Road Widening of East Bank Road as shown to support safe intersection site distance as per AS2890 for 80Km Speed Zone.
- This note remains an intrinsic part of this plan and this plan must not be reproduced without this note.

[A] PROPOSED 'ROC' BENERITTING PROPOSED LOT 15
[B] PROPOSED 'ROC' BENERITTING PROPOSED LOT 14
[C] PROPOSED 'ROC' BENERITTING PROPOSED LOTS 6 & 7
[D] PROPOSED 'ROC' BENERITTING PROPOSED LOTS 6 & 8
[E] PROPOSED 'ROC' BENERITTING PROPOSED LOTS 7 & 8
[F] PROPOSED 'ROC' BENERITTING PROPOSED LOTS 12 & 13

NOTES:
"ROC" - RIGHT OF CARRIAGEWAY

**DIAGRAM 'A'**

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Scale - 1:3000 @ A3

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216 EAST BANK ROAD
PLANNING PROPOSAL
CONCEPT SUBDIVISION
J. CLEARY
LOT 1 & 2 DP 1093448
EAST BANK ROAD, CORAMBA

Land Metrics
Land Development Consultants

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| Checked | Date |
| M.C. | 30/11/2022 |
| Dwg No | Sheet / Rev |
| 2021-029 | 01 |

# 2.0 BUSHFIRE STRATEGIC STUDY

## 2.1 Bushfire Landscape Assessment

*A bush fire landscape assessment considers the likelihood of a bush fire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.*

Some of the information provided below has been extracted from the Mid North Coast Bushfire Risk Management Plan (MNC BRMP). The aim of the MNC BRMP is to minimise the risk of adverse impact of bushfires on life, property and the environment. The objectives of the MNC BRMP are to:

- reduce the number of human-induced bush fire ignitions that cause damage to life, property and the environment;
- manage fuel to reduce the rate of spread and intensity of bush fires, while minimising environmental/ecological impacts;
- reduce the community's vulnerability to bush fires by improving its preparedness; and
- effectively contain fires with a potential to cause damage to life, property and the environment.

Chapter 4 of the MNC BRMP states that the Plan must be reviewed and updated within each successive five-year period from the constitution of the Bush Fire Management Committee. The BFMC will also review this plan as necessary to account for any changes in context or risk. This may be triggered by a range of circumstances, including but not limited to:

- changes to the BFMC area, organisational responsibilities or legislation;
- changes to the bushfire risk in the area; or
- following a major wildfire event.

The current Plan was signed by the Chairperson of the BFMC on 2/8/2017, and then 'signed off' by the Bush Fire Coordinating Committee on 23/5/2018, meaning that the BRMP is current at the time of preparing this Study.

### 2.1.1 The bush fire hazard in the surrounding area, including: Vegetation; Topography; Weather

#### *2.1.1.1 Vegetation*

The site is located in the Orara Valley, at the western foothills of Mount Coramba, west of Coffs Harbour. It occupies land used for agricultural purposes, which is consistent with the general landuse in the general vicinity. The vegetation in the area is a mosaic of forest and cleared farmland with remnant vegetation often occupying steep slopes along watercourses, and site is representative of this mosaic. The Orara East State Forest is located to the immediate east of the site, extending east for approximately 5 km.

The forest vegetation is predominantly a mix of wet and dry sclerophyll forest. The gullies and southern slopes dominated by wet sclerophyll communities, and the northern slopes dominated by more sparsely-spaced structure of dry sclerophyll communities.

Embers and fire brands from the upslope forest fires have the potential to travel long distances, causing spotting well ahead of the main fire front(s). Fires occurring in grasslands tend to result in less ember attack.

The Orara East State Forest has been identified as an "Economic Infrastructure" in the MNC BRMP. This would be primarily due to the tourist attraction to the SF, however, plantation harvesting does occur within the SF with harvesting operations generally planned on a 35-year cycle.

#### *2.1.1.2 Topography*

Slopes on the development site and on the neighbouring lands are generally < 15°, with only small sections of riparian corridors having slopes exceeding this. This is generally consistent with the majority of lands in the general vicinity.

A slope assessment around the boundaries of the site, including the remnants on the site, has been undertaken. This slope assessment has been conducted perpendicular to the site boundaries and has been used to determine the effective slope constraining the site.

Fires occurring in these areas are more likely to be in the lower-end of the intensity range, due in part to the moderate slopes, but also due to the location of the hazards in relation to the site (having regard for fire weather conditions).

Localised wind patterns during a wildfire, that do not conform to the predicted predominant wind directions, are less likely to be due to topography, and would more likely influenced by fire intensity.

#### *2.1.1.3 Weather*

The typical/average climate in the Mid North Coast BFMC area is sub-tropical, characterised by warm, wet summers, and the bushfire season generally runs from September to January.

The NSW statutory Bushfire Danger Period is from 1st October to 31st March each year, however it may vary due to local conditions. It is not unusual, however, for the NSW Rural Fire Service to commence early, or extend, the Bushfire Danger Period due to localised climatic conditions.

The extension of the Bushfire Danger Period is not necessarily the result from the expectation of the extreme bushfire weather conditions usually associated with mid-summer, but rather is due to the weather conditions for these other periods being

unusually warm or dry (or both) for that period of the year. The Bushfire Danger Period is the period within which permits must be obtained from the fire authorities for certain types of fires; it does not prohibit the lighting of fires. In the Mid North Coast BFMC area, the issuing of fire permits is not permitted from midnight 22nd December to midnight 5th January.

Prevailing weather conditions conducive to erratic bushfire conditions in the Mid North Coast BFMC area are strong west to north-west winds, accompanied by high temperatures and lower relative humidity.

Between 1994 – 2006 only 3 occurrences were recorded at the Coffs Harbour Bureau of Meteorology weather station where the FFDIs was ≥80, with all of these instances coinciding with a westerly wind influence (western quarter).

**Table 1:** *Occurrences at Coffs Harbour where FFDI was 80 or more (from 1994 to 2006)*

| Date | FFDI | Wind Speed | Wind Direction | Rel. Humidity | Air Temp | DF Forest | DF Scrub | KBDI | Rainfall | Days Since Rain |
|---|---|---|---|---|---|---|---|---|---|---|
| 27/9/2003 | 87.3 | 46.4 | 260 (W) | 7.1 | 32.9 | 10 | 12 | 151 | 0 | 14 |
| 2/1/2002 | 83.7 | 38.9 | 300 (NW) | 8.3 | 39 | 9.7 | 10 | 151 | 0 | 2 |
| 12/1/2002 | 112.1 | 42.5 | 270 (W) | 6.8 | 42.7 | 10 | 12 | 167 | 0 | 2 |

### 2.1.2 Potential Bushfire Behaviour (based on vegetation, topography, weather)

Refer to 2.1.4 below.

### 2.1.3 Bushfire History in the Area

The NSW Rural Fire Service already has access to information on fire history in the area. This information is not readily available to the public, so there seems little point in pursuing this info from the RFS and then re-presenting it back in a Report.

The Mid North Coast BFMC area has on average 185 bushfires per year, of which two on average can be considered to be major fires. The main sources of ignition in the Mid North Coast BFMC area are:

- Escaped private hazard reduction burns;
- Lightning strikes;
- Arson.

### 2.1.4 Potential Fire Runs and their Intensities

Potential fire runs through consistent vegetation forms are the longest:

- From east or south, through forest in the Orara East State Forest. For these scenarios, the predominant fire runs are on downslopes, and under easterly wind

influences. Wildfires from this direction could impact on the site with intensities much lower than those modelled by *PBP-2019* (i.e., FFDI of <80). The frequency of days with FFDIs of ≥80 are low, with only 3 recoded occurrences at the Coffs Harbour Bureau of Meteorology weather station between 1994 – 2006. None of these instances occurred under an easterly wind influence.

- From west or north through improved-pasture grasslands on the Orara Valley flood plain. For these scenarios, the predominant fire runs are on generally across level ground, or otherwise through vegetated riparian corridors.

There are no *Strategic Fire Advantage Zones*, or *Land Management Zones*, in proximity to the site that would provide a significant influence over the predicted fire behaviour likely to impact the property.

### 2.1.5 The difficulty in Accessing and Suppressing a Fire, the Continuity of Bushfire Hazards or the Fragmentation of Landscape Fuels and the Complexity of the Associated Terrain

The continuity of the bushfire hazards does not pose any specific substantial difficulty in suppressing wildfires in the vicinity of the property.

The Orara East State Forest is provided with a large network of forest roads and fire trails. In the immediate vicinity of the property is Hopes Road, Cyclone Road, East Bank Forest Road with intersecting trails of Hop, Skip and Jump Trails. With Tiger Fire Trail to the south-west of the property, the property is surrounded by an existing fire trail network. These publically accessible trails provide opportunity for accessing and suppressing fires, or establishing control-lines. Access to these areas would be restricted to off-road fire trucks.

Access into the State Forest in order to carry out firefighting activities would be ideally done only after plantation harvesting within the SF. The large cleared areas provide a significantly safer environment than if no recent harvesting had occurred. Recent experiences (Canberra, Jan 2003; Kian Road, Oct-Nov 2019) have resulted in an acceptance that terrain can severely hamper firefighting operations (extinguishment). A single-point ignition (such a from a lightning strike) in a similarly contoured landscape can be difficult to extinguish by ground-crews, resulting in a gradual fire spread over days or weeks. Larger established wildfires, during extreme fire weather conditions, pose a firefighter safety risk.

The proper maintenance of the fire trail network could aid in the preparation and undertaking of hazard reduction burning, should that be deemed appropriate depending on the life-cycle of the plantation at that point in time. However, as previously stated, accessing these steep areas during a wildfire event is not only problematic and requires a thorough risk assessment, it does not provide any degree of certainty that fire containment and extinguishment could occur.

Access to the grassland environment along the Orara Valley flood plain is available from the Orara Valley Way, and all the side roads and property access roads of it. The entire length of Orara Valley Way is accessible by 2-wheel drive vehicles, allowing both urban and rural fire trucks to access these areas.

## 2.2 Land Use Assessment

*The land use assessment will identify the most appropriate locations within the masterplan area or site layout for the proposed land uses.*

### 2.2.1 The risk profile of different areas of the development layout based on the above landscape study

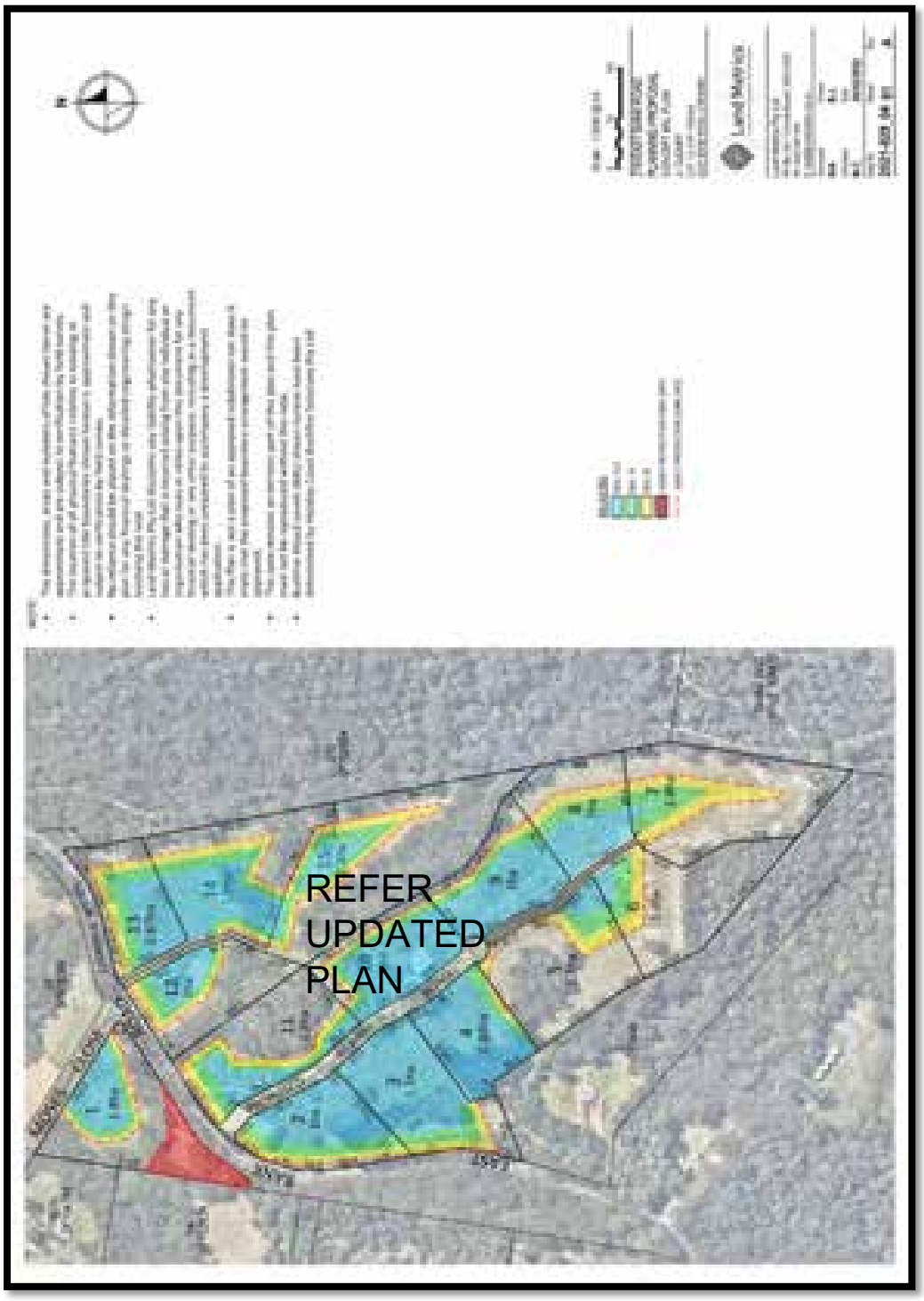
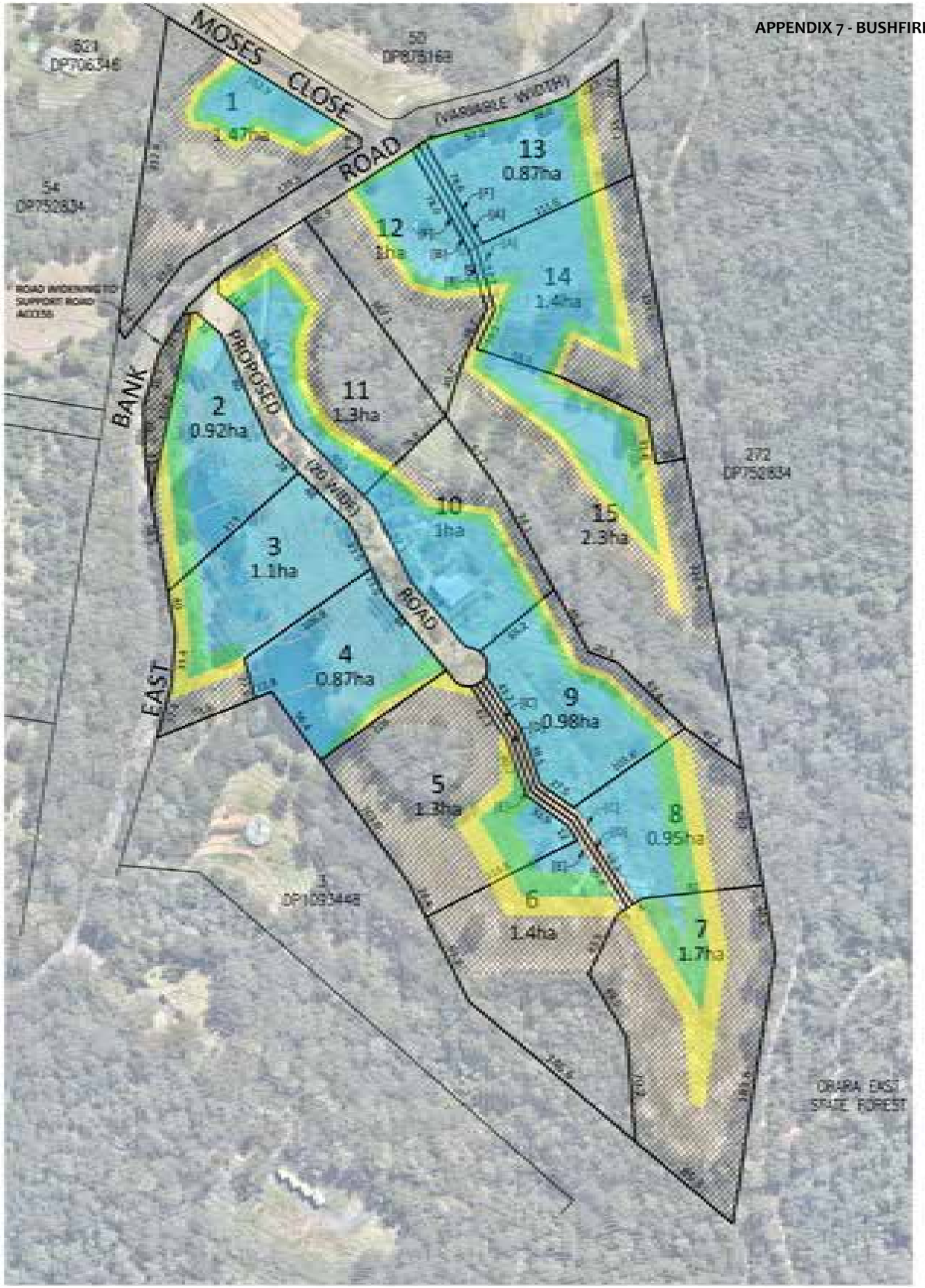



Figure 4: plan identifying Flame Zone areas / APZs and BAL zones (Land Metrics, 28/02/2022)




NOTE:

- The dimensions, areas and numbers of lots shown heron are approximate and are subject to verification by field survey.
- The location of all physical features relative to existing or proposed title boundaries shown hereon is approximate and subject to verification by field survey.
- No reliance should be placed on the information shown on this plan for any financial dealings or detailed engineering design involving the land.
- Land Metrics Pty Ltd disclaims any liability whatsoever for any loss or damage that is incurred arising from any individual or organisation who uses or relies upon this document for any financial dealing or any other purpose, including as a document which has been prepared to accompany a development application.
- This Plan is not a plan of an approved subdivision nor does it imply that the proposed boundary arrangement would be approved.
- Road Widening of East Bank Road as shown to support safe intersection site distance as per AS2890 for 80Km Speed Zone.
- This note remains an intrinsic part of this plan and this plan must not be reproduced without this note.
- Bushfire Attack Levels (BAL) shown hereon have been determined by Holiday Coast Bushfire Solutions Pty Ltd.

[A] PROPOSED 'ROC' BENEFITTING PROPOSED LOT 15
[B] PROPOSED 'ROC' BENEFITTING PROPOSED LOT 14
[C] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 6 & 7
[D] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 6 & 8
[E] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 7 & 8
[F] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 12 & 13

'ROC' RIGHT OF CARRIAGEWAY

BAL-29 (29kW/m²)
BAL-19 (19kW/m²)
BAL-12.5 (12.5kW/m²)
Minimum APZ (Asset Protection Zone)

N

Scale - 1:3000 @ A3

218 EAST BANK ROAD
PLANNING PROPOSAL
CONCEPT BAL PLAN
J. CLEARY
LOT 1 & 2 DP 109448
EAST BANK ROAD, CORAMBA

Land Metrics
Land Development Consultants

Land Metrics Pty Ltd
PO Box 6511 Coffs Harbour, NSW 2450
Ph: 0422 687 846
E: mail@landmetrics.net.au

| Surveyed | Drawn |
|---|---|
| N/A | M.C |
| Checked | Date |
| M.C. | 30/11/2022 |
| Dwg No | Sheet | Rev |
| 2021_029 | 03 | |

The APZs identified in the plans above are not suitable for residential structures. These areas are determined to be within BAL-40 and BAL-FZ zones.

The BPMs from *PBP-2019* that are applied to home-based child care are commensurate with the "*residential*" requirements rather than the *Special Fire Protection Purpose* requirements. Therefore, the fact that home-based child care can occur on the lots without consent, the RFS views this type of occupancy in the same light as normal single-dwelling residential use (with the exception that a *Bushfire Emergency Response Plan* needs to be prepared for home-based child care premises).

### 2.2.2 The proposed land use zones and permitted uses

Apart from the matters addressed in the BAL plans above, the broader planning issues should be dealt with by the project planner.

### 2.2.3 The most appropriate siting of different land uses based on risk profiles within the site (i.e. not locating development on ridge tops, SFPP development to be located in lower risk areas of the site)

Refer to 2.2.1 and 2.2.2 above.

The site is constrained generally along the eastern and south-western boundaries. A central road (rather than perimeter road) has been proposed. The remaining developable land is therefore located either side of the central road. The minimum setbacks required by *PBP-2019* have been complies with.

The "central road" arrangement provides for the potential evacuation from the site to be along a roadway that is <u>not</u> located on the interface, but rather is located <u>away</u> from the interface, and within multiple APZs around the future dwellings.

Council's LEP provides:

> **<u>Zone R5 Large Lot Residential</u>**
> **1 Objectives of zone**
> · To provide residential housing in a rural setting while preserving, and minimising impacts on, environmentally sensitive locations and scenic quality.
> · To ensure that large residential lots do not hinder the proper and orderly development of urban areas in the future.
> · To ensure that development in the area does not unreasonably increase the demand for public services or public facilities.
> · To minimise conflict between land uses within this zone and land uses within adjoining zones.
> **2 Permitted without consent**
> Building identification signs; Extensive agriculture; Home-based child care; Home occupations
> **3 Permitted with consent**
> Animal boarding or training establishments; Bed and breakfast accommodation; Bee keeping; Boat launching ramps; Business identification signs; Camping grounds; Cellar door premises;

Centre-based child care facilities; Community facilities; Dual occupancies (attached); Dwelling houses; Eco-tourist facilities; Emergency services facilities; Entertainment facilities; Environmental facilities; Environmental protection works; Farm buildings; Farm stay accommodation; Flood mitigation works; Group homes; Home businesses; Home industries; Horticulture; Information and education facilities; Jetties; Kiosks; Neighbourhood shops; Oyster aquaculture; Places of public worship; Pond-based aquaculture; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Research stations; Respite day care centres; Restaurants or cafes; Roads; Roadside stalls; Self-storage units; Tank-based aquaculture; Veterinary hospitals; Water recreation structures; Water storage facilities

**4 Prohibited**

Any development not specified in item 2 or 3

The BPMs from *PBP-2019* that are applied to home-based child care are commensurate with the "*residential*" requirements rather than the *Special Fire Protection Purpose* requirements. Therefore, the fact that home-based child care can occur on the lots without consent, the RFS views this type of occupancy in the same light as normal single-dwelling residential use (with the exception that a *Bushfire Emergency Response Plan* needs to be prepared for home-based child care premises).

The BAL plan provided above demonstrates that that this D-t-S provision of *PBP-2019* has been satisfied. This is discussed in further detail in Appendix A of this Study.

### 2.2.4 The impact of the siting of these uses on APZ provision

As a rural-residential subdivision, only residential-sized APZs (29 kW/m$^2$ Radiant Heat Flux threshold) will need to be provided between the proposed dwelling envelopes (DE) and the property boundaries interfacing bushfire hazard vegetation. The BAL plan provided above demonstrates that that this D-t-S provision of *PBP-2019* has been satisfied. This is discussed in further detail in Appendix A of this Study.

None of the areas identified as APZ will be on land that poses ongoing management issues, such as steep land. The areas identifies as APZs are currently cleared of significant vegetation, or will be managed as APZ in consultation with the project ecologist. One such area is in the south-western corner of the site within proposed lots 7/8.

It would not be unreasonable to expect that all of the land within the proposed new lots is to be managed in a bushfire-hazard-reduced state. Rather than complying with inner protection area (IPA) standards of an APZ, those parts of the lots that are outside of the required APZ should be managed as part of the APZ, to outer protection area (OPA) standards.

## 2.3 Access and Egress

*A study of the existing and proposed road networks both within and external to the masterplan area or site layout*

### 2.3.1 The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile

The proposed internal road will comply with nearly all of the D-t-S provisions (*Acceptable Solutions*) of *PBP-2019*.

The proposed new road will not form a perimeter road. It will be located centrally to allow the greatest ease of access for vehicles entering / exiting the proposed new lots. The CHCC development standards for roads will also be met. Not only does a perimeter road locate the traffic access / egress point closer to the bushfire hazard vegetation on the adjoining lands, a perimeter road would be impractical for the scope and scale of the proposed development. Travel distances from the individual lots to East Bank Road would be increased under a "perimeter road" arrangement compared with the cul-de-sac and RoW arrangement proposed.

The road is not a through-road, and has a length of approximately 480 m. Rather than a 24 m diameter turning circle at the dead-end, a vehicle manoeuvring area will be provided that complies with the specifications of Appendix 3 of *PBP-2019*. Proposed lots 6 / 7 / 8 will access the cul-de-sac head via a Right of Way

The proposed new road will be aligned to in part along a riparian corridor, so some of the existing native vegetation will be removed or otherwise managed as a non-hazard as part of this proposal. The "central road" arrangement provides for the potential evacuation from the site to be along a roadway that is not located on the interface, but rather is located away from the interface, and within a corridor of multiple APZs around the future dwellings.

Although secondary access is available via the neighbouring fire trail network, these routes are not viable alternatives in the event of a wildfire emergency occurring the general vicinity. A secondary access / egress point from within the site to East Bank Road would provide no material benefit over the single road concept.

The proposed new road will have a width of 5.5 m and parking on the road will be either prohibited, or parking-bays will be provided in addition to the 5.5 m road width. All specifications regarding gradient and clearances will be provided.

Property access roads to the individual lots will need to comply with the provisions of *PBP-2019*. The alignment of these driveways will need to be carefully considered in relation to eventual siting of the dwellings and on-site firefighting water supplies.

- minimum 4m carriageway width;
- a minimum vertical clearance of 4m to any overhanging obstructions;

- provide a suitable turning area in accordance with Appendix 3 of *PBP-2019*;
- curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress;
- the minimum distance between inner and outer curves is 6m;
- the cross-fall is not more than 10°;
- maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads;
- provide fire truck access to within 4 m of on-site static water supplies.

### 2.3.2 The location of key access routes and direction of travel

Access to the site is currently only available from either the north or south along East Bank Road. Primary access would most likely be from the south as this direction provides the shortest travel distance and time from Coffs Harbour. The route north along East Bank Road provides access to Nana Glen, and then the Pacific Motorway to the east, or Grafton to the north.

- Travel distance from the site to Coffs Harbour is approximately 17 km along East Bank Road and Coramba Road.
- Travel distance from the site to the Pacific Motorway to the north is approximately 27 km along East Bank Road and Bucca Road.
- Travel distance from the site to Grafton is approximately 67 km along East Bank Road and Orara Way.

An alternative access route to the site is available from the east via Orara East State Forest (East Bank Forest Road and Hopes Road). Vehicles using this route would most likely be recreational four-wheel-drivers visiting the SF and surrounds. Access to / from the east should be avoided during a bushfire emergency event in the area.

### 2.3.3 The potential for development to be isolated in the event of a bush fire

The main development along East Bank Road is rural-living or agriculture. This has resulted in a large majority of the road frontage being exposed to a 'grassland' or 'managed land' use.

Small remnant of native vegetation exists along the main road routes, consisting primarily of road-side vegetation or riparian corridors. Fires occurring in these remnants would be most likely from spot-ignitions associated with escaped hazard-reduction burns (such as pile burns), or arson, or spotting from fires elsewhere. The chance of these events blocking the public road would be low given the shorter fire-run distances associated with remnants and riparian corridors.

Wildfires occurring in unmanaged grassland environments have the potential to burn with high intensities (particularly on steep slopes) however the flaming residence time in

grasslands is much shorter than in forest-type vegetation. Again, the chances of these fires blocking the public road would be low. Smoke hazard rather than radiant heat would be the primary consideration here.

## 2.4 Emergency Services

*An assessment of the future impact of new development on emergency services.*

### 2.4.1 Consideration of the increase in demand for emergency services responding to a bush fire emergency including the need for new stations/brigades

As more of the farmland areas are developed and managed as APZ, the amount of land able to support a wildfire is reduced. It could quite possibly be that developments such as these not only provide protection to the proposed new lots, but they also provide a benefit to surrounding properties. I would doubt that there would be a dataset available that quantifies this, however.

There may be a perception that this development may pose an increase in demand on the existing fire services, particularly in relation to wildfire events. I think this would be a misconception based on the fact that although the development creates an increase in the total number of properties within the precinct, the resulting development would be more bushfire-resilient than much of the existing development in the surrounding area.

The whole idea of adopting *PBP-2019* as a planning tool is to help create a system that places the onus of bushfire-protection on the individual lots being created.

- Vehicle access is adequate for an emergency response to each asset on the site;
- Each lot has ready-access to a firefighting water supply;
- Buildings are constructed to withstand the adverse affects of wildfires; and
- Landscaping and APZs have been properly designed and maintained.

The result of this is that the development site is more wildfire-resilient than the existing developments in the locality, and therefore actually less reliant on the fire services.

The site is currently within a Rural Fire district. These districts fall under the jurisdiction of the NSW Rural Fire Service for most fire-related emergencies. It is not expected within the foreseeable future that this would change.

Whilst the total area of land within the RFS Fire District remains unchanged as a result of this proposed development, the likely demand on fire services could increase due to:

- Structure fires due to additional homes and associated Class 10 buildings;
- Administering and responding to pile burns or hazard reduction activities.

Any increase in demand on the local brigades would be inconsequential.

There are several NSW Rural Fire Service brigades located in the locality, including Coramba, East Bank, Karangi, and Nana Glan. These brigades are volunteer-based brigades, and only respond to emergency incidents when crew members are available. It is unlikely that this development would pose a significant increase in demand for these brigades.

### 2.4.2 Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency

As pointed out elsewhere in this Study, obtaining safe firefighter access to the landscape around the development site for the purpose of firefighting poses several problems, including the fact that recent experience shows that firefighting operations away from the interface has little chance of being effective under the weather conditions predicted by *PBP-2019*.

Access within the development site will comply with the *Performance Criteria* of *PBP-2019*, as detailed in section 3.1.2 of this Study. This will enable firefighter access to all new dwelling assets within the development site.

Firefighter access to the bushfire hazard surrounding the development site is available via several public roads and trails, including but not limited to East Bank Forest Road, Hopes Road and Tiger Fire Road. This existing trail network allows firefighter access to the hazard vegetation for the carrying out of fire suppression and back-burning operations, as well as hazard reduction work.

From a landscape-perspective, the predominant hazard vegetation adjacent to the site is the forest within the Orara East State Forest. Fires from this direction would generally be downhill-spreading fires as they head east-to-west from the Mt. Coramba complex.

## 2.5 Infrastructure

*An assessment of the issues associated with infrastructure and utilities.*

### 2.5.1 The ability of the reticulated water system to deal with a major bush fire event in terms of pressures, flows, and spacing of hydrants

There is no reticulated water supply provided to the properties in the vicinity of the development site. Firefighting water supplies for the development will be provided by on-site static water supplies on each of the proposed new lots.

The supply could be individual water tanks on each proposed new lot, or alternatively the total supply required by *PBP-2019* could be provided as an amalgam of supplies in the one tank, and then distributed to the dwelling envelopes of each new lot.

Section 3.1.3 of this Study deals with the water supply in more detail.

### 2.5.2 Life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines etc

There are no major infrastructure services affected, or likely to be affected, by the proposed development.

There are no (existing or proposed) major infrastructure services that are likely to affect life-safety.

## 2.6 Adjoining Land

*The impact of new development on adjoining landowners and their ability to undertake bush fire management.*

### 2.6.1 Consideration of the implications of a change in land use on adjoining land including increased pressure on BPMs through the implementation of Bush Fire Management Plans

This proposed development does not pose any significant pressure on surrounding lands, from a bushfire-perspective.

To the contrary, the proposed development increases the level of bushfire-protection to the adjoining lands, due to the suite of BPMs provided within the development site as part of this proposal.

#### *2.6.1.1 From Within The Site*

Any fires from within the site would be as a result of pile burning or other hazard reduction work. Should this occur it would assumed to have been undertaken by the property owner and the size and extend of HR work would be limited by the available labour at that time.

Although the number of properties within the site are proposed to be increased, the frequency of HR work would not necessarily be increased by the same magnitude as a result. Whilst the conversion of farmland to APZs would require some slashing and crown-lifting of trees, the ongoing maintenance of the APZs would require limited pile burning.

Such HR work would be much smaller in size and extent following the initial establishment of the APZ.

#### *2.6.1.2 From Outside Of The Site*

Currently, if a wildfire was to enter the site there would be limited ability to contain the fire within the site. If it was of such intensity that it crossed the grasslands to the west of the site, crossed East Bank Road, the ability to contain and extinguish within the site would be limited given the current labour available.

A fire entering the site from the neighbouring forest vegetation would not be at a single ignition point, but rather would be a fire-front. If a wildfire with a wide front was to impact on the property then the ability of the property owner to contain and extinguish it would be limited.

A Land Use Conflict Risk Assessment (LUCRA) may be required by the CHCC. The LUCRA would specifically address any landuse conflict issues.

# 3.0 MINISTERIAL DIRECTIONS (SECTION 9.1(2) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979)

***4.4 Planning for Bushfire Protection***

***Objectives***

*(1) The objectives of this direction are:*

*(a) to protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas, and*

*(b) to encourage sound management of bush fire prone areas.*

***Where this direction applies***

*(2) This direction applies to all local government areas in which the responsible Council is required to prepare a bush fire prone land map under section 10.3 of the Environmental Planning and Assessment Act 1979 (the EP&A Act), or, until such a map has been certified by the Commissioner of the NSW Rural Fire Service, a map referred to in Schedule 6 of that Act.*

***When this direction applies***

*(3) This direction applies when a relevant planning authority prepares a planning proposal that will affect, or is in proximity to land mapped as bushfire prone land.*

***What a relevant planning authority must do if this direction applies***

*(4) In the preparation of a planning proposal the relevant planning authority must consult with the Commissioner of the NSW Rural Fire Service following receipt of a gateway determination under section 3.34 of the Act, and prior to undertaking community consultation in satisfaction of Schedule 1, clause 4 of the Act, and take into account any comments so made,*

*(5) A planning proposal must:*

*(a) have regard to Planning for Bushfire Protection2019,*

*(b) introduce controls that avoid placing inappropriate developments in hazardous areas, and*

*(c) ensure that bushfire hazard reduction is not prohibited within the APZ.*

*(6) A planning proposal must, where development is proposed, comply with the following provisions, as appropriate:*

*(a) provide an Asset Protection Zone (APZ) incorporating at a minimum:*

*(i) an Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and*

*(ii) an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road,*

*(b) for infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the planning proposal permit Special Fire Protection Purposes (as defined under section 100B of the Rural Fires Act 1997), the APZ provisions must be complied with,*

*(c) contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks,*

*(d) contain provisions for adequate water supply for firefighting purposes,*

*(e) minimise the perimeter of the area of land interfacing the hazard which may be developed,*

*(f) introduce controls on the placement of combustible materials in the Inner Protection Area.*

***Consistency***

*(7) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department*

*nominated by the Director-General) that the council has obtained written advice from the Commissioner of the NSW Rural Fire Service, to the effect that, notwithstanding the noncompliance, the NSW Rural Fire Service does not object to the progression of the planning proposal*

## 3.1 A planning proposal must have regard to Planning for Bushfire Protection 2019

The Ministerial Directions, and the preamble to *PBP-2019*, state that through the strategic planning process, a degree of certainty is required to ensure future development can meet the needs of *PBP-2019*. Whilst it may seem premature or even superfluous to assess the potential future subdivision against the requirements of *PBP-2019* at the 'Planning Proposal' stage, the process does ensure that the future lots are able to accommodate development with confidence.

Refer to Appendix A of this Study for the "*Bushfire Assessment Report*" that addresses the requirements of *PBP-2019*.

## 3.2 A planning proposal must introduce controls that avoid placing inappropriate developments in hazardous areas

*PBP-2006* and *PBP-2001* provide lists of development types that are both suitable, and unsuitable, for bushfire-prone areas, summarised as follows:

Table 2

| Not Desirable | Desirable |
|---|---|
| • Camping grounds<br>• Assembly buildings<br>• Land sharing communities<br>• Commercial and retail premises<br>• Education premises<br>• Prisons<br>• Premises for people with mental or physical incapacities<br>• Hospitals<br>• Flammable material bulk storage<br>• Stock / sale yards<br>• Timber yards<br>• Factories / warehouses<br>• Plantations<br>• Waste disposal / landfill depots<br>• Power generating works<br>• Sawmills<br>• Junk yards | • Tennis courts<br>• Golf courses<br>• Swimming pools<br>• Cemeteries<br>• Airstrips<br>• Cleared open space / recreation areas |

| | |
|---|---|
| • Liquid fuel depots<br>• Offensive and hazardous industries<br>• Chemical industries<br>• Service stations<br>• Ammunition storage/manufacture<br>• Fireworks manufacture/storage | |

The LEP should prohibit the listed undesirable developments within the bushfire-prone areas (land within 100m of identified bushfire hazard vegetation) of the subject site. Other types of development should be assessed on a case-by-case basis.

The comments provided at section 2.2 of this Study cover this matter in more detail.

## 3.3 A planning proposal must ensure that bushfire hazard reduction is not prohibited within the APZ

This has been discussed in more detail in the *Bushfire Hazard Assessment Report* attached as Appendix A of this Study.

The entire property should be managed as APZ. The minimum APZ required by *PBP-2019* should be managed as Inner Protection Area (IPA), the remaining area of each should be managed as a bushfire-hazard-free area by managing as an Outer Protection Area (OPA). This should help to ensure that bushfire hazard vegetation is not permitted to regenerate on the vacant allotments. Appendix B of this Study sets out the standards for APZs.

## 3.4 A planning proposal must, where development is proposed, comply with the following provisions, as appropriate - provide an Asset Protection Zone (APZ) incorporating at a minimum an Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property

The issues of APZs have been discussed in section 2.2 & 3.3, and in more detail in Appendix A of this Study. The minimum APZs required by *PBP-2019* have been provided.

The scale of the proposal does not warrant a perimeter road. This has been discussed in more detail in Appendix A of this Study.

## 3.5 A planning proposal must, where development is proposed, comply with the following provisions, as appropriate - an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road

The issues of APZs have been discussed in section 2.2 & 3.3, and in more detail in Appendix A of this Study. The minimum APZs required by *PBP-2019* have been provided.

The scale of the proposal does not warrant a perimeter road. This has been discussed in more detail in Appendix A of this Study.

## 3.6 For infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the planning proposal permit Special Fire Protection Purposes (as defined under section 100B of the Rural Fires Act 1997), the APZ provisions must be complied with

Refer to section 4.4.10 of Appendix A of this Study ("*Bushfire Hazard Assessment Report*") that addresses the requirements infill development (existing dwelling) on the site.

## 3.7 Contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks

This has been discussed in more detail in Appendix A of this Study. The scale of the proposal does not warrant a perimeter road, although the proposed road will meet the two-way traffic specifications of *PBP-2019*.

## 3.8 Contain provisions for adequate water supply for firefighting purposes

The site is not serviced by Council's reticulated water supply. Each new lot will be provided with an on-site static firefighting water supply at construction stage of the future dwellings. This has been discussed in more detail in Appendix A of this Study.

## 3.9 Minimise the perimeter of the area of land interfacing the hazard which may be developed

This is a criteria that is difficult to influence. The perimeter of the development site is unable to be altered to reduce the impact from wildfires from adjacent lands.

## 3.10 Introduce controls on the placement of combustible materials in the Inner Protection Area

This has been discussed in more detail in Appendix A and section 3.2 of this Study.

# 4.0 REFERENCES

NSW Bush Fire Coordinating Committee (2018), *Mid North Coast Bushfire Risk Management Plan – 23/5/2018*, Sydney.

NSW Government, *Environmental Planning and Assessment Act 1979* (as amended), http://www.legislation.nsw.gov.au

NSW Government, *Rural Fires Act 1997,* http://www.legislation.nsw.gov.au

NSW Government, *Rural Fires Regulation 2013,* http://www.legislation.nsw.gov.au

NSW Government Geospatial Portal (2021-'22), *various images,* http://maps.six.nsw.gov.au/

NSW Rural Fire Service (2019), *Planning for Bushfire Protection 2019,* Sydney.

NSW Rural Fire Service (2006), *Planning for Bushfire Protection 2006 including Addendum Appendix 3*, Sydney.

NSW Rural Fire Service (2001), *Planning for Bushfire Protection 2001*, Sydney.

NSW Rural Fire Service (2005), *Standards for asset protection zones*, Sydney.

NSW Rural Fire Service (2012), *Practice note 4/12 - 'In principle' masterplan agreements in bushfire prone areas*, Sydney.

NSW Rural Fire Service (2012), *Practice note 5/12 - Reuse of rezoning reports on bushfire prone land*, Sydney.

Standards Australia (2018), *Australian Standard 3959-2018 Construction of buildings in bushfire-prone areas*, Sydney.

# 5.0 APPENDICES

| | |
|---|---|
| Appendix A - | "*Bushfire Hazard Assessment Report*" addressing *PBP-2019* requirements. |
| Appendix B - | Standards for APZs (RFS 2005) and Appendix 4 of *PBP-2019.* |
| Appendix C - | Appendix 3 of *PBP-2019* (access requirements for firefighting vehicles) |

# CLEARY-2021-13 APPENDIX A

# BUSHFIRE ASSESSMENT REPORT
# (*PBP-2019*)

## PLANNING PROPOSAL AND SUBDIVISION

## LOTS 1 & 2//1093448,
## 218 EAST BANK ROAD,
## CORAMBA.

**Holiday Coast Bushfire Solutions**
ACN: 117 523 449
ABN: 82 117 523 449

Steve Ellis
Bushfire Risk Assessor
176 Wallace Street
MACKSVILLE NSW 2447
Mobile: 0419 245 725
E-mail: steve@bushfiresolutions.com.au

# BUSHFIRE ASSESSMENT REPORT

**This Report forms Appendix A to the document "Cleary-2021-13 Bushfire Strategic Study"**

| | |
|---|---|
| REPORT PREPARED IN RELATION TO: | **PLANNING PROPOSAL AND RURAL SUBDIVISION** |
| PROPERTY DESCRIPTION: | **LOTS 1 & 2 IN DP 1093448, 218 EAST BANK ROAD, CORAMBA.** |
| REPORT COMMISSIONED BY: (my Client) | **JAMES AND LINDA CLEARY.** |
| |  DATE ISSUED: 2/03/2022 |

| VERSION | REVISION |
|---|---|
| 1 | Original Report addressing PBP-2019 only. |
| 2 | Amended lot numbering and amended following consideration of Ecologist's Report (2/8/2021) |
| 3 | Amended lot layout and lot numbering. |

Date saved: 2/03/2022
Date printed: 2/03/2022

**IMPORTANT NOTICE**

Site inspections, and the results found herein, are carried out generally in accordance with the methodology as set out in the document "Planning for Bushfire Protection 2019", but also having regard for the wider 'reach' of the criteria set out for a Bushfire Strategic Study. The results of the site inspections and their correlation with PBP-2019 are based on information provided by the "Reference Documents" and information provided by the Client (or his/her agents). Holiday Coast Bushfire Solutions Pty Ltd will not be held liable for the omission to provide, or restrict access to, critical information (such as restrictions on property Title, easements, relevant consultant reports, etc) relevant to this development proposal.

The author of this Report, S. Ellis possesses industry-relevant qualifications including Graduate Diploma in Design for Bushfire Prone Areas (UWS) and Certificate 2 & 3 in Firefighting Operations and Certificate 4 in Firefighting Supervision.



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# GLOSSARY

| | |
|---|---|
| Acceptable solution | Measures which have been deemed to meet the specified performance criteria. |
| Assembly point | An area or building/structure that is used to assemble people for evacuation or that have evacuated from a site in an emergency situation. |
| Asset protection zone (APZ) | A fuel-reduced area surrounding a built asset or structure which provides a buffer zone between a bushfire hazard and an asset. The APZ includes a defendable space within which firefighting operations can be carried out. The size of the required asset protection zone varies with slope, vegetation and Fire Danger Index (FDI). |
| Australian Standard AS 3959 (AS 3959) | AS 3959:2009 Construction of buildings in bushfire-prone areas, Standards Australia, 2009. |
| BAL certificate | A certificate issued to identify the bushfire attack level (BAL) of a proposed development in the Complying Development process under State Environmental Planning Policy (Exempt and Complying Development Codes) 2008. |
| BFCC | Bush Fire Coordinating Committee |
| BFMC | Bush Fire Management Committee |
| Bushfire assessment report | A report submitted with the development application (DA) which establishes compliance with PBP. The report determines the extent of bushfire attack and the proposed mitigation measures. Appendix 1 sets out the information requirements for a bushfire assessment. See also clause 44 of the Rural Fires Regulation 2013. |
| Bushfire attack level (BAL) | A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. In the Building Code of Australia, the BAL is used as the basis for establishing the requirements for construction to improve protection of building elements. |
| Bushfire | An unplanned fire burning in vegetation; also referred to as wildfire. |
| Bushfire attack | Attack by burning embers, radiant heat or flame generated by a bushfire. |
| Bushfire hazard | Any vegetation that has the potential to threaten lives, property or the environment. |
| Bushfire prone land (BPL) | An area of land that can support a bushfire or is likely to be subject to bushfire attack, as designated on a bushfire prone land map. |
| Bushfire prone land map (BPLM) | A map prepared in accordance with NSW RFS requirements and certified by the Commissioner of the NSW RFS under section 10.3(2) of the Environmental Planning and Assessment Act 1979. |
| Bushfire protection measures (BPMs) | A range of measures (controls) used to minimise the risk arising from a bushfire. BPMs include asset protection zones (APZs), construction standards, suitable access, water and utility services, emergency management and landscaping. |
| Bushfire risk | Is the likelihood and consequence of a bushfire igniting, spreading and causing damage to assets of value to the community. Risk may be rated as being extreme, major, moderate, minor or insignificant and is related to the vulnerability of the asset. |
| BRMP | Bushfire Risk Management Plan |

| | |
|---|---|
| Bushfire safety authority (BSA) | An approval by the Commissioner of the NSW RFS that is required for a subdivision for residential or rural residential purpose or for a SFPP development listed under section 100B (6) of the Rural Fires Act 1997. |
| Certifying authority | As defined in the Environmental Planning and Assessment Act 1979, those with authority to issue Part 6 certificates and Complying Development Certificates (CDCs). |
| Complying development | Complying development is a combined planning and construction approval for straightforward development that can be determined through a fast track assessment by a council or private accredited certifier. |
| Consent authority | As defined in the Environmental Planning and Assessment Act 1979, in relation to development consents, usually the local council. |
| Defendable space | An area adjoining an asset that is managed to reduce combustible elements and is free from constructed impediments. It is a safe working environment in which active firefighting can be undertaken to defend the structure, before and after the passage of a bushfire. |
| Development | As defined in the Environmental Planning and Assessment Act 1979. |
| Development application (DA) | An application for consent to carry out development such as building, subdivision, or the use of a building or land. Applications are normally made to the local council. |
| Development footprint | The building envelope or area shown on a plan over which any buildings and associated asset protection zones may be constructed. |
| Ecologically sustainable development | As defined in section 6 of the Protection of the Environment Administration Act (NSW) 1991. |
| Effective slope | The land beneath the vegetation which most significantly affects fire behaviour, having regard to the vegetation present. |
| Exit | A doorway opening to a road or open space, as defined in the National Construction Code (NCC). |
| Fire Danger Index (FDI) | The chance of a fire starting, its rate of spread, its intensity and the difficulty of its suppression, according to various combinations of air temperature, relative humidity, wind speed and both the long- and short-term drought effects.<br>Note: FDI in PBP refers to the Forest Fire Danger Index calculated by the McArthur Mk 5 Forest Fire Danger Meter using the equations published by Noble, I.R., Bary, G.A.V., and Gill, A.M., 1980.<br>Grassland Fire Danger Index (GFDI) values are calculated by the McArthur Mk 4 Grassland Fire Danger Meter using the equations published by Purton, C.M., 1982. |
| Flame zone | The distance from a bushfire at which there is deemed to be significant potential for sustained flame contact to a building. The flame zone is determined by the calculated distance at which the radiant heat from the design fire exceeds 40kW/m$^2$. |
| Grasslands | Grassed areas capable of sustaining a fire. Under Australian Standard 3959, this is identified as low open shrubland, hummock grassland, closed tussock grassland, tussock grassland, open tussock, sparse open tussock, dense sown pasture, sown pasture, open herbfield, and sparse open herb field. Grass, whether exotic or native, which is regularly maintained at or below 10cm in height (including maintained lawns, golf courses, maintained public reserves, parklands, nature strips and commercial nurseries) is regarded as managed land. |
| Grassland deeming provision | An acceptable solution applying to properties in grassland hazard areas which replaces the site assessment procedure in AS 3959. |
| Infill development | Refers to the development of land by the erection of or addition to, a building (or buildings), which is within an existing allotment and does not require the spatial extension of services. Existing services may include public roads, electricity, water or sewerage. |

| | |
|---|---|
| Inner protection area (IPA) | The component of an asset protection zone which is closest to the asset (measured from drip line). It consists of an area maintained to minimal fuel loads so that a fire path is not created between the hazard and the building. |
| Integrated development | As referred to under s4.46 (formerly S91) of the Environmental Planning and Assessment Act 1979, an integrated development is one that requires development consent and approval from one or more government agencies, and is not a state significant development (SSD) or complying development. |
| Isolated development | Development which is located predominantly in native bushland or is considered to be within a remote area. Access and evacuation may be challenging due to distances that are required to be travelled through bushfire prone areas. |
| Local Environmental Plan (LEP) | An environmental planning instrument prepared under Part 3 of the Environmental Planning and Assessment Act 1979. Local environmental plans guide planning decisions and the ways in which land is used through zoning and development controls. |
| Managed land | Land that has vegetation removed or maintained to a level that limits the spread and impact of bushfire. It may include existing developed land (residential, commercial or industrial), roads, golf course fairways, playgrounds, sports fields, vineyards, orchards, cultivated ornamental gardens and commercial nurseries. Most common will be gardens and lawns within curtilage of buildings. These areas will be managed to meet the requirements of an asset protection zone. |
| National Construction Code (NCC) | The National Construction Code, published by the Australian Building Codes Board, comprising the Building Code of Australia as Volumes One and Two, and the Plumbing Code of Australia as Volume Three. |
| Outer protection area (OPA) | The outer component of an asset protection zone, where fuel loads are maintained at a level where the intensity of an approaching bushfire would be significantly reduced. Applies to forest vegetation only. |
| Performance-based solution | A method of complying with the Performance Criteria other than by an acceptable solution. |
| Primitive camping | A predetermined site which is part of a commercially operated venture where there may already be a site for a tent and a fire pit. |
| Setback | The distance required through planning provisions to separate a building from the bushfire hazard, street frontage or from adjacent buildings or property boundary. |
| Short fire run | A fire run which has a single point of ignition and a short distance to travel, where the calculated resultant head width is less than 100 metres. |
| Special fire protection purpose (SFPP) developments | Developments where the vulnerable nature of the occupants means a lower radiant heat threshold is required in order to allow the evacuation of occupants, and emergency services to operate in support of those occupants. |
| State Environmental Planning Policy (SEPP) | An environmental planning instrument prepared under Part 3 of the Environmental Planning and Assessment Act 1979. |
| Subdivision | As defined in the Environmental Planning and Assessment Act 1979. |
| Tourist accommodation | A building or place that provides temporary or short-term accommodation on a commercial basis including backpackers accommodation, bed and breakfast accommodation, farm stay accommodation, hotel or motel accommodation and serviced apartments. |
| Vegetation classification | Vegetation type identified using the formations and classifications within Ocean Shores to Desert Dunes: The Native Vegetation of New South Wales and the ACT (Keith, 2004). |

# 1.0 FRAMEWORK

Refer to the Bushfire Strategic Study for a detailed explanation of the legal framework addressing development on bushfire-prone land in NSW.

# 2.0 GENERAL DESCRIPTION OF LAND AND PROPOSAL

## 2.1 The Land

A site assessment was carried out by me on Sunday 20th June 2021 for the purposes of preparing a Bushfire Hazard Assessment Report as required by clause 44 of the Rural Fires Regulation 2013 – Application for a bush fire safety authority.

The property is located in a rural area to the west of Coffs Harbour on the north coast of NSW. The property is located between the Orara River flood plain to the west, and Mount Coramba to the east. Landuse in the general vicinity is primarily a mixture of agriculture and rural-living.

The property is partially cleared of native vegetation, with remnants remaining in the southern corner, watercourses and areas of steep slopes.

Access to and from the property is available to the north and south via East Bank Road. To the north, East Bank Road links with Bucca Road at Nana Glen. To the south, East Bank Road links with Coramba Road at Coramba.


Figure 1: aerial image showing general location of property (© NSW Lands, 2021)

At the time of the site assessment the property was occupied by a two-storey dwelling and associated outbuildings. The existing dwelling is intended to be retained on proposed lot 10.

## 2.2 The Proposal

This Report is an assessment of a rural-residential subdivision. Existing lots 1 & 2 are proposed to be subdivided to create 15 new rural-residential lots.

Primary access to the development will be established via a new cul-de-sac off East Bank Road. This cul-de-sac will be constructed generally along the alignment of the existing driveway, and will pass the existing dwelling at its south-western APZ. The new cul-de-sac will have a length of approximately 310 m. Rights of Way off the new cul-de-sac are proposed to be provided for several of the new lots. Secondary access for proposed lots 12 – 15 will be provided off East Bank Road opposite the Moses Close intersection. Access to proposed lot 1 will be off Moses Close.

The property is not serviced by Council's reticulated water supply, therefore an on-site static water supply is to be provided for each new lot at construction stage for the future dwellings.

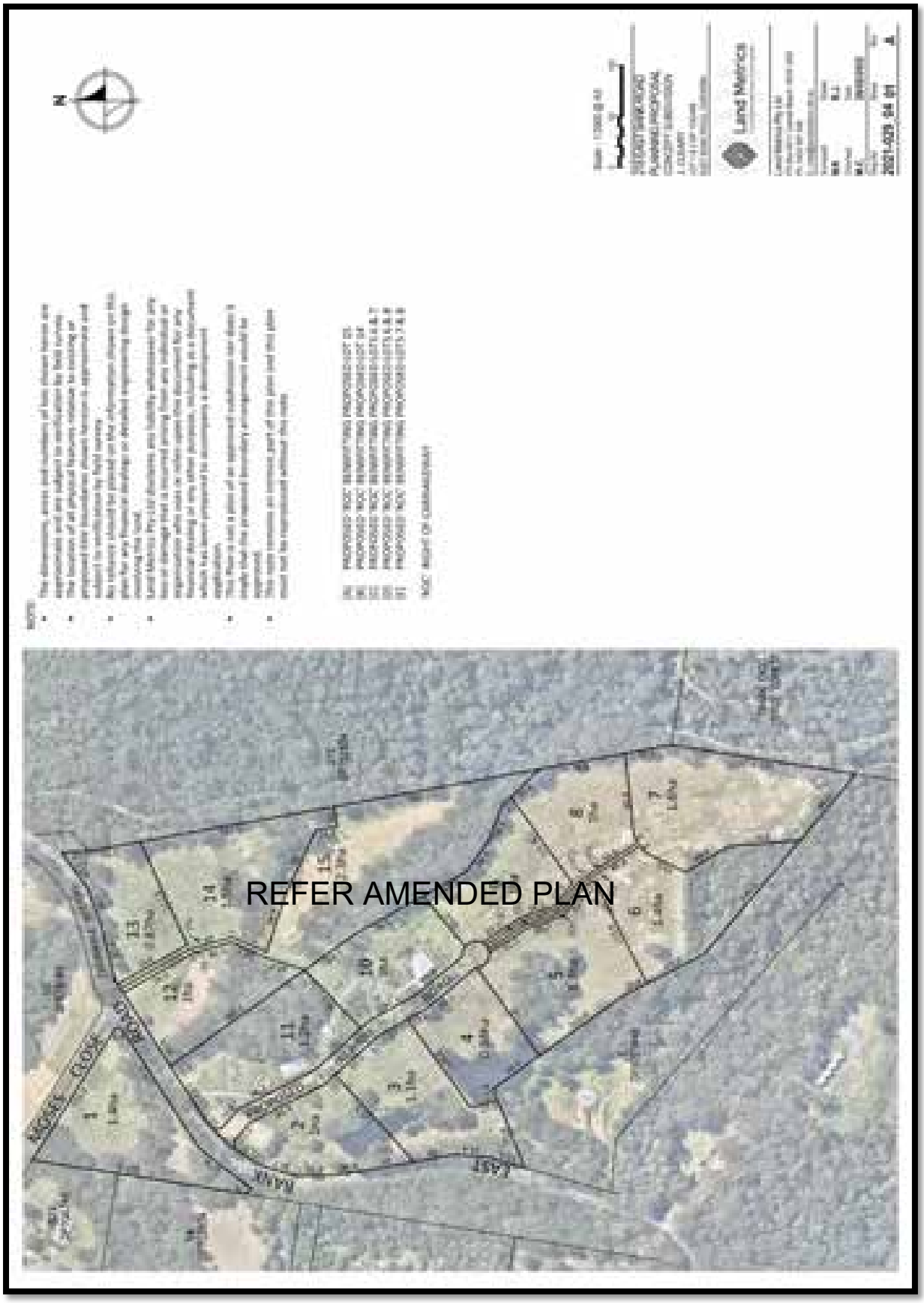
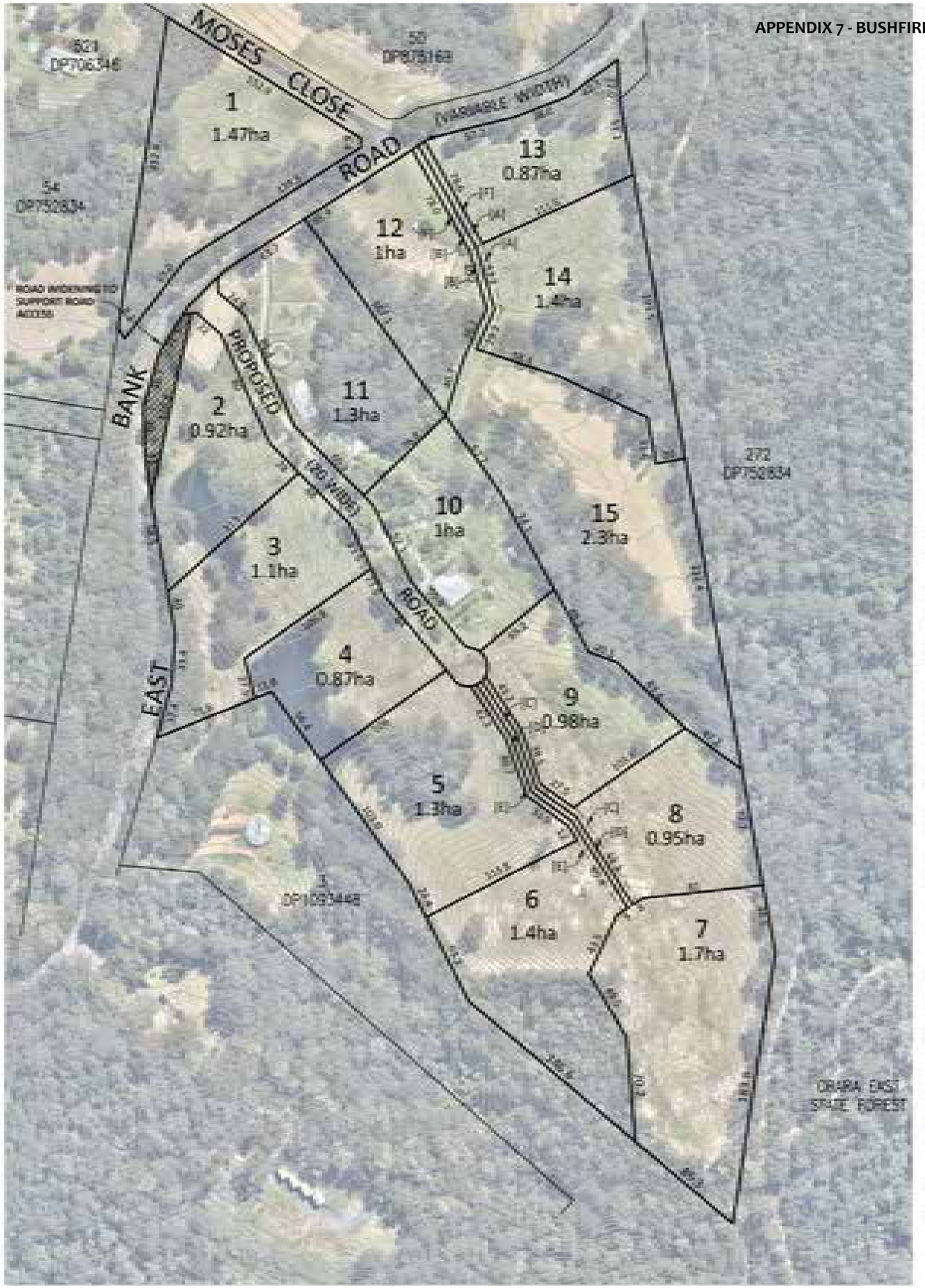



Figure 2: proposed concept plan for subdivision (Land Metrics, 28/02/2022)

# ILLUSTRATION 1.5 CONCEPT SUBDIVISION PLAN



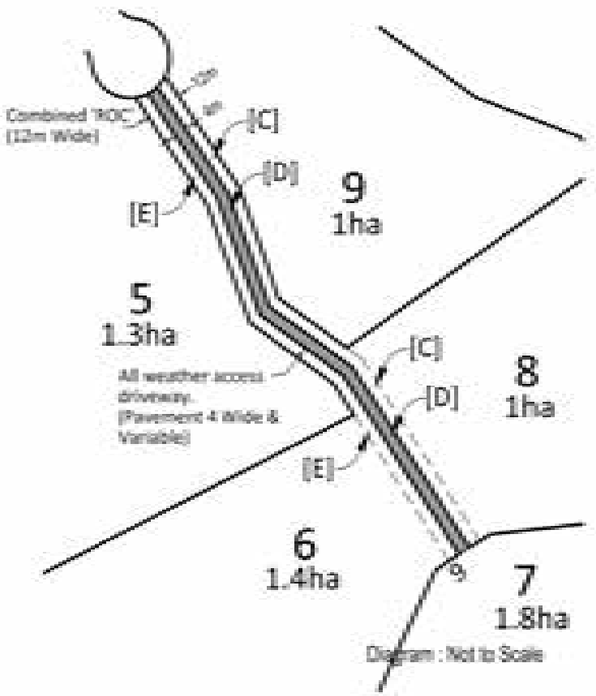

NOTE:

- The dimensions, areas and numbers of lots shown heron are approximate and are subject to verification by field survey.
- The location of all physical features relative to existing or proposed title boundaries shown hereon is approximate and subject to verification by field survey.
- No reliance should be placed on the information shown on this plan for any financial dealings or detailed engineering design involving the land.
- Land Metrics Pty Ltd disclaims any liability whatsoever for any loss or damage that is incurred arising from any individual or organisation who uses or relies upon this document for any financial dealing or any other purpose, including as a document which has been prepared to accompany a development application.
- This Plan is not a plan of an approved subdivision nor does it imply that the proposed boundary arrangement would be approved.
- Road Widening of East Bank Road as shown to support safe intersection site distance as per AS2890 for 80Km Speed Zone.
- This note remains an intrinsic part of this plan and this plan must not be reproduced without this note.

[A] PROPOSED 'ROC' BENERITTING PROPOSED LOT 15
[B] PROPOSED 'ROC' BENERITTING PROPOSED LOT 14
[C] PROPOSED 'ROC' BENERITTING PROPOSED LOTS 6 & 7
[D] PROPOSED 'ROC' BENERITTING PROPOSED LOTS 6 & 8
[E] PROPOSED 'ROC' BENERITTING PROPOSED LOTS 7 & 8
[F] PROPOSED 'ROC' BENERITTING PROPOSED LOTS 12 & 13

NOTES:
"ROC" - RIGHT OF CARRIAGEWAY

**DIAGRAM 'A'**

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216 EAST BANK ROAD
PLANNING PROPOSAL
CONCEPT SUBDIVISION
J. CLEARY
LOT 1 & 2 DP 1093448
EAST BANK ROAD, CORAMBA

Land Metrics
Land Development Consultants

Land Metrics Pty Ltd
PO Box 6511 Corindi Beach, NSW 2456
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| Surveyed | Drawn |
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| N/A | M.C. |
| Checked | Date |
| M.C. | 30/11/2022 |
| Dwg No | Sheet / Rev |
| 2021-029 | 01 |

# 3.0 SITE ASSESSMENT

The procedure adopted for the site inspection generally followed the site assessment methodology of PBP-2019. The methodology is outlined below.

| A1.1 - Site assessment methodology for determining APZs |
|---|
| Identify APZs<br>Step 1: Determine vegetation formation in all directions around the building to a distance of 140 metres (refer to A1.2);<br>Step 2: Determine the effective slope of the land from the building for a distance of 100 metres (refer to A1.4 and A1.5);<br>Step 3: Determine the relevant FFDI for the council area in which the development is to be undertaken (refer to A1.6); and<br>Step 4: Match the relevant FFDI, vegetation formation and effective slope to determine the APZ required from the appropriate table of this Appendix (refer to A1.7). |

## 3.1 Vegetation Assessment

### 3.1.1 Vegetation Description

A vegetation assessment was carried out to include a distance of 140 metres from the proposed new lots, in all directions. It is determined that the general vegetation description is summarised as follows:

Table 1: proposed lot 1

| | |
|---|---|
| North | Generally all of the land within the assessment area to the north and north-east of the proposed lot is managed farmland save for remnant native vegetation located along a riparian corridor approximately 55 m from the property boundary. |
| East | All of the land within the assessment area to the south-east of the proposed lot will be APZ within the other proposed new lots. |
| South | The land within the assessment area to the south-west of the proposed DE is a mix of remnant, grassland and forest. The area between the remnant along the watercourse and the forest further south is intended to be managed as APZ, therefore for the purpose of this assessment, this aspect will be constrained by remnant. |
| West | A remnant of vegetation occupies a steep embankment to the north-west of the proposed lot. Beyond the remnant is the APZ of the neighbouring residence. |

Table 2: proposed lot 2

| | |
|---|---|
| North | The land within the assessment area to the north of East Bank Road is a mix of forest and grasslands. For the purpose of this assessment, this aspect will be constrained by forest, located to the S-W of proposed lot 1. |
| East | Generally all of the land within the assessment area to the east of the proposed lot will be APZ within the other proposed new lots.<br>On the eastern side of proposed lot 11 is a vegetated riparian corridor. The total area of this vegetated area is < 1 Ha, and therefore will be considered a remnant under the concession afforded by PBP-2019. |
| South | All of the land within the assessment area to the south of the proposed lot will be APZ within the other proposed new lots. |
| West | All of the land within the assessment area to the west of the proposed lot is forest. |

Table 3: proposed lot 3

| | |
|---|---|
| North | All of the land within the assessment area to the north of the proposed lot will be APZ within the other proposed new lots. |
| East | Generally all of the land within the assessment area to the east of the proposed lot will be APZ within the other proposed new lots.<br>On the eastern side of proposed lot 11 is a vegetated riparian corridor. The total area of this vegetated area is < 1 Ha, and therefore will be considered a remnant under the concession afforded by PBP-2019. |
| South | All of the land with 85 m to the south of the proposed lot will be APZ within the other proposed new lots. At 85 m from the property boundary is a remnant of forest with an area of approximately 0.4 Ha.<br>Beyond the remnant will be APZ within the other proposed new lots. |
| West | All of the land within the assessment area to the west of the proposed lot is forest. |

Table 4: proposed lot 4

| | |
|---|---|
| North | All of the land within the assessment area to the north of the proposed lot will be APZ within the other proposed new lots. |
| East | All of the land within the assessment area to the east of the proposed lot will be APZ within the other proposed new lots. The existing riparian corridor will be disturbed by the new public road. |
| South | Within proposed lots 9/10 is a remnant of native vegetation. This remnant has an area of approximately 0.4 Ha, and will be referred to as a "remnant" throughout this Report.<br>This remnant will not be managed as APZ as part of this development proposal due to the steep slope within the remnant.<br>Beyond the remnant to the south of the proposed lot will be APZ within the other proposed new lots. |
| West | The land within the assessment area to the west of the proposed lot is a mix of forest and managed APZ surrounding the neighbouring residence. For the purpose of this assessment, this aspect will be constrained by forest. |

Table 5: proposed lot 5

| | |
|---|---|
| North | Within proposed lots 9/10 is a remnant of native vegetation. This remnant has an area of approximately 0.4 Ha, and will be referred to as a "remnant" throughout this Report.<br>This remnant will not be managed as APZ as part of this development proposal due to the steep slope within the remnant.<br>Generally all of the land to the north of the remnant will be APZ within the other proposed new lots. |
| East | All of the land within the assessment area to the east of the proposed lot will be APZ within the other proposed new lots. The existing riparian corridor will be disturbed by the new public road. |
| South | All of the land within approximately 35 m to the south of the proposed lot will be APZ within the other proposed new lots. Beyond the APZ is forest. |
| West | All of the land within the assessment area to the west of the proposed lot is forest. |

Table 6: proposed lot 6

| | |
|---|---|
| North | Remnant vegetation is located approximately 40 m north of the property boundary. Generally all of the other land within the assessment area to the north of the proposed lot will be APZ within the other proposed new lots. |
| East | All of the land within 100 m to the east of the proposed lot will be APZ within the other proposed new lots. Beyond 100 m is forest. |
| South | Generally all of the land within the assessment area to the south of the proposed lot is forest. |
| West | All of the land within the assessment area to the west of the proposed lot is forest. |

Table 7: proposed lot 7

| | |
|---|---|
| North | All of the land within the assessment area to the north of the proposed lot will be APZ within the other proposed new lots. |
| East | All of the land within the assessment area to the east of the proposed lot is forest. |
| South | All of the land within the assessment area to the south of the proposed lot is forest. |
| West | All of the land within the assessment area to the west of the proposed lot is forest. |

Table 8: proposed lot 8

| | |
|---|---|
| North | Generally all of the land within the assessment area to the north of the proposed lot will be APZ within the other proposed new lots.<br>The vegetated riparian corridor has a width of < 50 m, however, fire run distance directly towards the proposed lot from that direction is > 50 m. |
| East | All of the land within the assessment area to the east of the proposed lot is forest. |
| South | Generally all of the land within the assessment area to the south of the proposed lot will be APZ within the other proposed new lots. |
| West | Generally all of the land within the assessment area to the west of the proposed lot is forest. |

Table 9: proposed lot 9

| | |
|---|---|
| North | Generally all of the land within the assessment area to the north of the proposed lot will be APZ within the other proposed new lots.<br>The vegetated riparian corridor to the N-E has a width of < 50 m, and therefore will be considered a remnant under the concession afforded by PBP-2019. |
| East | All of the other land within the assessment area to the east of the proposed lot is forest. |
| South | All of the land within the assessment area to the south of the proposed lot will be APZ within the other proposed new lots. |
| West | Generally all of the land within the assessment area to the west of the proposed lot will be APZ within the other proposed new lots. The existing remnant on proposed lot 5 is approximately 25m from the property boundary. |

Table 10: proposed lot 10 – existing dwelling

| | |
|---|---|
| North | Existing APZ for 80 m. Beyond the APZ is a remnant of native vegetation. This remnant has an area of approximately 0.8 Ha. |
| East | Existing APZ for 50 m. Beyond the APZ is a remnant of native vegetation occupying a watercourse. |
| South | Existing APZ for 60 m. Beyond the APZ is a remnant of native vegetation on proposed lot 5. This remnant has an area of approximately 0.4 Ha, and has been referred to as a "remnant" throughout this Report. |
| West | All of the land within the assessment area to the west of the dwelling is APZ on the subject property and occupied adjoining property. |

Table 11: proposed lot 11

| | |
|---|---|
| North | Generally all of the land within the assessment area to the north of East Bank Road is a mix of forest and grasslands. For the purpose of this assessment, this aspect will be constrained by forest. |
| East | Within the proposed lot and extending into proposed lot 12 is a remnant of native vegetation occupying a riparian corridor. The area of this vegetation is < 1 Ha and will therefore be considered a remnant with respect to proposed lot 11.<br>Beyond the remnant will be APZ within the other proposed new lots. |
| South | All of the land within the assessment area to the south of the proposed lot will be APZ within the other proposed new lots. |
| West | Generally all of the land within the assessment area to the west of the proposed lot will be APZ within the other proposed new lots. Forest is located on the opposite side of East Bank Road at a distance of > 100 m. |

Table 12: proposed lot 12

| | |
|---|---|
| North | All of the land within the assessment area to the north of the proposed lot will be APZ by virtue of East Bank Road, the APZ of proposed lot 1, and the managed paddocks on the neighbouring property. |
| East | Generally all of the land within the assessment area to the east of the proposed lot will be APZ within the other proposed new lots. Forest is located at the eastern boundary of the site at a distance of > 100 m. |
| South | Within the proposed lot is a remnant of native vegetation occupying a riparian corridor. The area of this vegetation is < 1 Ha and will therefore be considered a remnant with respect to proposed lot 12.<br>Beyond the remnant will be APZ within the other proposed new lots. |
| West | Within the proposed lot and extending into proposed lot 11 is a remnant of native vegetation occupying a riparian corridor. The area of this vegetation is < 1 Ha and will therefore be considered a remnant with respect to proposed lot 12.<br>Beyond the remnant will be APZ within the other proposed new lots. |

Table 13: proposed lot 13

| | |
|---|---|
| North | Generally all of the land within the assessment area to the north of the proposed lot is managed farmland save for remnant native vegetation located along a riparian corridor. |
| East | All of the land within the assessment area to the east of the proposed lot is forest. |
| South | All of the land within the assessment area to the south of the proposed lot will be APZ within proposed new lot 14. The area occupied by scattered trees along the southern boundary of proposed lot 14 will be managed as APZ without the need for removing native woody vegetation. |
| West | To the west of proposed lot 13 at a distance of approximately 40 m is the remnant vegetation located on proposed lot 12. |

Table 14: proposed lot 14

| | |
|---|---|
| North | All of the land within 100 m to the north of the proposed lot will be APZ within the other proposed new lots. Beyond 100 m is East Bank Road and riparian corridor on the neighbouring property. |
| East | All of the land within the assessment area to the east of the proposed lot is forest. |
| South | Generally all of the land within the assessment area to the south of the proposed lot will be APZ within proposed new lot 15. The area occupied by scattered trees along the southern boundary of proposed lot 14 will be managed as APZ without the need for removing native woody vegetation.<br>The riparian corridor located along the western boundary of proposed lot 15 is located approximately 60 m from the developable area of lot 14. |
| West | Immediately west of the proposed lot is the remnant located within proposed lot 12. |

Table 15: proposed lot 15

| | |
|---|---|
| North | Generally all of the land within the assessment area to the north of the proposed lot will be APZ within proposed new lot 14. The area occupied by scattered trees along the southern boundary of proposed lot 14 will be managed as APZ without the need for removing native woody vegetation. |
| East | All of the land within the assessment area to the east of the proposed lot is forest. |
| South | Along the south-western boundary of the proposed lot is a riparian corridor. |
| West | Along the south-western boundary of the proposed lot is a riparian corridor. |

### 3.1.2 Vegetation Classification

Table 16: proposed lot 1

| | |
|---|---|
| North | Remnant @ 55 m. |
| East | Managed land. |
| South | Remnant. |
| West | Remnant. |

Table 17: proposed lot 2

| | |
|---|---|
| North | Forest @ 25 m. |
| East | Remnant @ 45 m. |
| South | Managed land. |
| West | Forest. |

Table 18: proposed lot 3

| | |
|---|---|
| North | Managed land. |
| East | Remnant @ 40 m. |
| South | Remnant @ 85 m. |
| West | Forest. |

Table 19: proposed lot 4

| | |
|---|---|
| North | Managed land. |
| East | Managed land. |
| South | Remnant. |
| West | Forest. |

Table 20: proposed lot 5

| | |
|---|---|
| North | Remnant. |
| East | Managed land. |
| South | Forest @ 45 m. |
| West | Forest. |

Table 21: proposed lot 6

| | |
|---|---|
| North | Remnant @ 40 m. |
| East | Managed land. |
| South | Forest. |
| West | Forest. |

Table 22: proposed lot 7

| | |
|---|---|
| North | Managed land. |
| East | Forest. |
| South | Forest. |
| West | Forest. |

Table 23: proposed lot 8

| | |
|---|---|
| North | Forest. |
| East | Forest. |
| South | Managed land. |
| West | Forest @ 70 m. |

Table 24: proposed lot 9

| | |
|---|---|
| North | Remnant. |
| East | Forest. |
| South | Managed land. |
| West | Remnant @ 35 m. |

Table 25: proposed lot 10 – existing dwelling

| | |
|---|---|
| North | Remnant @ 82 m. |
| East | Remnant @ 47 m. |
| South | Remnant @ 60 m. |
| West | Managed land. |

Table 26: proposed lot 11

| | |
|---|---|
| North | Forest. |
| East | Remnant. |
| South | Managed land. |
| West | Managed land. |

Table 27: proposed lot 12

| | |
|---|---|
| North | Managed land. |
| East | Managed land. |
| South | Remnant. |
| West | Remnant. |

Table 28: proposed lot 13

| | |
|---|---|
| North | Remnant. |
| East | Forest. |
| South | Managed land. |
| West | Remnant @ 40 m. |

Table 29: proposed lot 14

| | |
|---|---|
| North | Remnant @ 90 m. |
| East | Forest. |
| South | Remnant @ 60 m. |
| West | Remnant @ 10 m. |

Table 30: proposed lot 15

| | |
|---|---|
| North | Managed land. |
| East | Forest. |
| South | Remnant. |
| West | Remnant. |

### 3.1.3 Past or Future Disturbance Factors (including extenuating circumstances)

Much of the remnant vegetation within the site is intended to be (or has been) managed as APZ. The owners have engaged an Ecologist, Greg Elks of Idyll Spaces Environmental Consultants, who has advised on which vegetated areas can be hazard-reduced.

Specifically in relation to proposed lot 1, the south-western corner of the proposed lot (to the south of the watercourse) is required to be managed as APZ to allow for "remnant" setbacks and BALs to be applied to the DE, rather than "forest" setbacks and BALs.

All of the other APZ areas (the areas between the identified hazard vegetation and the BAL-29 zone, will need to be managed as APZ in perpetuity.

## 3.2 Effective Slope

A slope assessment was carried out to include a distance of 100 metres from the proposed BE, in all directions. Photographs were taken to verify my assessment. Slope was determined using a clinometer.

The gradient that would most significantly influence fire behaviour varied, and is summarised as follows:

Table 31: proposed lot 1

| | | |
|---|---|---|
| North | Remnant @ 55 m. | >0° – 5° downslope |
| East | Managed land. | |
| South | Remnant. | 0° |
| West | Remnant. | Upslope |

Table 32: proposed lot 2

| | | |
|---|---|---|
| North | Forest @ 25 m. | >0° – 5° downslope |
| East | Remnant @ 45 m. | 0° - across watercourse |
| South | Managed land. | |
| West | Forest. | Upslope |

Table 33: proposed lot 3

| | | |
|---|---|---|
| North | Managed land. | |
| East | Remnant @ 40 m. | >0° – 5° downslope |
| South | Remnant @ 85 m. | Upslope |
| West | Forest. | Upslope |

Table 34: proposed lot 4

| | | |
|---|---|---|
| North | Managed land. | |
| East | Managed land. | |
| South | Remnant. | Upslope |
| West | Forest. | Upslope |

Table 35: proposed lot 5

| | | |
|---|---|---|
| North | Remnant. | >5° – 10° downslope |
| East | Managed land. | |
| South | Forest @ 45 m. | >10° – 15° downslope |
| West | Forest. | >15° – 20° downslope |

Table 36: proposed lot 6

| | | |
|---|---|---|
| North | Remnant @ 40m. | >5° – 10° downslope |
| East | Managed land. | |
| South | Forest. | >10° – 15° downslope |
| West | Forest. | >15° – 20° downslope |

Table 37: proposed lot 7

| | | |
|---|---|---|
| North | Managed land. | |
| East | Forest. | >5° – 10° downslope |
| South | Forest. | Upslope |
| West | Forest. | >10° – 15° downslope |

Table 38: proposed lot 8

| | | |
|---|---|---|
| North | Forest. | 0° - across watercourse |
| East | Forest. | >5° – 10° downslope |
| South | Managed land. | |
| West | Forest @ 70 m. | >10° – 15° downslope |

Table 39: proposed lot 9

| | | |
|---|---|---|
| North | Remnant. | 0° - across watercourse |
| East | Forest. | >5° – 10° downslope |
| South | Managed land. | |
| West | Remnant @ 35 m. | >10° – 15° downslope |

Table 40: proposed lot 10 – existing dwelling

| | | |
|---|---|---|
| North | Remnant @ 82 m. | >0° – 5° downslope |
| East | Riparian remnant @47m. | 0° - across watercourse |
| South | Remnant @ 60 m. | >0° – 5° downslope |
| West | Managed land. | |

Table 41: proposed lot 11

| | | |
|---|---|---|
| North | Forest @ 25 m. | >0° – 5° downslope |
| East | Remnant. | 0° - across watercourse |
| South | Managed land. | |
| West | Managed land. | |

Table 42: proposed lot 12

| | | |
|---|---|---|
| North | Managed land. | |
| East | Managed land. | |
| South | Remnant. | 0° - across watercourse |
| West | Remnant. | 0° - across watercourse |

Table 43: proposed lot 13

| | | |
|---|---|---|
| North | Remnant. | >0° – 5° downslope |
| East | Forest. | Upslope |
| South | Managed land. | |
| West | Remnant @ 40m. | 0° - across watercourse |

Table 44: proposed lot 14

| | | |
|---|---|---|
| North | Remnant @ 90 m. | >0° – 5° downslope |
| East | Forest. | Upslope |
| South | Remnant @ 60 m. | 0° - across watercourse |
| West | Remnant @ 10 m. | 0° - across watercourse |

Table 45: proposed lot 15

| | | |
|---|---|---|
| North | Managed land. | |
| East | Forest. | Upslope |
| South | Remnant. | 0° - across watercourse |
| West | Remnant. | 0° - across watercourse |

# 4.0 BUSHFIRE ASSESSMENT MATTERS – CLAUSE 44 OF THE RURAL FIRES REGULATION 2013

## 4.1 Identification of any significant environmental features on the property

The following environmental features are to be considered and assessed by the applicant in a Statement of Environmental Effects:

- riparian corridors
- SEPP 14 – Coastal Wetlands
- SEPP 26 Littoral rainforests
- SEPP 44 – Koala Habitat
- areas of geological interest
- environmental protection zones or steep lands (>18o)
- land slip or flood prone areas
- National parks estate or various other reserves

An Ecologist's Report has been prepared by Greg Elks, and that report has been considered in the identification of the locations for the DEs for the proposed new lots.

## 4.2 The details of any threatened species, population or ecological community identified under the Biodiversity Conservation Act 2016 that is known to the applicant to exist on the property

These matters are to be considered and assessed by the applicant in a Statement of Environmental Effects.

An Ecologist's Report has been prepared by Greg Elks, and that report has been considered in the identification of the locations for the DEs for the proposed new lots.

## 4.3 The details and location of any Aboriginal object (within the meaning of the National Parks and Wildlife Act 1974) or Aboriginal place (within the meaning of that Act) that is known to the applicant to be situated on the property

Aboriginal heritage issues are to be considered and assessed by the applicant in a Statement of Environmental Effects.

## 4.4 A bushfire assessment for the proposed development (including the methodology used in the assessment) that addresses the following matters:

### 4.4.1 The extent to which the development is to provide for setbacks, including asset protection zones

The minimum required setbacks are determined by referring to Appendix 1 of PBP-2019, specifically Table A1.12.3 sets out the minimum required APZs for residential development.

**Table A1.12.3**

Minimum distances for APZs - residential development, FFDI 80 areas (<29kW/m², 100DK)

| KEITH VEGETATION FORMATION | EFFECTIVE SLOPE | | | | |
|---|---|---|---|---|---|
| | Up slopes and flat | >0°-5° | >5°-10° | >10°-15° | >15°-20° |
| | Distance (m) from the asset to the predominant vegetation formation | | | | |
| Rainforest | 9 | 12 | 15 | 20 | 28 |
| Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland | 22 | 29 | 37 | 50 | 68 |
| Grassy and Semi-arid Woodland (including Mallee) | 11 | 14 | 17 | 21 | 27 |
| Forested Wetland (excluding Coastal Swamp Forest) | 8 | 10 | 13 | 17 | 22 |
| Tall Heath | 16 | 18 | 20 | 23 | 26 |
| Short Heath | 8 | 10 | 12 | 14 | 16 |
| Arid Shrubland (acacia and chenopod) | 6 | 7 | 8 | 9 | 10 |
| Freshwater Wetlands | 5 | 6 | 6 | 7 | 8 |
| Grassland | 10 | 11 | 12 | 14 | 16 |

Figure 4: Table A1.12.3 of PBP-2019

From Figure 4 above, the following Tables are produced. The proposed development is able to provide these minimum setbacks.

Table 46: proposed lot 1

| | | | |
|---|---|---|---|
| North | Remnant @ 55 m. | >0° – 5° downslope | 12 m required |
| East | Managed land. | | |
| South | Forest. | 0° | 9 m required |
| West | Remnant. | Upslope | 9 m required |

Table 47: proposed lot 2

| | | | |
|---|---|---|---|
| North | Forest @ 25 m. | >0° – 5° downslope | 25 m required |
| East | Managed land.<br>The riparian corridor may be managed as APZ as part of this development proposal. | | |
| South | Managed land. | | |
| West | Forest. | Upslope | 20 m required |

Table 48: proposed lot 3

| | | | |
|---|---|---|---|
| North | Managed land. | | |
| East | Managed land. | | |
| South | Remnant @ 85 m.<br>This remnant will most likely NOT be managed as APZ as part of this development proposal due to the steep slope within the remnant. | Upslope | 9 m required |
| West | Forest. | Upslope | 20 m required |

Table 49: proposed lot 4

| | | | |
|---|---|---|---|
| North | Managed land. | | |
| East | Managed land. | | |
| South | Remnant.<br>This remnant will most likely NOT be managed as APZ as part of this development proposal due to the steep slope within the remnant. | Upslope | 9 m required |
| West | Forest. | Upslope | 20 m required |

Table 50: proposed lot 5

| | | | |
|---|---|---|---|
| North | Remnant.<br>This remnant will most likely NOT be managed as APZ as part of this development proposal due to the steep slope within the remnant. | >5° – 10° downslope | 15 m required |
| East | Managed land. | | |
| South | Forest @ 35 m.<br>Some of the forest in this area may be managed as APZ within lot 8. | >10° – 15° downslope | 39 m required |
| West | Forest. | >15° – 20° downslope | 48 m required |

Table 51: proposed lot 6

| | | | |
|---|---|---|---|
| North | Remnant @ 40 m.<br>This remnant will most likely NOT be managed as APZ as part of this development proposal due to the steep slope within the remnant. | >5° – 10° downslope | 15 m required |
| East | Managed land. | | |
| South | Forest.<br>Some of the forest in this area may be managed as APZ within lots 7/8. | >10° – 15° downslope | 39 m required |
| West | Forest. | >10° – 15° downslope | 39 m required |

Table 52: proposed lot 7

| | | | |
|---|---|---|---|
| North | Managed land. | | |
| East | Forest. | >5° – 10° downslope | 31 m required |
| South | Forest. | Upslope | 20 m required |
| West | Forest. | >10° – 15° downslope | 39 m required |

Table 53: proposed lot 8

| | | | |
|---|---|---|---|
| North | Managed land.<br>The riparian corridor may be managed as APZ as part of this development proposal. | | |
| East | Forest. | >5° – 10° downslope | 31 m required |
| South | Managed land. | | |
| West | Forest @ 25 m. | >10° – 15° downslope | 39 m required |

Table 54: proposed lot 9

| | | | |
|---|---|---|---|
| North | Managed land.<br>The riparian corridor may be managed as APZ as part of this development proposal. | | |
| East | Forest. | >5° – 10° downslope | 31 m required |
| South | Managed land. | | |
| West | Remnant @ 20 m. | >100 – 150 downslope | 20 m required |

Table 55: proposed lot 10 – existing dwelling

| | | | |
|---|---|---|---|
| North | Managed land. | | |
| East | Managed land. | | |
| South | Remnant @ 60 m.<br>This remnant will most likely NOT be managed as APZ as part of this development proposal due to the steep slope within the remnant. | Upslope | 9 m required |
| West | Managed land. | | |

Table 56: proposed lot 11

| | | | |
|---|---|---|---|
| North | Forest @ 25 m. | >0° – 5° downslope | 25 m required |
| East | Managed land.<br>The riparian corridor may be managed as APZ as part of this development proposal. | | |
| South | Managed land.<br>The remnant vegetation within this area may be managed as APZ as part of this development proposal. | | |
| West | Managed land. | | |

Table 57: proposed lot 12

| | | | |
|---|---|---|---|
| North | Managed land. | | |
| East | Managed land. | | |
| South | Managed land.<br>The remnant vegetation within this area may be managed as APZ as part of this development proposal. | | |
| West | Managed land.<br>The riparian corridor may be managed as APZ as part of this development proposal. | | |

Table 58: proposed lot 13

| | | | |
|---|---|---|---|
| North | Remnant @ 25 m. | >0° – 5° downslope | 12 m required |
| East | Forest. | Upslope | 20 m required |
| South | Managed land. | | |
| West | Managed land. | | |

Table 59: proposed lot 14

| | | | |
|---|---|---|---|
| North | Managed land. | | |
| East | Forest. | Upslope | 20 m required |
| South | Managed land. | | |
| West | Managed land. | | |

Table 60: proposed lot 15

| | | | |
|---|---|---|---|
| North | Managed land. | | |
| East | Forest. | Upslope | 20 m required |
| South | Managed land.<br>The riparian corridor may be managed as APZ as part of this development proposal. | | |
| West | Managed land. | | |

All of the required minimum setbacks have been accommodated into the proposed development. The BAL plan attached as Figure 6 of this Report verifies this.

### 4.4.2 The siting and adequacy of water supplies for fire fighting

The proposed development will not be serviced by the council's reticulated water supply, therefore an on-site firefighting water supply will need to be provided on each lot at the time of construction of the future dwellings. The location of these water supplies should have regard for firefighting vehicle access on to each lot and proximity to the dwelling.

This issue is dealt with in more detail in section 4.4.10 of this Report.

### 4.4.3 The capacity of public roads in the vicinity to handle increased volumes of traffic in the event of a bush fire emergency

East Bank Road is a minor rural road that links Coramba and Nana Glen. It services properties that are primarily rural in nature. The road is not designed or aligned to handle heavy traffic volumes, or high-speed traffic (as is experienced in Coramba Road / Orara Valley Way).

As part of the Planning Proposal, the *Bushfire Strategic Study* will provide some commentary on traffic matters. It is this office's understanding that a traffic management study will also be undertaken as part of that process.

### 4.4.4 Whether or not public roads in the vicinity that link with the fire trail network have two-way access

The proposed subdivision does not provide for any fire trails in the design.

The lands to the east and south-west of the subject property are provided with a fire trail network. These trails provide access from East Bank Road to the Orara East State Forest. The concept plan provided by the Client indicates that connection to these fire trails will

be provided from the development site. However, this is seen as unnecessary due to the existing links to the north and south of the property from East Bank Road.

### 4.4.5 The adequacy of arrangements for access to and egress from the development site for the purposes of an emergency response

The proposed development incorporates a central road through the property. The road has a length of approximately 480 m and terminates in a dead-end that will meet the specifications of "Appendix 3" of PBP-2019.

The alignment of the proposed new road will be generally along the ridgeline and alignment of the existing driveway, and terminates to the south of the existing home.

This issue is dealt with in detail in section 4.4.10 of this Report.

### 4.4.6 The adequacy of bush fire maintenance plans and fire emergency procedures for the development site

The requirement to maintain the landscaping within the proposed lots in accordance with the principles contained within the NSW Rural Fire Service documents “Appendix 4” of PBP-2019 and "Standards for Asset Protection Zones" is deemed sufficient and are considered to be sound passive bushfire protection measures. These documents are provided as Appendix B of the Bushfire Strategic Study for the benefit of the Client and future property owners.

Vacant lots should be managed as outer protection area (OPA) as defined by the RFS standards.

## 4.4.7 The construction standards to be used for building elements in the development

The procedure adopted for determining the construction standards applicable followed the site assessment methodology of Appendix 1 of PBP-2019. The methodology is outlined below.

| **A1.1 - Site assessment methodology for determining APZs and BALs** |
|---|
| Identify APZs<br>Step 1: Determine vegetation formation in all directions around the building to a distance of 140 metres (refer to A1.2);<br>Step 2: Determine the effective slope of the land from the building for a distance of 100 metres (refer to A1.4 and A1.5);<br>Step 3: Determine the relevant FFDI for the council area in which the development is to be undertaken (refer to A1.6); and<br>Step 4: Match the relevant FFDI, vegetation formation and effective slope to determine the APZ required from the appropriate table of this Appendix (refer to A1.7). |
| Identify construction requirements<br>Step 1: Follow steps 1 - 3 above;<br>Step 2: Determine the separation distance by measuring from the edge of the unmanaged vegetation to the closest external wall;<br>Step 3: Match the relevant FFDI, appropriate vegetation, distance and effective slope to determine the appropriate BAL using the relevant tables at the end of this section (A1.12.5, A1.12.6 and A1.12.7); and<br>Step 4: Refer to Section 3 in AS 3959 and NASH Standard to identify appropriate construction requirements for the calculated BAL. |

Table A1.12.6 of PBP-2019 (Figure 5 on next page) is used to determined construction standards as specified in AS 3959-2018 Construction of buildings in bushfire-prone areas.

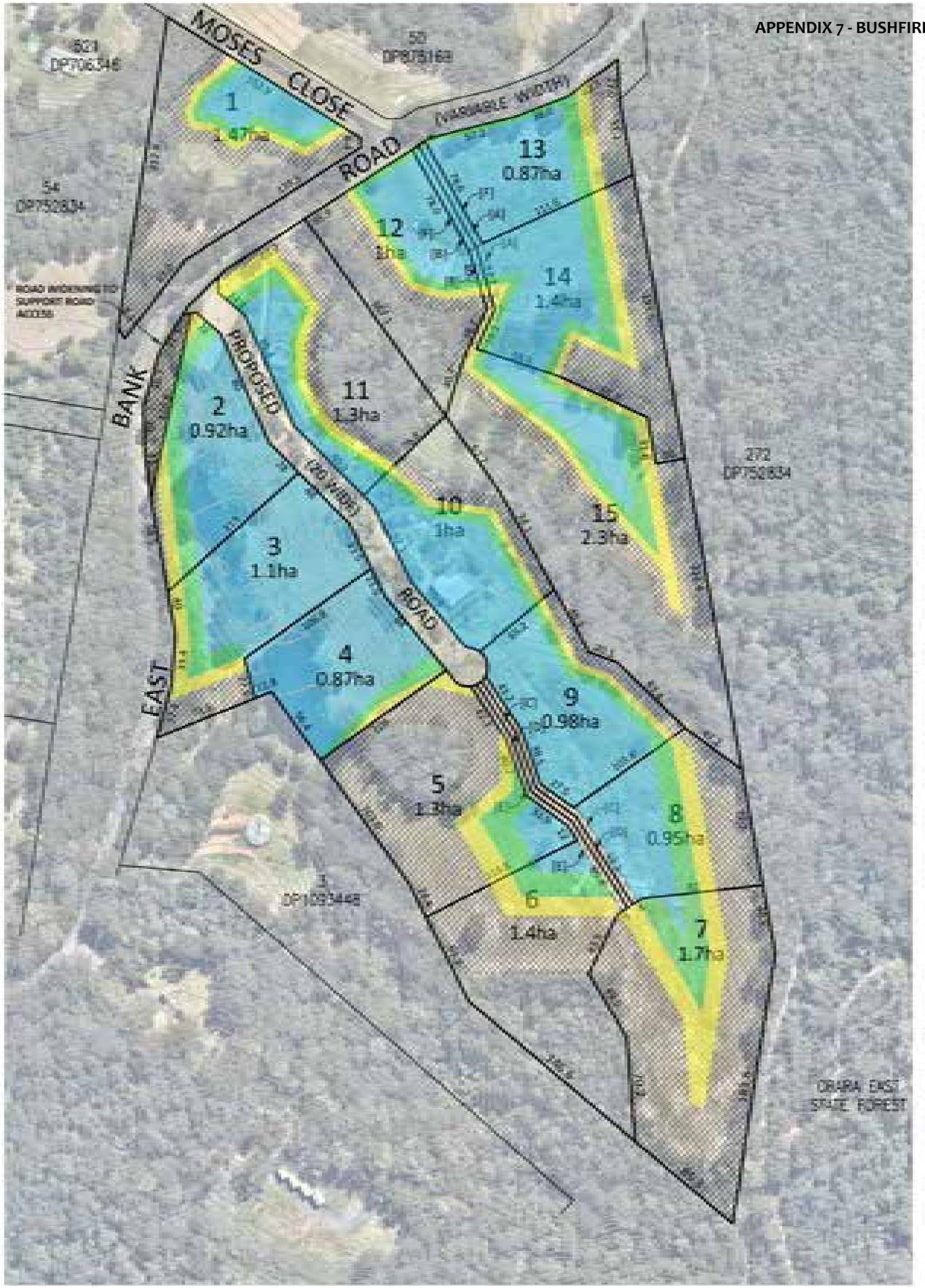
**Table A1.12.6**

Determination of BAL, FFDI 80 – residential development

| KEITH VEGETATION FORMATION | BUSH FIRE ATTACK LEVEL (BAL) | | | | |
|---|---|---|---|---|---|
| | BAL-FZ | BAL-40 | BAL-29 | BAL-19 | BAL-12.5 |
| | Distance (m) asset to predominant vegetation class | | | | |
| Rainforest | < 7 | 7 – < 9 | 9 – < 14 | 14 – < 20 | 20 – < 100 |
| Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland | < 13 | 13 – < 20 | 20 – < 29 | 29 – < 40 | 40 – < 100 |
| Grassy and Semi-Arid Woodland (including Mallee) | < 8 | 8 – < 11 | 11 – < 16 | 16 – < 22 | 22 – < 100 |
| Forested Wetland (excluding Coastal Swamp Forest) | < 8 | 8 – < 8 | 8 – < 12 | 12 – < 18 | 18 – < 100 |
| Tall Heath | < 12 | 12 – < 16 | 16 – < 23 | 23 – < 32 | 32 – < 100 |
| Short Heath | < 7 | 7 – < 9 | 9 – < 14 | 14 – < 20 | 20 – < 100 |
| Arid-Shrublands (acacia and chenopod) | < 5 | 5 – < 6 | 6 – < 8 | 8 – < 14 | 14 – < 100 |
| Freshwater Wetlands | < 4 | 4 – < 5 | 5 – < 7 | 7 – < 11 | 11 – < 100 |
| Grassland | < 7 | 7 – < 10 | 10 – < 14 | 14 – < 20 | 20 – < 50 |
| Rainforest | < 9 | 9 – < 12 | 12 – < 17 | 17 – < 25 | 25 – < 100 |
| Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland | < 16 | 16 – < 25 | 25 – < 35 | 35 – < 47 | 47 – < 100 |
| Grassy and Semi-Arid Woodland (including Mallee) | < 10 | 10 – < 13 | 13 – < 19 | 19 – < 28 | 28 – < 100 |
| Forested Wetland (excluding Coastal Swamp Forest) | < 8 | 8 – < 10 | 10 – < 15 | 15 – < 22 | 22 – < 100 |
| Tall Heath | < 15 | 15 – < 19 | 19 – < 28 | 28 – < 38 | 38 – < 100 |
| Short Heath | < 8 | 8 – < 10 | 10 – < 15 | 15 – < 22 | 22 – < 100 |
| Arid-Shrublands (acacia and chenopod) | < 6 | 6 – < 7 | 7 – < 9 | 9 – < 18 | 18 – < 100 |
| Freshwater Wetlands | < 4 | 4 – < 5 | 5 – < 8 | 8 – < 12 | 12 – < 100 |
| Grassland | < 8 | 8 – < 11 | 11 – < 16 | 16 – < 23 | 23 – < 50 |
| Rainforest | < 11 | 11 – < 15 | 15 – < 22 | 22 – < 33 | 33 – < 100 |
| Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland | < 24 | 24 – < 33 | 33 – < 45 | 45 – < 67 | 67 – < 100 |
| Grassy and Semi-Arid Woodland (including Mallee) | < 12 | 12 – < 17 | 17 – < 24 | 24 – < 34 | 34 – < 100 |
| Forested Wetland (excluding Coastal Swamp Forest) | < 10 | 10 – < 13 | 13 – < 20 | 20 – < 28 | 28 – < 100 |
| Tall Heath | < 15 | 15 – < 20 | 20 – < 29 | 29 – < 40 | 40 – < 100 |
| Short Heath | < 8 | 8 – < 12 | 12 – < 18 | 18 – < 25 | 25 – < 100 |
| Arid-Shrublands (acacia and chenopod) | < 6 | 6 – < 8 | 8 – < 12 | 12 – < 18 | 18 – < 100 |
| Freshwater Wetlands | < 5 | 5 – < 6 | 6 – < 10 | 10 – < 14 | 14 – < 100 |
| Grassland | < 8 | 8 – < 12 | 12 – < 18 | 18 – < 26 | 26 – < 50 |
| Rainforest | < 14 | 14 – < 20 | 20 – < 29 | 29 – < 40 | 40 – < 100 |
| Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland | < 30 | 30 – < 39 | 39 – < 52 | 52 – < 68 | 68 – < 100 |
| Grassy and Semi-Arid Woodland (including Mallee) | < 16 | 16 – < 21 | 21 – < 31 | 31 – < 42 | 42 – < 100 |
| Forested Wetland (excluding Coastal Swamp Forest) | < 12 | 12 – < 17 | 17 – < 24 | 24 – < 33 | 33 – < 100 |
| Tall Heath | < 17 | 17 – < 23 | 23 – < 32 | 32 – < 44 | 44 – < 100 |
| Short Heath | < 10 | 10 – < 13 | 13 – < 20 | 20 – < 28 | 28 – < 100 |
| Arid-Shrublands (acacia and chenopod) | < 7 | 7 – < 9 | 9 – < 14 | 14 – < 20 | 20 – < 100 |
| Freshwater Wetlands | < 5 | 5 – < 7 | 7 – < 11 | 11 – < 16 | 16 – < 100 |
| Grassland | < 10 | 10 – < 14 | 14 – < 21 | 21 – < 30 | 30 – < 50 |
| Rainforest | < 19 | 19 – < 25 | 25 – < 34 | 34 – < 46 | 46 – < 100 |
| Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland | < 39 | 39 – < 48 | 48 – < 63 | 63 – < 91 | 91 – < 100 |
| Grassy and Semi-Arid Woodland (including Mallee) | < 22 | 22 – < 27 | 27 – < 38 | 38 – < 52 | 52 – < 100 |
| Forested Wetland (excluding Coastal Swamp Forest) | < 16 | 16 – < 22 | 22 – < 32 | 32 – < 43 | 43 – < 100 |
| Tall Heath | < 19 | 19 – < 25 | 25 – < 36 | 36 – < 49 | 49 – < 100 |
| Short Heath | < 11 | 11 – < 15 | 15 – < 22 | 22 – < 32 | 32 – < 100 |
| Arid-Shrublands (acacia and chenopod) | < 7 | 7 – < 10 | 10 – < 15 | 15 – < 23 | 23 – < 100 |
| Freshwater Wetlands | < 6 | 6 – < 8 | 8 – < 12 | 12 – < 18 | 18 – < 100 |
| Grassland | < 12 | 12 – < 16 | 16 – < 24 | 24 – < 34 | 34 – < 50 |

Figure 5: Table A1.12.6 of PBP-2019

The following plan identifies the various BALs across the site. The APZ areas are defined as the red area on lot 1, and the areas between the BAL-29 zone and the adjacent vegetation.




NOTE:

- The dimensions, areas and numbers of lots shown heron are approximate and are subject to verification by field survey.
- The location of all physical features relative to existing or proposed title boundaries shown hereon is approximate and subject to verification by field survey.
- No reliance should be placed on the information shown on this plan for any financial dealings or detailed engineering design involving the land.
- Land Metrics Pty Ltd disclaims any liability whatsoever for any loss or damage that is incurred arising from any individual or organisation who uses or relies upon this document for any financial dealing or any other purpose, including as a document which has been prepared to accompany a development application.
- This Plan is not a plan of an approved subdivision nor does it imply that the proposed boundary arrangement would be approved.
- Road Widening of East Bank Road as shown to support safe intersection site distance as per AS2890 for 80Km Speed Zone.
- This note remains an intrinsic part of this plan and this plan must not be reproduced without this note.
- Bushfire Attack Levels (BAL) shown hereon have been determined by Holiday Coast Bushfire Solutions Pty Ltd.

[A] PROPOSED 'ROC' BENEFITTING PROPOSED LOT 15
[B] PROPOSED 'ROC' BENEFITTING PROPOSED LOT 14
[C] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 6 & 7
[D] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 6 & 8
[E] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 7 & 8
[F] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 12 & 13

'ROC' RIGHT OF CARRIAGEWAY

BAL-29 (29kW/m²)
BAL-19 (19kW/m²)
BAL-12.5 (12.5kW/m²)
Minimum APZ (Asset Protection Zone)

N

Scale - 1:3000 @ A3

218 EAST BANK ROAD
PLANNING PROPOSAL
CONCEPT BAL PLAN
J. CLEARY
LOT 1 & 2 DP 109448
EAST BANK ROAD, CORAMBA

Land Metrics
Land Development Consultants

Land Metrics Pty Ltd
PO Box 6511 Coffs Harbour, NSW 2450
Ph: 0422 687 846
E: mail@landmetrics.net.au

| Surveyed | Drawn |
|---|---|
| N/A | M.C |
| Checked | Date |
| M.C. | 30/11/2022 |
| Dwg No | Sheet | Rev |
| 2021_029 | 03 | |

### 4.4.8 The adequacy of sprinkler systems and other fire protection measures to be incorporated into the development

No sprinkler systems are required as part of this subdivision proposal.

### 4.4.9 Any registered fire trails on the property

There are no fire trails on the properties. A fire trail network does exist in the State Forest to the east and south of the property.

### 4.4.10 An assessment of the extent to which the proposed development conforms with or deviates from Planning for Bush Fire Protection

#### *4.4.10.1 Asset Protection Zones / Separation Distances*

Below is a table setting out the Performance Criteria and Acceptable Solutions for residential and rural-residential subdivisions as required by Chapter 5 of PBP-2019, and a statement as to whether the proposal meets the Acceptable Solution.

Table 61 – APZs and Landscaping

| | Performance Criteria | Acceptable Solution | Complies / Does not comply |
|---|---|---|---|
| Asset Protection Zones | [1] Potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m² on each proposed lot. | [1.1] APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI. | Complies |
| | [2] APZs are managed and maintained to prevent the spread of a fire towards the building. | [2.1] APZs are managed in accordance with the requirements of Appendix 4. | Complies |
| | [3] The APZs is provided in perpetuity. | [3.1] APZs are wholly within the boundaries of the development site | Complies |
| | [4] APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised. | [4.1] APZs are located on lands with a slope less than 18 degrees. | Complies |
| Landscaping | [5] Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions. | [5.1] Landscaping is in accordance with Appendix 4; and<br>[5.2] Fencing is constructed in accordance with section 7.6. | Complies<br>Able to comply |

In relation to Acceptable Solution 1.1, the BAL plan provided as Figure 6 above indicates that the required APZs and appropriate BALs can be accommodated by the proposed subdivision.

In relation to Acceptable Solution 2.1 & 5.1, at the issue of subdivision certificate and in perpetuity, vacant lots should be managed as OPA in accordance with the NSW Rural Fire Service guidelines. These are attached as Appendix B of the Bushfire Strategic Study.

In relation to Acceptable Solution 5.2, PBP-2019 clarifies as follows.

> 7.6 Fences and gates
>
> Fences and gates in bush fire prone areas may play a significant role in the vulnerability of structures during bush fires. In this regard, all fences in bush fire prone areas should be made of either hardwood or non-combustible material.
>
> However, in circumstances where the fence is within 6m of a building or in areas of BAL-29 or greater, they should be made of non-combustible material only.

### *4.4.10.2 Access*

Below is a table setting out the Performance Criteria and Acceptable Solutions for residential and rural-residential subdivisions as required by Chapter 5 of PBP-2019, and a statement as to whether the proposal meets the Acceptable Solution.

Table 62 - Access

| | Performance Criteria | Acceptable Solution | Complies / Does not comply |
|---|---|---|---|
| General Access Requirements | [6] Firefighting vehicles are provided with safe, all-weather access to structures. | [6.1] Property access roads are two-wheel drive, all-weather roads; | Able to comply |
| | | [6.2] Perimeter roads are provided for residential subdivisions of three or more allotments; | Does not comply |
| | | [6.3] Subdivisions of three or more allotments have more than one access in and out of the development; | Complies |
| | | [6.4] Traffic management devices are constructed to not prohibit access by emergency services vehicles; | Complies |
| | | [6.5] Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient; | Complies |
| | | [6.6] All roads are through roads; | Does not comply |

| | | | |
|---|---|---|---|
| | | [6.7] Dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; | Does not comply |
| | | [6.8] Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; | Complies |
| | | [6.9] Where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and | Not applicable |
| | | [6.10] One way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression. | Not applicable |
| | [7] The capacity of access roads is adequate for firefighting vehicles. | [7.1] The capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/ causeways are to clearly indicate load rating. | Complies |
| | [8] There is appropriate access to water supply. | [8.1] Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression; | Not applicable |
| | | [8.2] Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning; and | Not applicable |
| | | [8.3] There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available | Able to comply |

| | | | |
|---|---|---|---|
| Perimeter Roads | [9] Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface | [9.1] Are two-way sealed roads; | Not applicable |
| | | [9.2] Minimum 8m carriageway width kerb to kerb; | Not applicable |
| | | [9.3] Parking is provided outside of the carriageway width; | Not applicable |
| | | [9.4] Hydrants are located clear of parking areas; | Not applicable |
| | | [9.5] Are through roads, and these are linked to the internal road system at an interval of no greater than 500m; | Not applicable |
| | | [9.6] Curves of roads have a minimum inner radius of 6m; | Not applicable |
| | | [9.7] The maximum grade road is 15 degrees and average grade of not more than 10 degrees; | Not applicable |
| | | [9.8] The road crossfall does not exceed 3 degrees; and | Not applicable |
| | | [9.9] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided. | Not applicable |
| Non-Perimeter Roads | [10] Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating. | [10.1] Minimum 5.5m carriageway width kerb to kerb; | Able to comply |
| | | [10.2] Parking is provided outside of the carriageway width; | Able to comply |
| | | [10.3] Hydrants are located clear of parking areas; | Not applicable |
| | | [10.4] Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; | Does not comply |
| | | [10.5] Curves of roads have a minimum inner radius of 6m; | Complies |
| | | [10.6] The road crossfall does not exceed 3 degrees; and | Complies |
| | | [10.7] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided. | Complies |
| Property Access Roads | [11] Firefighting vehicles can access the dwelling and exit the property safely. | [11.1] There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where | |

| | | | |
|---|---|---|---|
| | | the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles.<br>In circumstances where this cannot occur, the following requirements apply: | |
| | | [11.2] Minimum 4m carriageway width; | Able to comply |
| | | [11.3] In forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay; | Not applicable |
| | | [11.4] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; | Able to comply |
| | | [11.5] Provide a suitable turning area in accordance with Appendix 3; | Able to comply |
| | | [11.6] Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; | Able to comply |
| | | [11.7] The minimum distance between inner and outer curves is 6m; | Able to comply |
| | | [11.8] The crossfall is not more than 10 degrees; | Able to comply |
| | | [11.9] Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and | Able to comply |
| | | [11.10] A development comprising more than three dwellings has access by dedication of a road and not by right of way.<br>Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style | Does not comply |

| | | | |
|---|---|---|---|
| | | development property access roads in addition to the above. | |

In relation to Acceptable Solution 6.2, although 14 new lots are proposed to be created on the eastern side of East Bank Road, the proposed new road is not a perimeter road. Where an Acceptable Solution has not been complied with, the proposal should be assessed against the corresponding Performance Criteria, which states:

> [6] Firefighting vehicles are provided with safe, all-weather access to structures.

The proposed new road is provided centrally within the property, generally as distant from the hazard vegetation on the adjoining sites as possible. This location is much safer than providing the main access route in close proximity to a hazard.

The adjoining lands to the south-west and east of the site are provided with a fire trail network, negating the need for firefighter access to these interface areas from within the subject site. This is particularly evident along the eastern boundary where Hopes Road is located generally along the boundary.

In relation to Acceptable Solution 6.3, the 15 lots access the public road system at 3 separate locations. Lot 1 has direct access to Moses Close; lots 2 – 11 access the public road system via a new public road cul-de-sac; lots 12 – 15 access the public road system via Right of Way.

In relation to Acceptable Solution 6.6 & 6.7 & 9.5 & 10.4, the proposed internal non-perimeter road is a dead-end road with a length of approximately 310 m. Where an Acceptable Solution has not been complied with, the proposal should be assessed against the corresponding Performance Criteria, which state:

> [6] Firefighting vehicles are provided with safe, all-weather access to structures.
>
> [9] Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.
>
> [10] Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.

Although the internal road servicing lots 2 – 11 is a dead-end road, it is centrally located within the property and will be protected by APZs to be established on the proposed lots. Access to, and egress from, future structures is safer where the distance from the road to the hazard is increased. In addition, travel distances from the indicative DEs to East Bank Road are reduced with a non-perimeter road as the individual property access roads are maintained as short as possible.

Access to the interface is available via the existing fire trail network surrounding the property. There is no need to rely on access to the interface via a perimeter road for this proposal.

The internal road will meet the width & gradient specifications of PBP-2019 for non-perimeter roads (discussed below in this section of the Report).

The turning-head at the dead-end will need to be 24 m in diameter (type A), or otherwise comply with the provisions for vehicle manoeuvring areas as provided in "Appendix 3" of PBP-2019 (Type B, C, D). The area required for vehicle manoeuvring is in addition to parking areas.

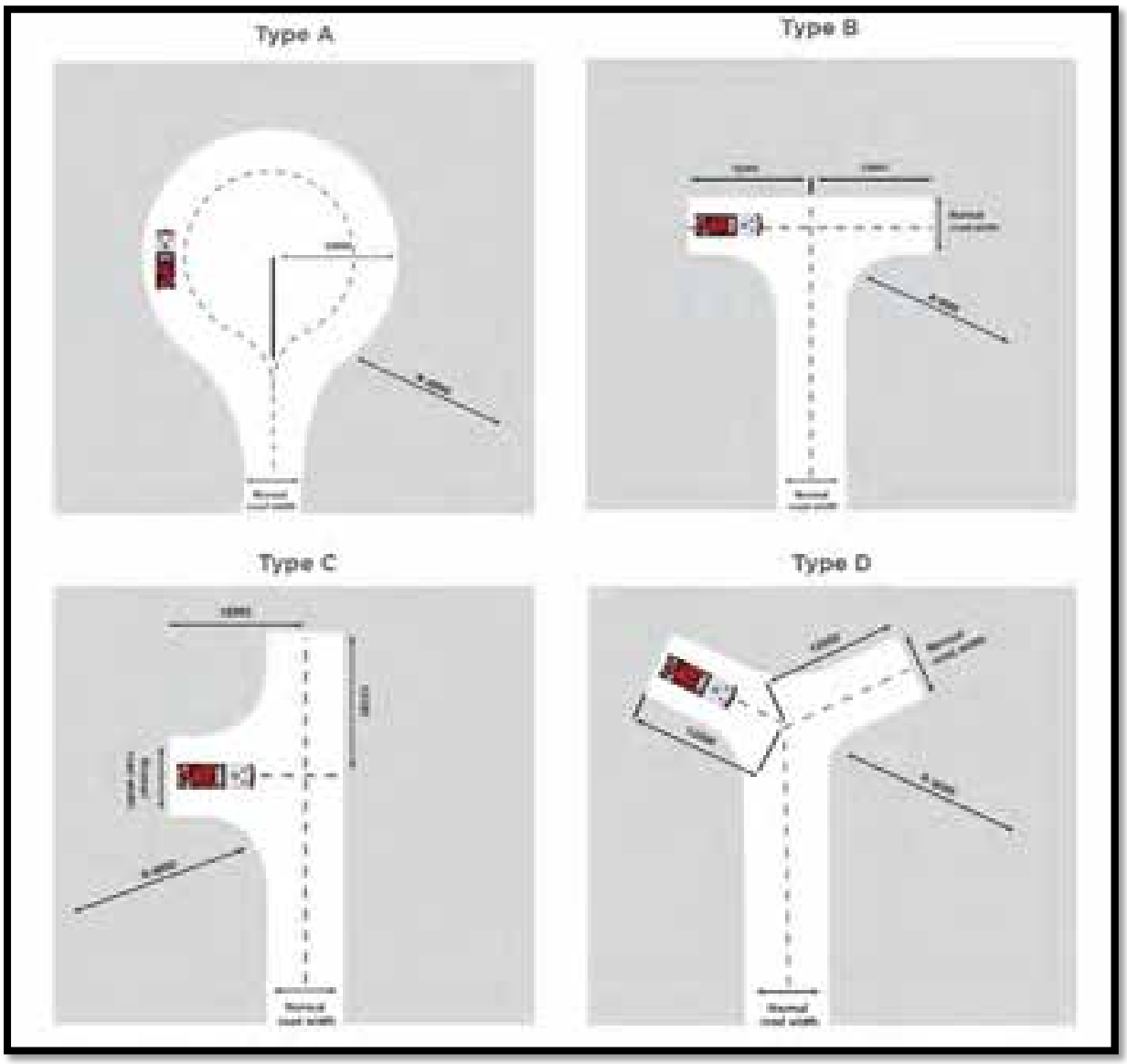



Figure 7: dimensions for fire truck turning areas

In relation to Acceptable Solution 10.1 & 10.2, the proposed internal road will be located within a 17 m wide road reserve, and have a width of not less than 5.5 m. This width does not include parking areas so will need to be:

- 5.5 m wide with no on-street parking; or
- 5.5 m wide with on-street parking permitted only in 2.5m wide individual parking bays; or
- 8.0 m wide with parking permitted on one side only; or
- 10.5 m wide with parking permitted on both sides.

In relation to driveways (property access roads), all of the relevant Acceptable Solutions are able to be provided at the construction stage of future dwellings.

In relation to Acceptable Solution 11.10, access to proposed lots 12 – 15 will be via a Right of Carriageway (RoC). Where an Acceptable Solution has not been complied with, the proposal should be assessed against the corresponding Performance Criteria, which states:

> [11] Firefighting vehicles can access the dwelling and exit the property safely.

The access will be provided within the lots as battle-axe access ways and RoCs within a corridor of not less than 10 m wide. The length of the RoC will not exceed 200 m and will be a relatively straight alignment. The RoCs will be created with "restriction on use" so that the individual battle-axe and RoCs are not separately fenced, but instead only the outer perimeter of the RoC corridor can be fenced. This will ensure the access corridor width can never be compromised and safe access for firefighting vehicles is maintained whilst residents might be seeking to evacuate.

#### *4.4.10.3 Utility Services*

Below is a table setting out the Performance Criteria and Acceptable Solutions for residential and rural-residential subdivisions as required by Chapter 5 of PBP-2019, and a statement as to whether the proposal meets the Acceptable Solution.

Table 63 - Services

| | Performance Criteria | Acceptable Solution | Complies / Does not comply |
|---|---|---|---|
| Water Supplies | [12] Adequate water supplies is provided for firefighting purposes | [12.1] Reticulated water is to be provided to the development where available; | Not applicable |
| | | [12.2] A static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and | Complies |
| | | [12.3] Static water supplies shall comply with Table 5.3d of PBP-2019. | Complies (20,000 litres per lot) |
| | [13a] Water supplies are located at regular intervals; and<br>[13b] The water supply is accessible and reliable for firefighting operations. | [13.1] Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005; | Not applicable |
| | | [13.2] Hydrants are not located within any road carriageway; and | Not applicable |
| | | [13.3] Reticulated water supply to urban subdivisions uses a ring | Not applicable |

| | | | |
|---|---|---|---|
| | | main system for areas with perimeter roads. | |
| | [14] Flows and pressure are appropriate. | [15.1] Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005 | Not applicable |
| | [15] The integrity of the water supply is maintained. | [15.1] All above-ground water service pipes are metal, including and up to any taps; and<br>[15.2] Above-ground water storage tanks shall be of concrete or metal | Able to comply<br>Able to comply |
| Electricity Services | [16] Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings. | [16.1] Where practicable, electrical transmission lines are underground;<br>Where overhead, electrical transmission lines are proposed as follows:<br>* lines are installed with short pole spacing of 30m, unless crossing gullies, gorges or riparian areas; and<br>* no part of a tree is closer to a power line than the distance set out in ISSC3 Guideline for Managing Vegetation Near Power Lines. | Able to comply |
| Gas Services | [17] Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings. | [17.1] Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 - The storage and handling of LP Gas, the requirements of relevant authorities, and metal piping is used;<br>[17.2] All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;<br>[17.3] Connections to and from gas cylinders are metal;<br>[17.4] Polymer-sheathed flexible gas supply lines are not used; and<br>[17.5] Above-ground gas service pipes are metal, including and up to any outlets. | Able to comply<br>Able to comply<br>Able to comply<br>Able to comply<br>Able to comply |

All of the relevant Acceptable Solutions in relation to water supplies, electricity and LPG supplies are able to be accommodated within the proposed development. Apart from electricity services, these matters are generally only able to be addressed at construction stage of future dwellings.

## 4.4.11 Existing Dwelling on Proposed Lot 11

The existing dwelling on proposed lot 10 will be assessed against the suite of bushfire protection measures listed in PBP-2019, namely APZs, construction standards, vehicular access, water supply and utility services, and landscaping.

### *4.4.11.1 Asset Protection Zones*

The existing dwelling is surrounded by a well maintained APZ comprising lawns and gardens. Some minor irregularities exist with landscaping when assessed against the PBP-2019 requirements. Prior to the issue of subdivision certificate the landscaping around the existing dwelling should comply with the principles contained within Appendix B of the Bushfire Strategic Study.

### *4.4.11.2 Construction Standard*

Remnant vegetation will remain within 100 m of the dwelling, and although not within the theoretical Flame Zone, the dwelling will remain on land that is considered to be bushfire-prone. Therefore, the existing dwelling should be assessed against the provisions contained within the NSW Rural Fire Service document titled "Upgrading of Existing Buildings" (NSW RFS, 2014). The table below identifies each of the matters listed for assessment and a statement related to the measure.

Table 64

| BUILDING ELEMENT | MINIMAL PROTECTION MEASURES | COMMENTS |
|---|---|---|
| GENERAL | Seal all gaps (>3mm) around the house (excluding subfloor) with:<br>appropriate joining strips;<br>flexible silicon based sealant; or<br>mesh with a maximum aperture of 2mm, made from corrosion resistant steel, bronze or aluminium. | Recommended. |
| WALLS | Install sarking with a flammability index of not more than 5 behind weatherboards or other external cladding when they are being replaced for maintenance or other reasons. | Recommended. |
| SUBFLOOR | Removal of combustible materials and keeping areas clear and accessible. | Recommended. |

| | | |
|---|---|---|
| DOORS | Install weather strips, draught excluders or draught seals at the base of side-hung doors. | Recommended. |
| VENTS & WEEPHOLES | Seal vents and weepholes in external walls with mesh (with an aperture size of 2 mm) of corrosion resistant steel, bronze or aluminium. | Recommended. |
| ROOFS | Seal around roofing and roof penetrations with a non-combustible material.<br><br>Install sarking with a flammability index of not more than 5 beneath existing roofing when it is being replaced for maintenance or other reasons.<br><br>If installed, gutter and valley leaf guards shall be non-combustible. | Recommended.<br><br>Recommended. |
| WINDOWS | Install mesh with a maximum aperture of 2mm, made from corrosion resistant steel, bronze or aluminium to all external doors and openable windows | Recommended. |

#### *4.4.11.3 Vehicular Access*

The proposed new public road cul-de-sac is to be generally located over the alignment of the existing driveway. Vehicular access from the dwelling will be provided directly onto the proposed new road.

#### *4.4.11.4 Water, Electricity and LPG Supplies*

The water, electricity and LPG supplies to the existing dwelling are to comply with the relevant provisions of Table 78 of this Report.

#### *4.4.11.5 Landscaping*

Refer to 4.4.10.1 (APZs) above.

# 5.0 CONCLUSION AND RECOMMENDATIONS

This Report is an assessment of a rural-residential subdivision. Existing lots 1 & 2 are proposed to be subdivided to create 15 new rural-residential lots. This Report forms Appendix A of a Bushfire Strategic Study that addresses the rezoning of the property from RU2 to R5 – large lot residential.

The property is currently occupied by a single dwelling and various rural structures. The existing dwelling will be retained on proposed lot 10. A new public road will be constructed over the general alignment of the existing driveway.

The new public road will be the primary access for the development, and is proposed to be a new cul-de-sac off East Bank Road. This cul-de-sac will provide access to 10 of the 15 new lots. The indicative dwelling envelopes will be located in close proximity to the new road, therefore long property access roads are not required. The new cul-de-sac will have a length of approximately 310 m. Proposed lots 6 – 8 will access the cul-de-sac via a Right of Way.

Secondary access for proposed lots 12 – 15 will be provided off East Bank Road opposite the Moses Close intersection. Access to proposed lot 1 will be off Moses Close.

The property is not serviced by Council's reticulated water supply, therefore an on-site static water supply is to be provided for each new lot at construction stage for the future dwellings.

I support the approval of the subdivision subject to the following specific recommendations.

1. At the issue of subdivision certificate and in perpetuity, the areas of the proposed lots identified as APZs on Figure 6 of this Report are to be maintained as APZ in accordance with the OPA specifications listed in Appendix B of the Bushfire Strategic Study.
2. Vegetation removal to create and maintain APZs should be carried out having regard for the restrictions imposed by the approved Biodiversity Report prepared by Idyll Spaces Environmental Consultants.
3. Construction of the future dwellings are permitted in the BAL-29, BAL-19 and BAL-12.5 areas as indicated on Figure 6 of this Report.

## 5.1 Limitations

**5.1.1** This Report and the subsequent recommendations reflect the reasonable and practical efforts of the author. It is important to note that the author (and State

and Local Government authorities) cannot guarantee that bushfire ignition and subsequent bushfire damage will not occur.

**5.1.2** Current legislation is essentially 'silent' in relation to the maintenance of bushfire protection measures. Maintenance is a major factor in the effectiveness of any BPM provided/installed. The extent to which the BPMs are implemented and maintained will affect the probability of achieving adequate bushfire safety margins.

**5.1.3** Given the natural phenomenon of bushfires, and limitations in technology and research, a system to guarantee the survival of life and property cannot be made. This is reflected in the following statements of limitations:

> *The goal of 'absolute' or '100%' safety is not attainable and there will always be a finite risk of injury, death or property damage.* (IFEG-2005)

> *No development in a bushfire prone area can be guaranteed to be entirely safe from bushfires.* (**PBP-2001**)

> *Notwithstanding the precautions adopted, it should always be remembered that bushfires burn under a wide range of conditions and an element of risk, no matter how small, always remains.* (**PBP-2001**)

2/03/2022

**Holiday Coast Bushfire Solutions**
**Grad. Dip. Design in Bushfire Prone Areas (UWS)**

# 6.0 REFERENCES

NSW Government, Environmental Planning and Assessment Act 1979 (as amended), http://www.legislation.nsw.gov.au

NSW Government, Rural Fires Act 1997, http://www.legislation.nsw.gov.au

NSW Government, Rural Fires Regulation 2013, http://www.legislation.nsw.gov.au

NSW Government Geospatial Portal (2021-'22), various images, http://maps.six.nsw.gov.au/

NSW Rural Fire Service (2019), Planning for Bushfire Protection 2019, Sydney.

NSW Rural Fire Service (2006), Planning for Bushfire Protection 2006 including Addendum Appendix 3, Sydney.

NSW Rural Fire Service (2005), Standards for asset protection zones, Sydney.

Standards Australia (2018), Australian Standard 3959-2018 Construction of buildings in bushfire-prone areas, Sydney.

# 7.0 APPENDICES

| | |
|---|---|
| Appendix A of the Bushfire Strategic Study | This Report. |
| Appendix B of the Bushfire Strategic Study | Standards for APZs (RFS 2005) and Appendix 4 of PBP-2019. |
| Appendix C of the Bushfire Strategic Study | Appendix 3 of PBP-2019 (access requirements for firefighting vehicles) |

# CLEARY-2021-13 APPENDIX B

## STANDARDS FOR ASSET PROTECTION ZONES

## PLANNING PROPOSAL AND SUBDIVISION

## LOTS 1 & 2//1093448,
## 218 EAST BANK ROAD,
## CORAMBA.

# APPENDIX 4

## ASSET PROTECTION ZONE REQUIREMENTS

In combination with other BPMs, a bush fire hazard can be reduced by implementing simple steps to reduce vegetation levels. This can be done by designing and managing landscaping to implement an APZ around the property.

Careful attention should be paid to species selection, their location relative to their flammability, minimising continuity of vegetation (horizontally and vertically), and ongoing maintenance to remove flammable fuels (leaf litter, twigs and debris).

This Appendix sets the standards which need to be met within an APZ.

### A4.1 Asset Protection Zones

An APZ is a fuel-reduced area surrounding a building or structure. It is located between the building or structure and the bush fire hazard.

For a complete guide to APZs and landscaping, download the NSW RFS document *Standards for Asset Protection Zones* at the NSW RFS Website www.rfs.nsw.gov.au.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows for suppression of fire;
- an area from which backburning or hazard reduction can be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Bush fire fuels should be minimised within an APZ. This is so that the vegetation within the zone does not provide a path for the spread of fire to the building, either from the ground level or through the tree canopy.

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the building;
- damage to the building asset from intense radiant heat; and
- ember attack.

The methodology for calculating the required APZ distance is contained within Appendix 1. The width of the APZ required will depend upon the development type and bush fire threat. APZs for new development are set out within Chapters 5, 6 and 7 of this document.

In forest vegetation, the APZ can be made up of an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

### A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defendable space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

**Trees**

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

**Shrubs**

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

**Grass**

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

### A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

When establishing and maintaining an OPA the following requirements apply:

**Trees**

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

**Shrubs**

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

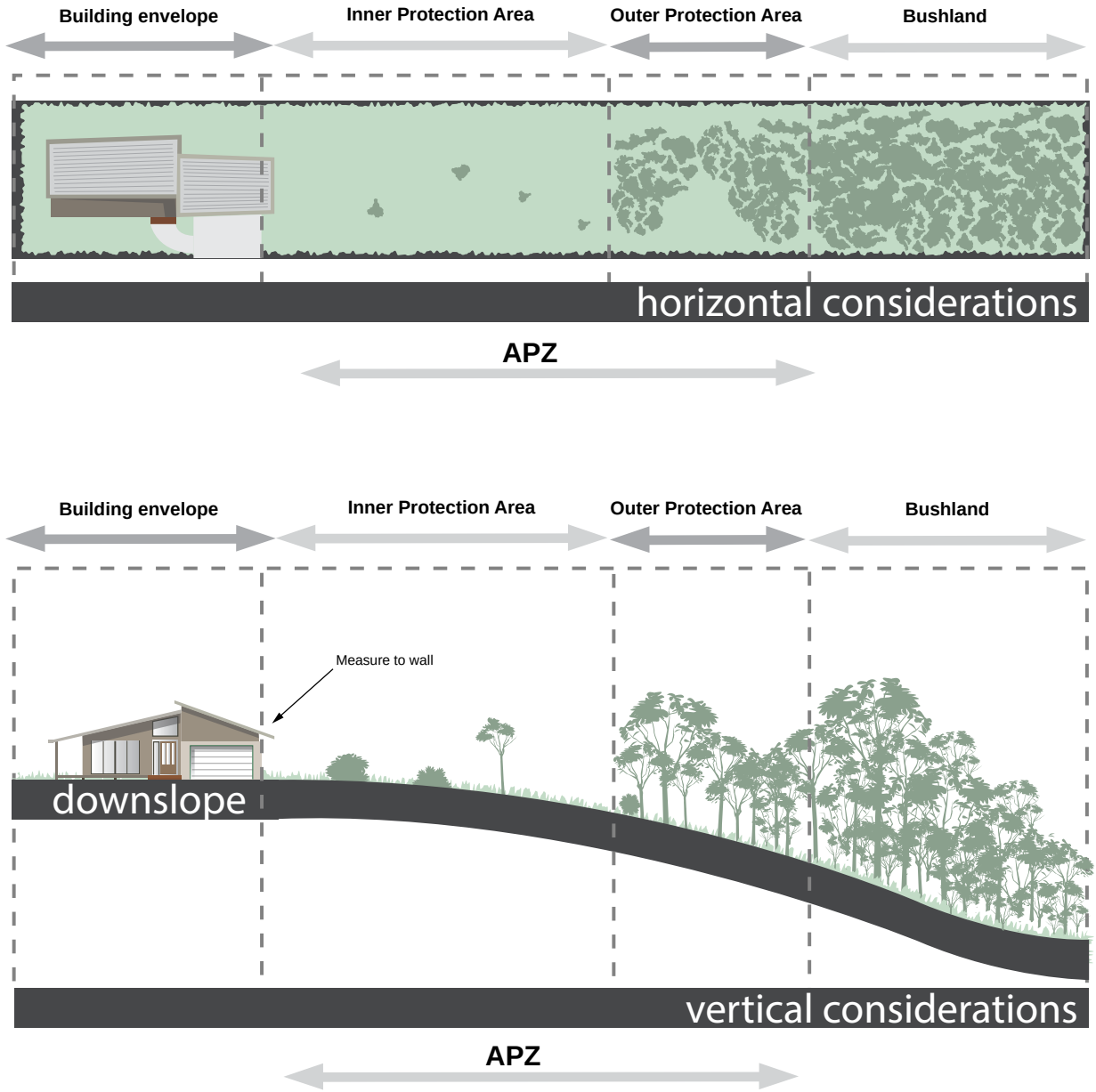
**Grass**

- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.

## Figure A4.1

Typical Inner and Outer Protection Areas.



APPENDIX 7 - BUSHFIRE STRATEGIC STUDY

# standards

## for asset protection zones

protection

NSW RURAL FIRE SERVICE

# STANDARDS FOR ASSET PROTECTION ZONES

# INTRODUCTION

For thousands of years bush fires have been a natural part of the Australian landscape. They are inevitable and essential, as many Australian plants and animals have adapted to fire as part of their life cycle.

In recent years developments in bushland areas have increased the risk of bush fires harming people and their homes and property. But landowners can significantly reduce the impact of bush fires on their property by identifying and minimising bush fire hazards. There are a number of ways to reduce the level of hazard to your property, but one of the most important is the creation and maintenance of an Asset Protection Zone (APZ).

A well located and maintained APZ should be used in conjunction with other preparations such as good property maintenance, appropriate building materials and developing a family action plan.

# WHAT IS AN ASSET PROTECTION ZONE?

An Asset Protection Zone (APZ) is a fuel reduced area surrounding a built asset or structure. This can include any residential building or major building such as farm and machinery sheds, or industrial, commercial or heritage buildings.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows suppression of fire;
- an area from which backburning may be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Potential bush fire fuels should be minimised within an APZ. This is so that the vegetation within the planned zone does not provide a path for the transfer of fire to the asset either from the ground level or through the tree canopy.

# WHAT WILL THE APZ DO?

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the asset;
- damage to the built asset from intense radiant heat; and
- ember attack on the asset.

## WHERE SHOULD I PUT AN APZ?

An APZ is located between an asset and a bush fire hazard.

The APZ should be located wholly within your land. You cannot undertake any clearing of vegetation on a neighbour's property, including National Park estate, Crown land or land under the management of your local council, unless you have written approval.

If you believe that the land adjacent to your property is a bush fire hazard and should be part of an APZ, you can have the matter investigated by contacting the NSW Rural Fire Service (RFS).

There are six steps to creating and maintaining an APZ. These are:

1. Determine if an APZ is required;
2. Determine what approvals are required for constructing your APZ;
3. Determine the APZ width required;
4. Determine what hazard reduction method is required to reduce bush fire fuel in your APZ;
5. Take measures to prevent soil erosion in your APZ; and
6. Landscape and regularly monitor in your APZ for fuel regrowth.

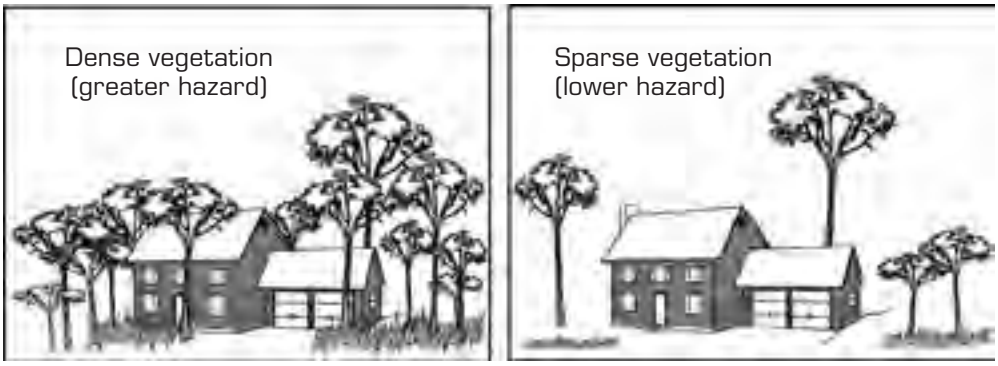
## STEP 1. DETERMINE IF AN APZ IS REQUIRED

Recognising that a bush fire hazard exists is the first step in developing an APZ for your property.

If you have vegetation close to your asset and you live in a bush fire prone or high risk area, you should consider creating and maintaining an APZ.

Generally, the more flammable and dense the vegetation, the greater the hazard will be. However, the hazard potential is also influenced by factors such as slope.

- A large area of continuous vegetation on sloping land may increase the potential bush fire hazard.
- The amount of vegetation around a house will influence the intensity and severity of a bush fire.
- The higher the available fuel the more intense a fire will be.




Isolated areas of vegetation are generally not a bush fire hazard, as they are not large enough to produce fire of an intensity that will threaten dwellings.

This includes:

- bushland areas of less than one hectare that are isolated from large bushland areas; and
- narrow strips of vegetation along road and river corridors.

If you are not sure if there is a bush fire hazard in or around your property, contact your local NSW Rural Fire Service Fire Control Centre or your local council for advice.

## STEP 2. DETERMINE WHAT APPROVALS ARE REQUIRED FOR CONSTRUCTING YOUR APZ

If you intend to undertake bush fire hazard reduction works to create or maintain an APZ you must gain the written consent of the landowner.

**Subdivided land or construction of a new dwelling**
If you are constructing an APZ for a new dwelling you will need to comply with the requirements in *Planning for Bushfire Protection*. Any approvals required will have to be obtained as part of the Development Application process.

**Existing asset**
If you wish to create or maintain an APZ for an existing structure you may need to obtain an environmental approval. The RFS offers a free environmental assessment and certificate issuing service for essential hazard reduction works. For more information see the RFS document *Application Instructions for a Bush Fire Hazard Reduction Certificate* or contact your local RFS Fire Control Centre to determine if you can use this approval process.

Bear in mind that all work undertaken must be consistent with any existing land management agreements (e.g. a conservation agreement, or property vegetation plan) entered into by the property owner.

If your current development consent provides for an APZ, you do not need further approvals for works that are consistent with this consent.

If you intend to burn off to reduce fuel levels on your property you may also need to obtain a Fire Permit through the RFS or NSW Fire Brigades. See the RFS document *Before You Light That Fire* for an explanation of when a permit is required.

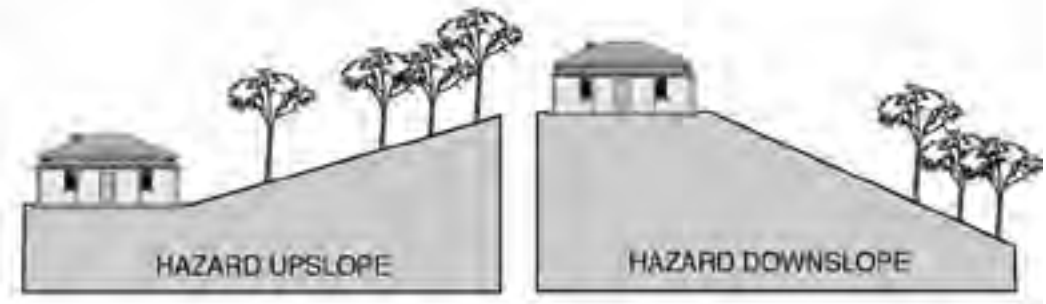
## STEP 3. DETERMINE THE APZ WIDTH

The size of the APZ required around your asset depends on the nature of the asset, the slope of the area, the type and structure of nearby vegetation and whether the vegetation is managed.

Fires burn faster uphill than downhill, so the APZ will need to be larger if the hazard is downslope of the asset.




Gentle slopes require a smaller APZ distance than steep slopes




A hazard downslope will require a greater APZ distance than a hazard upslope of the asset

Different types of vegetation (for example, forests, rainforests, woodlands, grasslands) behave differently during a bush fire. For example, a forest with shrubby understorey is likely to result in a higher intensity fire than a woodland with a grassy understorey and would therefore require a greater APZ width.

A key benefit of an APZ is that it reduces radiant heat and the potential for direct flame contact on homes and other buildings. Residential dwellings require a wider APZ than sheds or stockyards because the dwelling is more likely to be used as a refuge during bush fire.

**Subdivided land or construction of a new dwelling**
If you are constructing a new asset, the principles of *Planning for Bushfire Protection* should be applied. Your Development Application approval will detail the exact APZ distance required.

**Existing asset**
If you wish to create an APZ around an existing asset and you require environmental approval, the Bush Fire Environmental Assessment Code provides a streamlined assessment process. Your Bush Fire Hazard Reduction Certificate (or alternate environmental approval) will specify the maximum APZ width allowed.

For further information on APZ widths see *Planning for Bushfire Protection* or the *Bush Fire Environmental Assessment Code* (available on the RFS website), or contact your local RFS Fire Control Centre.

## STEP 4. DETERMINE WHAT HAZARD REDUCTION METHOD IS REQUIRED TO REDUCE BUSH FIRE FUEL IN YOUR APZ

The intensity of bush fires can be greatly reduced where there is little to no available fuel for burning. In order to control bush fire fuels you can reduce, remove or change the state of the fuel through several means.

Reduction of fuel does not require removal of all vegetation, which would cause environmental damage. Also, trees and plants can provide you with some bush fire protection from strong winds, intense heat and flying embers (by filtering embers) and changing wind patterns. Some ground cover is also needed to prevent soil erosion.

**Fuels can be controlled by:**

**1. raking or manual removal of fine fuels**
Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be removed on a regular basis. This is fuel that burns quickly and increases the intensity of a fire.

Fine fuels can be removed by hand or with tools such as rakes, hoes and shovels.

**2. mowing or grazing of grass**
Grass needs to be kept short and, where possible, green.

**3. removal or pruning of trees, shrubs and understorey**
The control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation.

Prune or remove trees so that you do not have a continuous tree canopy leading from the hazard to the asset. Separate tree crowns by two to five metres. A canopy should not overhang within two to five metres of a dwelling.

Native trees and shrubs should be retained as clumps or islands and should maintain a covering of no more than 20% of the area.

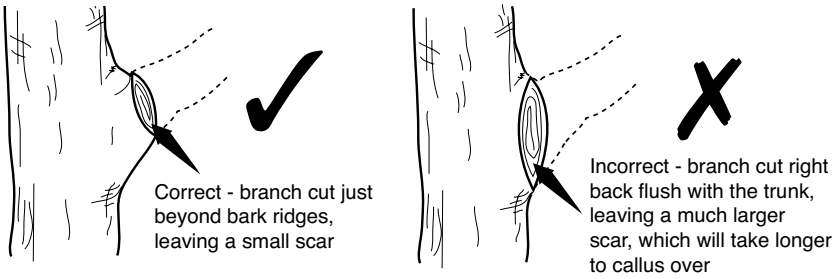
When choosing plants for removal, the following basic rules should be followed:

1. Remove noxious and environmental weeds first. Your local council can provide you with a list of environmental weeds or 'undesirable species'. Alternatively, a list of noxious weeds can be obtained at **www.agric.nsw.gov.au/noxweed/;**
2. Remove more flammable species such as those with rough, flaky or stringy bark; and
3 Remove or thin understorey plants, trees and shrubs less than three metres in height

The removal of significant native species should be avoided.

Prune in acordance with the following standards:

- Use sharp tools. These will enable clean cuts and will minimise damage to the tree.
- Decide which branches are to be removed before commencing work. Ensure that you maintain a balanced, natural distribution of foliage and branches.
- Remove only what is necessary.
- Cut branches just beyond bark ridges, leaving a small scar.
- Remove smaller branches and deadwood first.




There are three primary methods of pruning trees in APZs:

**1. Crown lifting (skirting)**
Remove the lowest branches (up to two metres from the ground). Crown lifting may inhibit the transfer of fire between the ground fuel and the tree canopy.

**2. Thinning**
Remove smaller secondary branches whilst retaining the main structural branches of the tree. Thinning may minimise the intensity of a fire.

**3. Selective pruning**
Remove branches that are specifically identified as creating a bush fire hazard (such as those overhanging assets or those which create a continuous tree canopy). Selective pruning can be used to prevent direct flame contact between trees and assets.

Your Bush Fire Hazard Reduction Certificate or local council may restrict the amount or method of pruning allowed in your APZ.

See the *Australian Standard 4373 (Pruning of Amenity Trees*) for more information on tree pruning.

**4. Slashing and trittering**
Slashing and trittering are economical methods of fuel reduction for large APZs that have good access. However, these methods may leave large amounts of slashed fuels (grass clippings etc) which, when dry, may become a fire hazard. For slashing or trittering to be effective, the cut material must be removed or allowed to decompose well before summer starts.

If clippings are removed, dispose of them in a green waste bin if available or compost on site (dumping clippings in the bush is illegal and it increases the bush fire hazard on your or your neighbour's property).

Although slashing and trittering are effective in inhibiting the growth of weeds, it is preferable that weeds are completely removed.

Care must be taken not to leave sharp stakes and stumps that may be a safety hazard.

**5. Ploughing and grading**
Ploughing and grading can produce effective firebreaks. However, in areas where this method is applied, frequent maintenance may be required to minimise the potential for erosion. Loose soil from ploughed or graded ground may erode in steep areas, particularly where there is high rainfall and strong winds.

**6. Burning (hazard reduction burning)**
Hazard reduction burning is a method of removing ground litter and fine fuels by fire. Hazard reduction burning of vegetation is often used by land management agencies for broad area bush fire control, or to provide a fuel reduced buffer around urban areas.

Any hazard reduction burning, including pile burns, must be planned carefully and carried out with extreme caution under correct weather conditions. Otherwise there is a real danger that the fire will become out of control. More bush fires result from escaped burning off work than from any other single cause.

**It is YOUR responsibility to contain any fire lit on your property. If the fire escapes your property boundaries you may be liable for the damage it causes.**

Hazard reduction burns must therefore be carefully planned to ensure that they are safe, controlled, effective and environmentally sound. There are many factors that need to be considered in a burn plan. These include smoke control, scorch height, frequency of burning and cut off points (or control lines) for the fire. For further information see the RFS document *Standards for Low Intensity Bush Fire Hazard Reduction Burning,* or contact your local RFS for advice.

**7. Burning (pile burning)**
In some cases, where fuel removal is impractical due to the terrain, or where material cannot be disposed of by the normal garbage collection or composted on site, you may use pile burning to dispose of material that has been removed in creating or maintaining an APZ.

For further information on pile burning, see the RFS document *Standards for Pile Burning.*

In areas where smoke regulations control burning in the open, you will need to obtain a Bush Fire Hazard Reduction Certificate or written approval from Council for burning. During the bush fire danger period a Fire Permit will also be required. See the RFS document *Before You Light that Fire* for further details.

## STEP 5. TAKE MEASURES TO PREVENT SOIL EROSION

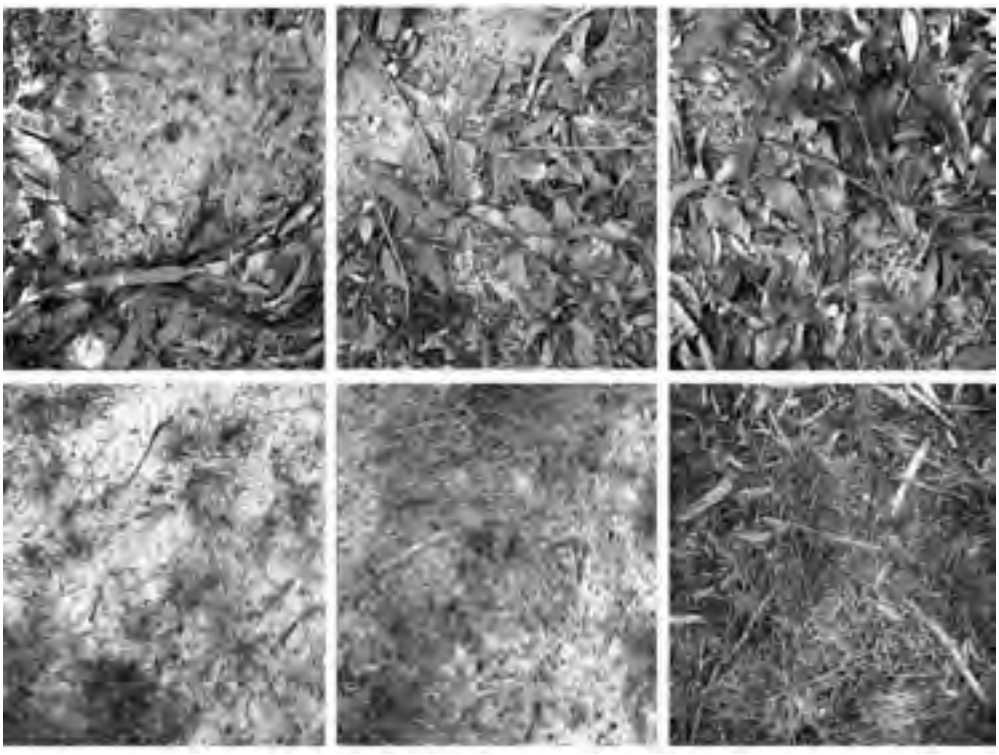
While the removal of fuel is necessary to reduce a bush fire hazard, you also need to consider soil stability, particularly on sloping areas.

Soil erosion can greatly reduce the quality of your land through:

- loss of top soil, nutrients, vegetation and seeds
- reduced soil structure, stability and quality
- blocking and polluting water courses and drainage lines

A small amount of ground cover can greatly improve soil stability and does not constitute a significant bush fire hazard. Ground cover includes any material which directly covers the soil surface such as vegetation, twigs, leaf litter, clippings or rocks. A permanent ground cover should be established (for example, short grass). This will provide an area that is easy to maintain and prevent soil erosion.

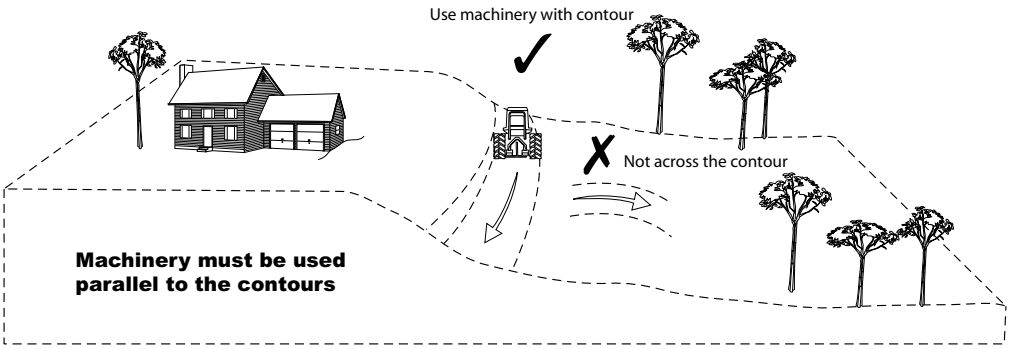
When using mechanical hazard reduction methods, you should retain a ground cover of at least 75% to prevent soil erosion. However, if your area is particularly susceptible to soil erosion, your Hazard Reduction Certificate may require that 90% ground cover be retained.



**50%** **75%** **100%**

Ground Cover

To reduce the incidence of soil erosion caused by the use of heavy machinery such as ploughs, dozers and graders, machinery must be used parallel to the contours. Vegetation should be allowed to regenerate, but be managed to maintain a low fuel load.



## STEP 6. ONGOING MANAGEMENT AND LANDSCAPING

Your home and garden can blend with the natural environment and be landscaped to minimise the impact of fire at the same time. To provide an effective APZ, you need to plan the layout of your garden to include features such as fire resistant plants, radiant heat barriers and windbreaks.

**Layout of gardens in an APZ**
When creating and maintaining a garden that is part of an APZ you should:

- ensure that vegetation does not provide a continuous path to the house;
- remove all noxious and environmental weeds;
- plant or clear vegetation into clumps rather than continuous rows;
- prune low branches two metres from the ground to prevent a ground fire from spreading into trees;
- locate vegetation far enough away from the asset so that plants will not ignite the asset by direct flame contact or radiant heat emission;
- plant and maintain short green grass around the house as this will slow the fire and reduce fire intensity. Alternatively, provide non-flammable pathways directly around the dwelling;
- ensure that shrubs and other plants do not directly abut the dwelling. Where this does occur, gardens should contain low-flammability plants and non flammable ground cover such as pebbles and crush tile; and
- avoid erecting brush type fencing and planting “pencil pine” type trees next to buildings, as these are highly flammable.


**Removal of other materials**
Woodpiles, wooden sheds, combustible material, storage areas, large quantities of garden mulch, stacked flammable building materials etc. should be located away from the house. These items should preferably be located in a designated cleared location with no direct contact with bush fire hazard vegetation.

**Other protective features**
You can also take advantage of existing or proposed protective features such as fire trails, gravel paths, rows of trees, dams, creeks, swimming pools, tennis courts and vegetable gardens as part of the property’s APZ.

## PLANTS FOR BUSH FIRE PRONE GARDENS

When designing your garden it is important to consider the type of plant species and their flammability as well as their placement and arrangement.

Given the right conditions, all plants will burn. However, some plants are less flammable than others.

Trees with loose, fibrous or stringy bark should be avoided. These trees can easily ignite and encourage the ground fire to spread up to, and then through, the crown of the trees.

Plants that are less flammable, have the following features:

- high moisture content
- high levels of salt
- low volatile oil content of leaves
- smooth barks without "ribbons" hanging from branches or trunks; and
- dense crown and elevated branches.

When choosing less flammable plants, be sure not to introduce noxious or environmental weed species into your garden that can cause greater long-term environmental damage.

For further information on appropriate plant species for your locality, contact your local council, plant nurseries or plant society.

If you require information on how to care for fire damaged trees, refer to the Firewise brochure *Trees and Fire Resistance; Regeneration and care of fire damaged trees.*

## WIND BREAKS

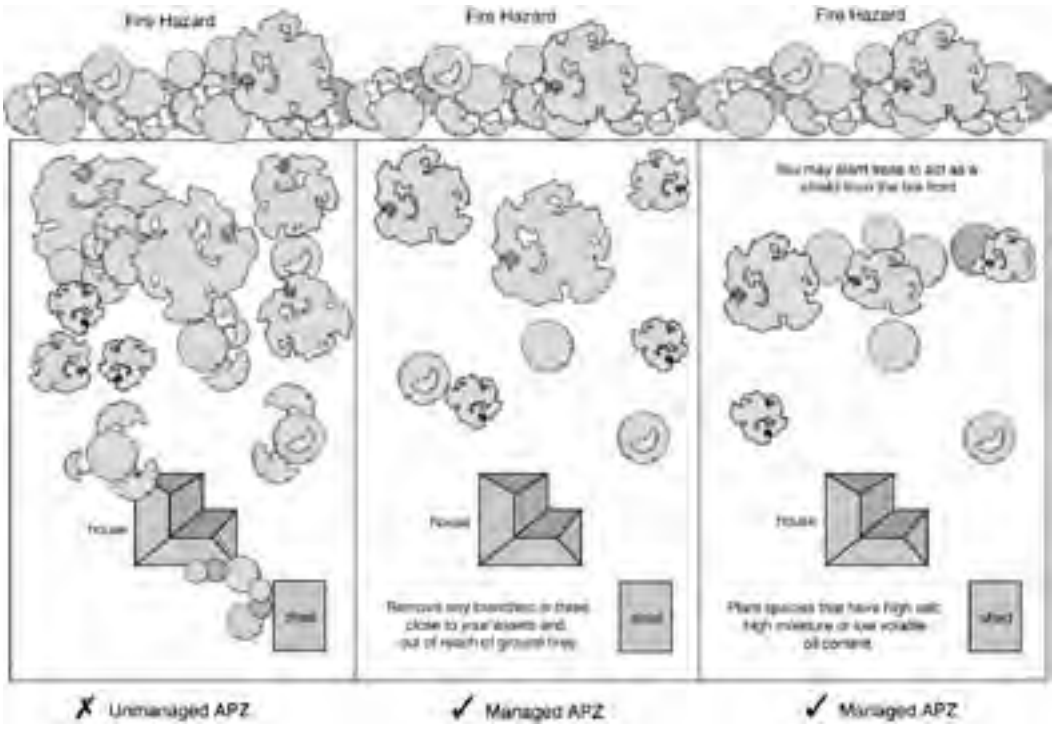
Rows of trees can provide a wind break to trap embers and flying debris that could otherwise reach the house or asset.

You need to be aware of local wind conditions associated with bush fires and position the wind break accordingly. Your local RFS Fire Control Centre can provide you with further advice.

When choosing trees and shrubs, make sure you seek advice as to their maximum height. Their height may vary depending on location of planting and local conditions. As a general rule, plant trees at the same distance away from the asset as their maximum height.

When creating a wind break, remember that the object is to slow the wind and to catch embers rather than trying to block the wind. In trying to block the wind, turbulence is created on both sides of the wind break making fire behaviour erratic.





## HOW CAN I FIND OUT MORE?

The following documents are available from your local Fire Control Centre and from the NSW RFS website at **www.rfs.nsw.gov.au.**

- Before You Light That Fire
- Standards for Low Intensity Bush Fire Hazard Reduction Burning
- Standards for Pile Burning
- Application Instructions for a Bush Fire Hazard Reduction Certificate

If you require any further information please contact:

- your local NSW Rural Fire Service Fire Control Centre. Location details are available on the RFS website or
- call the NSW RFS Enquiry Line 1800 679 737 (Monday to Friday, 9am to 5pm), or
- the NSW RFS website at **www.rfs.nsw.gov.au.**

**Produced by the NSW Rural Fire Service, Locked Mail Bag 17, GRANVILLE, NSW 2142. Ph. 1800 679 737**
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# CLEARY-2021-13 APPENDIX C

## APPENDIX 3 OF *PBP-2019* (ACCESS ROAD REQUIREMENTS FOR FIREFIGHTING VEHICLES)

## PLANNING PROPOSAL AND SUBDIVISION

## LOTS 1 & 2//1093448,
## 218 EAST BANK ROAD,
## CORAMBA.

# APPENDIX 3

## ACCESS

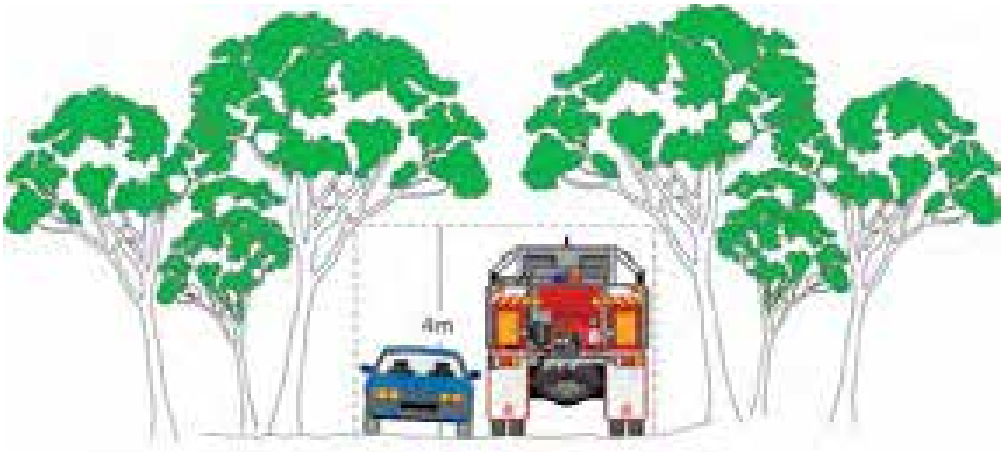
This appendix provides design principles for emergency service vehicle access.

### A3.1 Vertical clearance

An unobstructed clearance height of 4 metres should be maintained above all access ways including clearance from building construction, archways, gateways and overhanging structures (e.g. ducts, pipes, sprinklers, walkways, signs and beams). This also applies to vegetation overhanging roads.

### Figure A3.1

Vertical clearance.




### A3.2 Vehicle turning requirements

Curved carriageways should be constructed using the minimum swept path as outlined in Table A3.2.

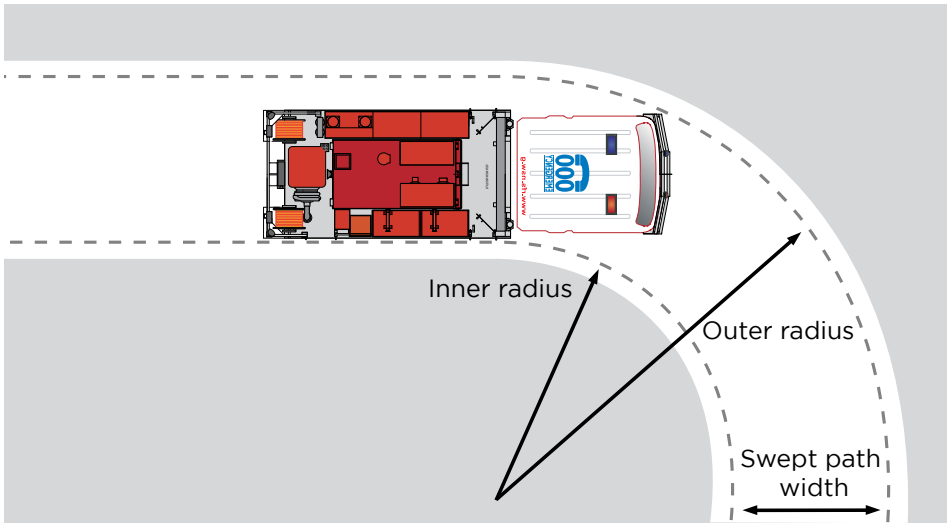
### Table A3.2

Minimum curve radius for turning vehicles.

| Curve radius (inside edge in metres) | Swept path (metres width) |
|---|---|
| < 40 | 4.0 |
| 40 - 69 | 3.0 |
| 70 - 100 | 2.7 |
| > 100 | 2.5 |

## Figure A3.2a

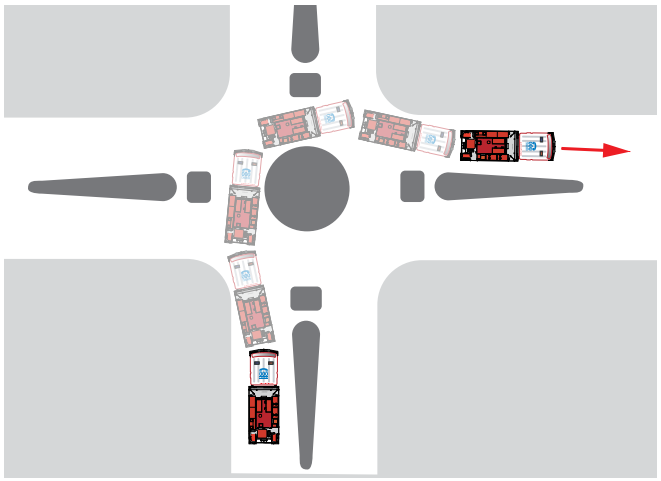
Swept path width for turning vehicles.




The radius dimensions given are for wall to wall clearance where body overhangs travel a wider arc than the wheel tracks (vehicle swept path). The swept path shall include an additional 500mm clearance either side of the vehicle.

## Figure A3.2b

Roundabout swept path.



Example of a swept path as applied to a roundabout. The distance between inner and outer turning arcs allows for expected vehicle body swing of front and rear overhanging sections (the swept path).

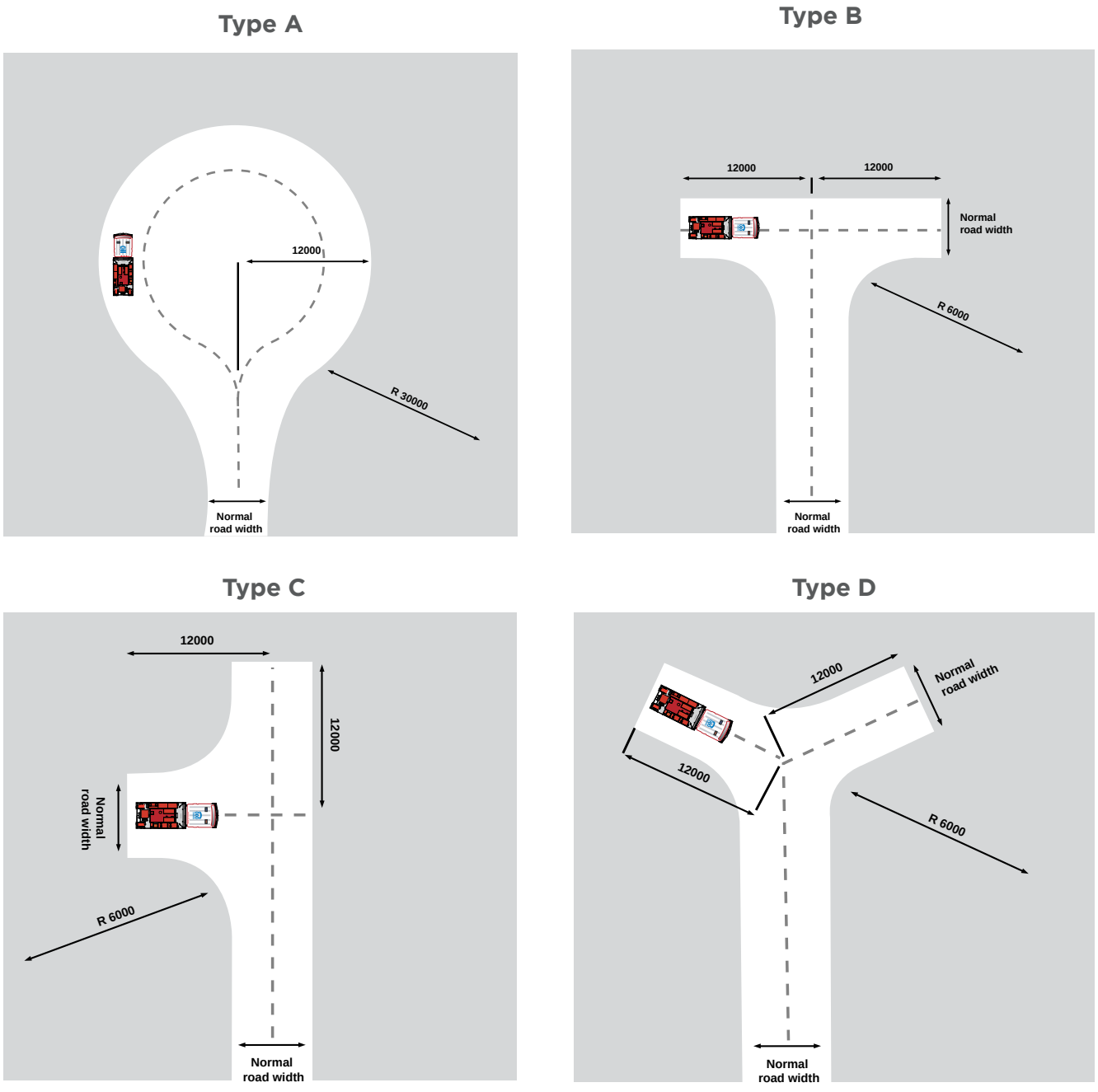
## A3.3 Vehicle turning head requirements

Dead ends that are longer then 200m must be provided with a turning head area that avoids multipoint turns. “No parking” signs are to be erected within the turning head.

The minimum turning radius shall be in accordance with Table A3.2. Where multipoint turning is proposed the NSW RFS will consider the following options:

### Figure A3.3

Multipoint turning options.



## A3.4 Passing bays

The construction of passing bays, where required, shall be 20m in length and provide a minimum trafficable width at the passing point of 6m.

## Figure A3.4

Passing bays can provide advantages when designed correctly. Poor design can and does severely impede access.

## A3.5 Parking

Parking can create a pinch point in required access. The location of parking should be carefully considered to ensure fire appliance access is unimpeded. Hydrants shall be located outside of access ways and any parking areas to ensure that access is available at all times.

## Figure A3.5

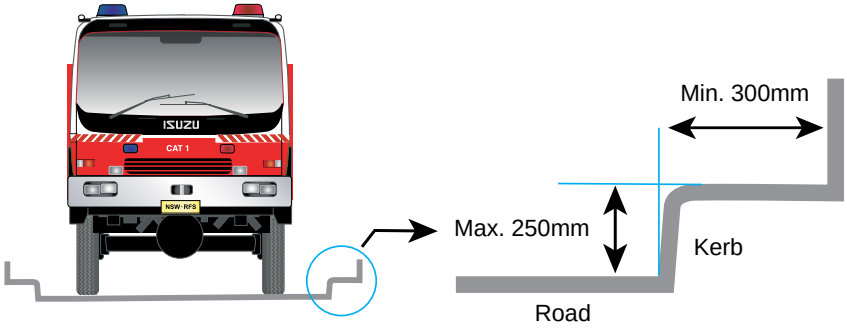
Hydrants and parking bays.

## A3.6 Kerb dimensions

All kerbs constructed around access roads should be no higher than 250mm and free of vertical obstructions at least 300mm back from the kerb face to allow clearance for front and rear body overhang.

### Figure A3.6

Carriageway kerb clearance dimensions.




## A3.7 Services

Hydrant services should be located outside the carriageway and parking bays to permit traffic flow and access. Setup of standpipes within the carriageway may stop traffic flow. Hydrant services shall be located on the side of the road away from the bush fire threat where possible.

## A3.8 Local Area Traffic Management (LATM)

The objective of LATM is to regulate traffic an acceptable level of speed and traffic volume within a local area.

Traffic engineers and planners should consider LATM devices when planning for local traffic control and their likely impact on emergency services. LATM devices by their nature are designed to restrict and impede the movement of traffic, especially large vehicles.

Where LATM devices are provided they are to be designed so that they do not impede fire vehicle access.

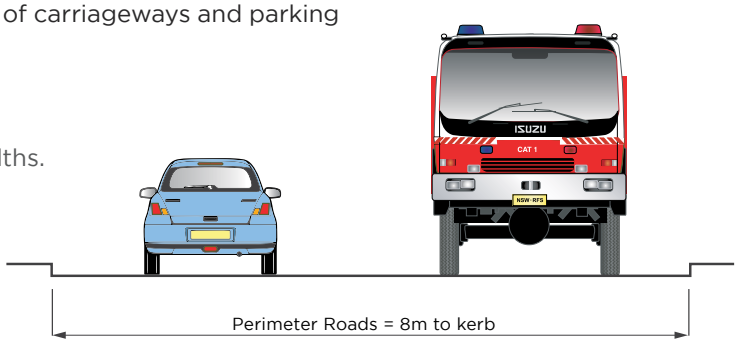
## A3.9 Road types

### A3.9.1 Perimeter Roads

Perimeter roads are to be provided with a minimum clear width of 8m. Parking and hydrants are to be provided outside of carriageways. Hydrants are to be located outside of carriageways and parking areas.

**Figure A3.9a**

Perimeter road widths.

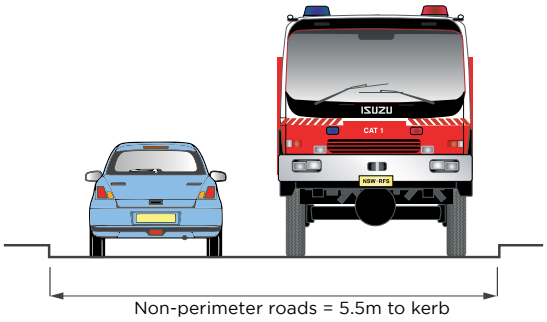



### A3.9.2 Non-perimeter Roads

Non-perimeter roads shall be provided with a minimum clear width of 5.5m. Parking is to be provided outside of the carriageway and hydrants are not to be located in carriageways or parking areas.

**Figure A3.9b**

Non-perimeter road widths.




### A3.9.3 Property access

Property access roads are to be a minimum of 4m wide.

**Figure A3.9c**

Property access road widths.

# Preliminary Environmental Site Assessment - 218 East Bank Road, Coramba

22 July 2022

For: Jim Cleary

Authored by: Strider Duerinckx

| Ref | Ver | Date | Distribution |
|---|---|---|---|
| 2021-204-04 | A | 22/7/22 | Client |
| | | | |

# Table of Contents

**Tables**



**Figures**



**Appendices**

# 1 Introduction

Earth Water Consulting Pty Limited (EWC) was engaged by  (the "Client") to undertake a Preliminary Environmental Site Assessment (PESA) for 218 East Bank Road, Coramba (the "Site") (Figure 1).

The PESA was requested by Coffs Harbour City Council (CHCC) due to a former landfill that was located offsite to the Southwest of the Site.

## 1.1 Objectives

The objectives of the PESA are to:

- Investigate the Site history and identify potentially contaminating activities that are currently being performed on the Site or neighbouring properties, or that may have been performed in the past; and
- Make a preliminary assessment of potential contamination issues for residential development based on the Site history review.

## 1.2 Suitability to Undertake Works

Strider Duerinckx has project managed and signs off on this investigation. Strider is an environmental geologist with 25 years experience in contaminated sites investigations. Strider is a CEnvP (Site Contamination Specialist) accredited.

# 2 Proposed Development

Based on plans of the proposed subdivision layout by Lane Metrics Pty Ltd, it is proposed to develop 15 residential bocks on the Site as follows in **Table 1** and shown in Figure 2.

**Table 1: Property Details**

| Lot & DP | Existing Size (m2) | Proposed No. of Lots | Lot IDs | Proposed Lot Sizes (ha) |
|---|---|---|---|---|
| **L1 & L2 DP1093448** | L1: 100,700<br>L2: 103,800<br>Total: 204, 500 | 15 | 1-15 | 8,700m$^2$ – 23,000m$^2$ |

# 3 Scope of Work

The PESA has been undertaken in reference to the relevant sections in the *Consultants Reporting on Contaminated Land* (NSW EPA 2020), and Department of Urban Affairs and Planning *Managing Land Contamination – Planning Guidelines SEPP55 – Remediation of Land* (DUAP & EPA 1998).

The assessment included:

- A desktop review of historical conditions and activities on the Site including:

  - Historical aerial photographs review (to map change in use over time);
  - NSW EPA contaminated land and POEO notices and records (onsite or offsite contamination presence or significant activities);
  - Historical ownership records;
  - Review of geology and hydrogeology including groundwater bores (risk of contamination migration); and
- A walkover of the Site to assess current layouts, surface conditions, presence of hazardous building materials that may result in subsurface contamination, and the presence of any obvious previous contaminating activities (such as current or historical fuel storage); and
- Collection of 3 check soil samples and analysis for heavy metals (As and Pb), OCP and OPP pesticides; and
- Collection of 2 water samples and analysis for a suite of wastewater contaminants including suspended and dissolved solids, organic carbon, potassium, ammonia, coliforms and pH; and
- Presentation of a PESA report detailing the results of the desktop review and site walkover, analytical results in comparison to guidelines, and assessment of contamination risks, conclusions regarding the contamination status of the Site, and recommendations for further investigations (if required).

# 4 Site Description

## 4.1 Site Identification

The Site is primarily located on the southern side of East Bank Road, with a small portion on the corner of East Bank Road and Moses Close.  and is zoned RU2 Rural Landscape. Surrounding land to the north and south is zoned RU2, with State Forest to the east, and RU2, R5 Large Lot Residential and C2 Environmental Conservation to the west.

## 4.2 Location and Features

The property is flanked on the east by Orara East State Forest, and otherwise bordered by private properties. The North Coast rail line runs approximately 700 metres to the west, and the Orara River approximately 1,500 metres to the west).

The property is a combination of cleared zones and forested areas, with ridge and gully systems which generally drain to the northwest. The southern portion of the property is dominated by an elevated ridgeline, which continues through the centre of the property to the northwest until it meets the road edge. The existing dwelling and other structures are located midslope on this ridgeline, and stables, arena and yards for horses further downslope. The proposed access road for the development will track along this ridgeline.

The proposed disturbance zones for dwellings and wastewater are located in the existing cleared areas.

## 4.3 Surrounding Land Use

The surrounding land use is detailed in **Table 2**.

**Table 2: Surrounding Landuse**

| North | South | East | West |
|---|---|---|---|
| Rural residential, grazing land and native vegetation patches | Dense native vegetation, a cemetery and a fire Road linking the State Forest | Orara East State Forest and mountain range of dense native vegetation | Rural residential, grazing land and native vegetation |

# 5 Site Inspection

Site inspections were undertaken on 23 June 2022 by staff of EWC. During the inspection of the proposed building envelopes it was noted that:

- No concrete slab pieces and pipes, and no visible signs of Asbestos Containing Material (ACM) such as Fibro Cement sheeting (FC) were observed;
- No other signs of disturbance were observed such as filling; and
- No chemical storage areas were visible

Typical Site details are shown the following photographs.

Photograph 1 – Looking west-northwest from proposed Lot 13 at Moses Close in the background.

Photograph 2 – Looking southwest from proposed Lot 4 towards the sampled dam.

Photograph 3 – Looking southeast across Proposed Lots 6-9.

Photograph 4 – Looking northeast from Lot 15, with Lots 13-14 in the distance.

Photograph 5 – Looking northwest from proposed Lot 5-6 at the primary dwelling in the background.

Photograph 6 – Looking northwest across proposed Lot 5 with the first series dam in the background.

# 6 Geology, Hydrogeology and Topography

## 6.1 Topography

The lowest point of the property is on the north-western segment boundary corner at approximately 110mAHD, and the highest point is on the southern corner boundary at approximately 140mAHD.

## 6.2 Geology

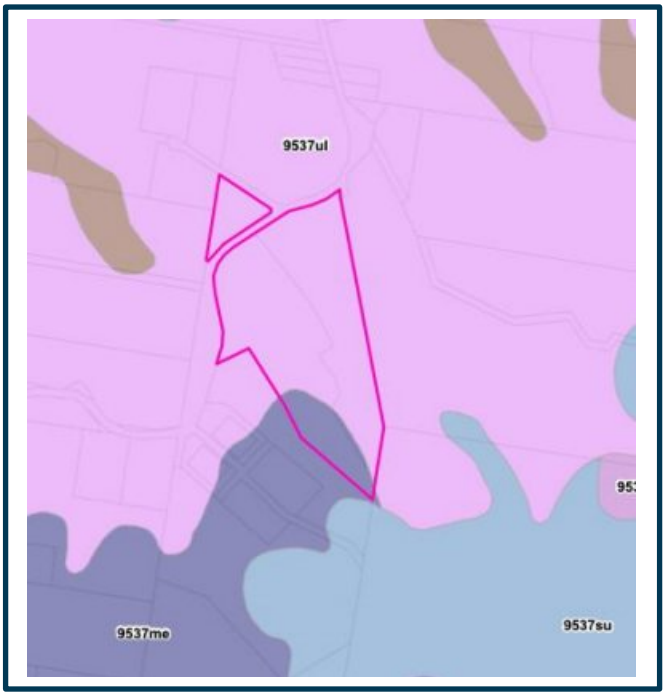
The property is underlain by the Coramba beds of the Coffs Harbour Association. The geology comprises Lithofeldspathic wacke, minor siltstone, siliceous siltstone, mudstone, metabasalt, chert & jasper, rare calcareous siltstone & felsic volcanics.

## 6.3 Soils

We reviewed the NSW eSpade Soil Landscape Database (NSW Department of Planning, Industry and Environment) (DPIE), which indicates that the Site is underlain by two dominant soil landscapes (**Table 3**) and **(**Photograph 7**)**.

**Table 3: Soil Landscapes**

| Soil Landscape | Type | Typical Profile | Limitations |
|---|---|---|---|
| **Ulong** (9537ul) | Erosional | Moderately deep to deep (>100 cm) well-drained. | Strongly to very strongly acid soils with strong sodicity, low wet bearing strength and subsoil aluminium toxicity potential. |
| **Megan** (9537me) | Erosional | Moderately deep to deep (>100 cm) well-drained. | Strongly acid, stony (localised) soils of high erodibility, aluminium toxicity potential and low subsoil fertility. |



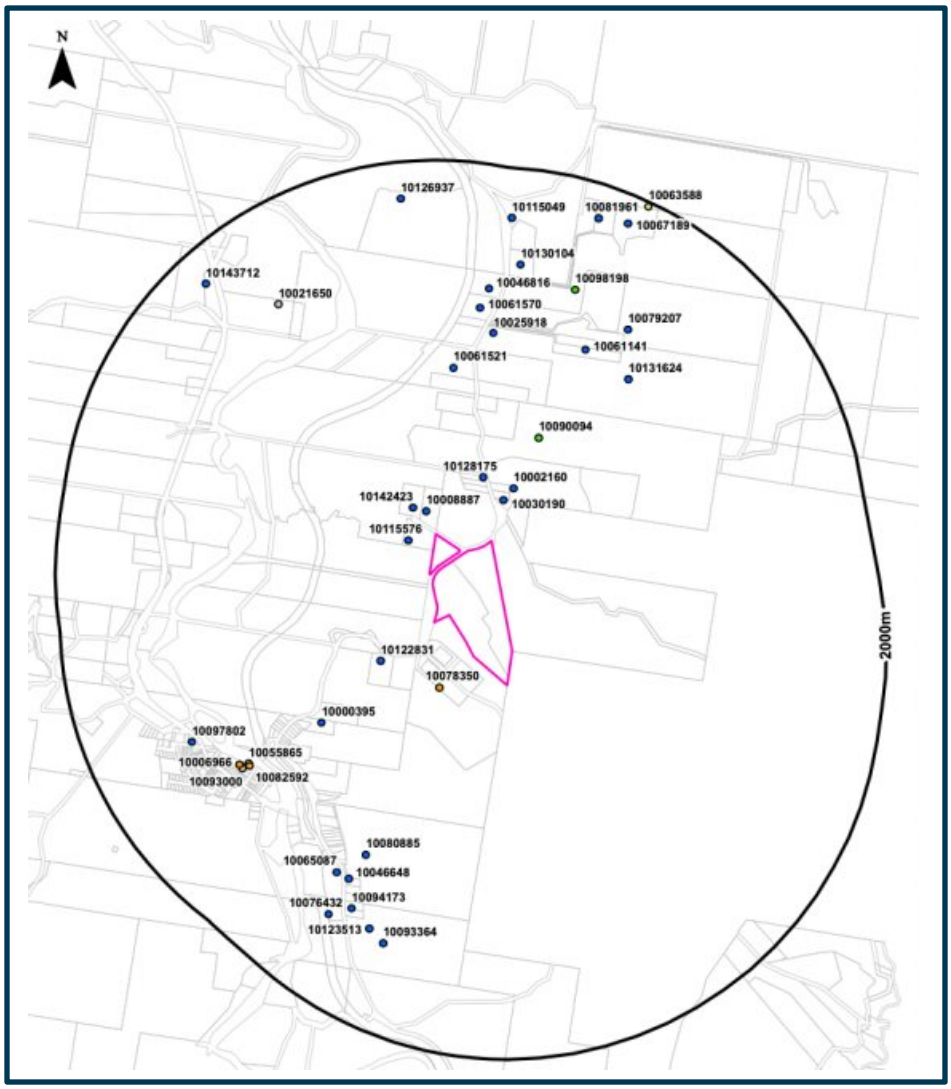

Photograph 7: Site soil landscapes

## 6.4 Hydrogeology

A NSW Office of Water Groundwater Bore Search was completed. The closest registered groundwater bore is located approximately 129m northwest of the Site (GW300596). The bore was drilled in 1995 and dug to 38m depth, with a water bearing zone between 30-38m, and was licensed for water supply. Licensed groundwater bores within a 2000m radius are displayed in Photograph 8**.**

Groundwater aquifers are mapped as fractured or fissured, extensive aquifers of low to moderate productivity

Regional groundwater is not expected to be impacted by historical activities on the Site, and contaminated groundwater is not expected to be flowing onto the Site from up hydraulic gradient sources.




Photograph 8: Licensed groundwater bores

# 7 Site History

## 7.1 Previous Environmental Investigations

No previous environmental investigations are known to have been undertaken on the Site.

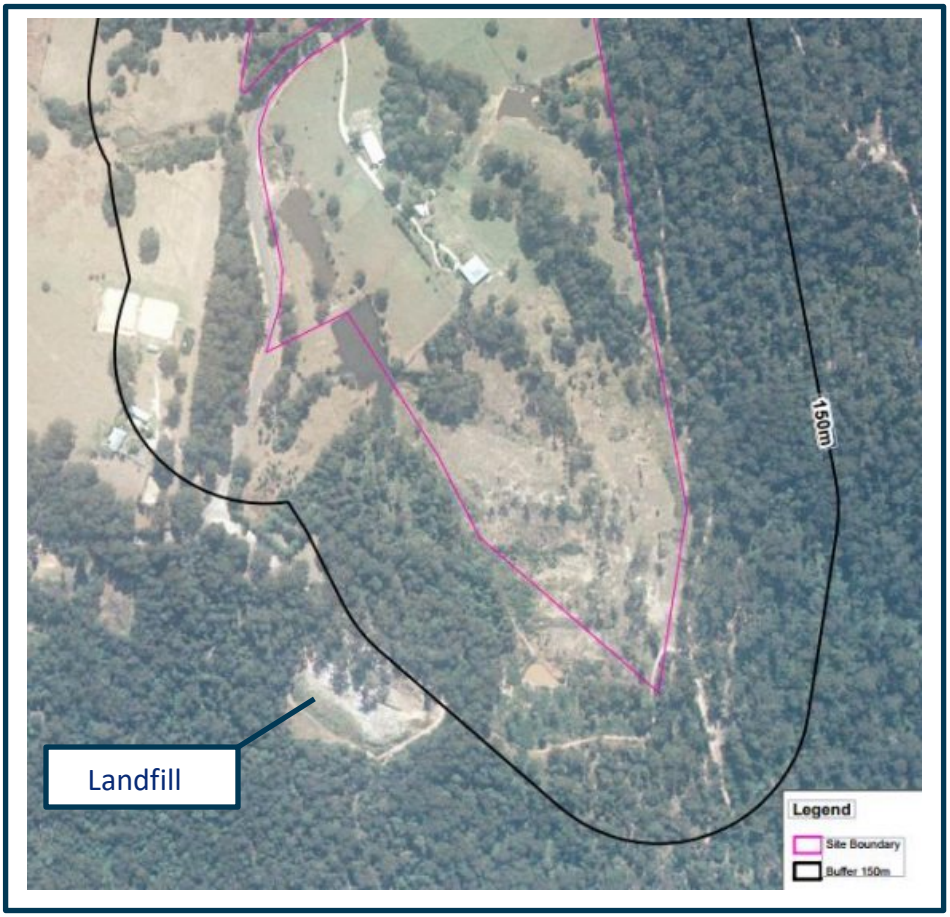
## 7.2 Aerial Photographs

A review of aerial photographs from 1954-2021 was undertaken. The observations are summarised in Table 4 and the aerials are included in Appendix A.

**Table 4: Aerial Photograph Review**

| Year | Site | Surrounding Land |
|---|---|---|
| 1954 | The majority of the Site has been cleared with dense vegetation remaining at the south-eastern corner. A prominent access links East Bank RD and runs along the ridgeline to the southeast of the Site. A few small to medium structures are present in a compound midway adjacent to the access. A dam is located midway on the western boundary. | Undeveloped bushlands surround the Site to the south-west, south and east. Cleared properties are located to the west and north of the Site. Access trails lead into the current State Forest. |
| 1964 | Vegetation regrowth in the southern portion of the Site. The remaining property likely under grazing. | As per 1954. |
| 1974 | Vegetation regrowth in intermittent drainages and paddock clearing of regenerated forest in the northern allotment. | Vegetation regrowth in intermittent drainages. Construction of dwelling and associated shed in property to the west. Cemetery to the southwest. Area cleared for waste transfer station/landfill to the south-east of the cemetery. |
| 1989 | The majority of vegetation in the southern portion of the Site has been cleared. Construction of primary dwelling and shed structures. Construction of dam towards the northeast corner and on the north-western boundary. | Construction of several dwellings and minor clearing. Development of |
| 1994 | As per 1989. | As per 1989. |
| 2004 | Construction of riding arenas. | As per 2004. Clearing at former landfill still visible. Structures visible (waste transfer?) in NW corner of that area. |
| 2013 | As per 2004. | Logging of the State Forest to the east. Construction of a dwelling adjacent to the western border. |

| Year | Site | Surrounding Land |
|---|---|---|
| 2021 | Clearing of a vegetation band along the ridgeline in the southern portion. | As per 2013. Bitumen ring road and multiple roofs present in the NW corner. |




Photograph 9: 1989 aerial photograph with possible former landfill to SW.

## 7.1 Historical Mapped Layout

EWC accessed a copy of 1942, 1974 and 2015 topographic maps of the area via the Lotsearch database:

- The 1941 topographic map shows the Site as cleared land as per the 1954 aerial photograph. No structures are mapped.
- The 1974 topographic map shows a similar layout to 1941 but with a structure present on Site; and
- The 2015 topographic map shows an additional two structures on Site, and medium lot residential to the north.

## 7.2 NSW EPA Records

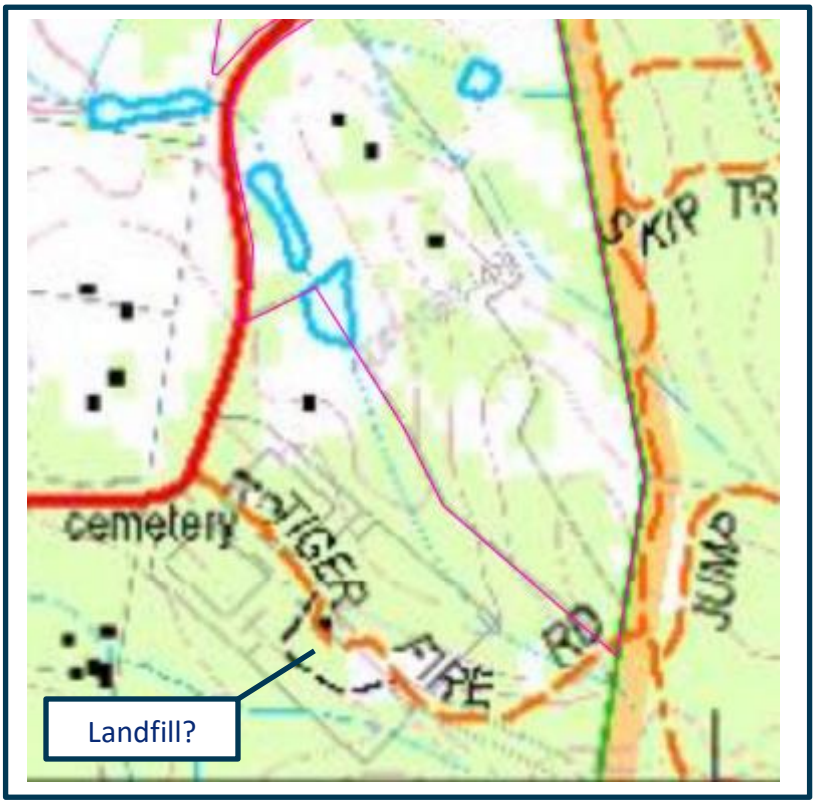
A search of the NSW EPA's contaminated land record revealed no investigation or remediation notices have been issued on the property or adjacent lots for contamination or 'significant risk of harm' under Section 58 of the Contaminated Land Management Act 1997.

A search of the public register under Section 308 of the Protection of the Environment Operations Act (POEO) indicated that no current and recently surrendered licenses have been held for potentially contaminating activities on the property or adjacent lots.

## 7.3 Other Contaminating Sites

Accessing the Lotsearch database, the properties are not listed as any Defence sites, former gasworks, PFAS contaminated, loose fill asbestos insulation registered, cattle tick dip, dry cleaners, fire rescue, gas terminals, liquid fuel depots, active mines or quarries, derelict mines, petrol stations, power stations, electrical substations, telephone exchanges, or wastewater treatment facilities, nor are any located in the vicinity.

There are no public records showing the location of the former landfill, only Council internal files that have not been released to EWC. Given its small size and limited operation in time, the landfill was likely unlined with minimal leachate controls. The former landfill appears to have been located on a parallel ridgeline to the Site, separated by an intermittent unnamed gully. The groundsurface slope from the former landfill is l sloping down to the west, indicating that leachate runoff/seepage risks are to the west away from the Site (Photograph 10).




Photograph 10: 2015 Topographic Map with possible former landfill to SW.

## 7.4 Adjacent Business Operations

No onsite or nearby dry cleaners, service stations or motor garages have been registered on the Site or mapped to a premise or road intersection in the historical business directories register database

## 7.5 Cattle Dips

No cattle dips have been mapped within the dataset buffer (NSW DPI).

## 7.6 Banana Cultivation

No banana cultivation has been mapped as occurring between 1943-1994 on or nearby the Site within the CHCC database.

## 7.7 Historical ownership

A search of historical owners was undertaken of the properties. These are summarised in **Table 5**, and the results are included in Appendix B.

**Table 5: Historical Ownership – Lot 2**

| Date | Detail |
|---|---|
| 10.09.1926<br>(1926 to 1968) | Thomas Peter Hope |
| 21.10.1968<br>(1968 to 1970) | Kathleen Edith Hope (Married Woman) |
| 27.02.1970<br>(1970 to 1977) | Cherie Investments Pty. Limited |
| 18.03.1977 | Cherie Investments Pty. Limited |
| 10.11.1980<br>(1980 to 1985) | James Patrick Cleary (Police Officer)<br>Jennifer Ann Cleary (Married Woman) |
| 30.04.1985<br>(1985 to 1985) | James Patrick Cleary |
| 20.06.1985<br>(1985 to Current) | James Patrick Cleary<br>Linda Fay Young |

## 7.8 Summary of Site History

The information obtained from the site history review can be summarised as follows:

- Prior to 1954 the majority of the Site was cleared with structures already present;
- Phases of vegetation regrowth and clearing subsequently followed;
- Clearing for a possible waste transfer station and landfill was erected in the 1970's upgradient to the southwest of the Site;
- The property was purchased by the Cleary family in 1980;

- No further major changes have occurred to present.

# 8 Potential Areas and Contaminants of Concern

Based on the site history and a walkover, the Areas of Environmental Concern (AECs) and associated Contaminants of Concern (CoC) for the Site have been identified. The identified AECs/CoCs are summarised in **Table 6**.

Section 4.3 and Table 4 of The NSW EPA Solid Waste Landfills Guidelines (2016) provides general parameters to assess in creeks around landfills. These have been adopted as CoCs at the Site.

**Table 6: Areas of Environmental Concern**

| AEC | Potential Contam. Activity | CoC | Likelihood | Comment |
|---|---|---|---|---|
| **1** | General activities and grazing across majority of the Site | Heavy Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), OCP, OPP | Very Low | Grazing land may occasionally contain residual heavy metals (eg arsenic) and OCP pesticides. |
| **2** | Offsite landfill transfer facility | Leachate derived runoff incl suspended and dissolved solids, potassium, ammonia nitrogen, pH, EC, DO and coliforms. | Very Low | Potential runoff and leaching into creek drainage. |

# 9 Sampling Program

In order to confirm the very low risk of potential surface contamination due to grazing activities, three (3) soil check samples were collected from three locations across the Site (S-1 to S-3). These were analysed for heavy metals and OCP/OPP pesticides.

In order to confirm the risk of potential runoff and leaching contamination due to the activities of the landfill/waste transfer facility in the headwaters of the Site, two (2) water samples were collected from two locations, one from the gully that drains past the facility into dams on the southwestern portion of the Site (W-2) and one from a background creek along the northeastern portion of the Site outside the zone of influence (W-1). Field parameters were collected insitu for pH, EC and dissolved oxygen, and laboratory analyses were undertaken for suspended and dissolved solids, total organic carbon, potassium, ammonia nitrogen, pH and coliforms.

## 9.1 Investigation Criteria

The soil sample results were compared to the following investigation levels and limits for standard residential land use:

- Health-based investigation levels (OCP, Arsenic and Lead) for standard residential sites (HIL A) provided in NEPM (NEPC 2013) Guidelines; and
- Environmental investigation levels (EILs) (Arsenic, Lead and DDT) provided in NEPM (NEPC 2013) Guidelines.

The soil investigation criteria are included in the attached summary Table LR1.

No specific thresholds exist relating to water impacted by solid waste landfill, instead the methodology recommended by NSW EPA (2016) guidelines is to undertake repeated measurements to assess for changes over time, and to compare background to impacted conditions. ANZECC (2000) guidelines provide for default trigger values for rivers and creeks in SE Australia, which are utilised as representative of general conditions.

The water investigation criteria are included in the attached summary Table LR2.

## 9.2 Sampling Methodology

Soil samples were collected from 0-75mm depth into laboratory supplied glass jars with Teflon lids and stored in a chilled esky. Water samples were collected in laboratory supplied containers suitable for the analyses to be undertaken and stored in a chilled esky. All sampling equipment was decontaminated between sample collection, and disposable gloves were worn and changed between samples.

Samples were forwarded under Chain of Custody conditions at Coffs Harbour Laboratory for analysis. The laboratory reports are included in Appendix C.

## 9.3 Soil Results

The sampling locations are presented in Figure 3. The analytical results are summarised in Table LR1, and laboratory report is included in Appendix C. Comparison of soil concentrations to the investigation criteria indicated that:

- Concentrations of heavy metals were reported well below the HIL A and EIL investigation criteria for all samples analysed; and
- Concentrations of OCP and OPP were reported below the laboratory Limit of Reporting (LOR) for all samples analysed.

## 9.4 Water Results

The water sampling locations are presented in Figure 3. The analytical results are summarised in Table LR2, and laboratory report is included in Appendix C. Comparison of soil concentrations to the investigation criteria indicated that:

- In comparison to the background creek sample, the runoff creek sample was recorded with slightly higher concentrations of TDS, ammonia, and EC, but lower concentrations of TSS, TOC, potassium and TCol;

- Relative to thresholds EC was reported within expected background ranges and below expected pH in both locations (naturally acidic). Dissolved oxygen was positive indicating oxygenating conditions.

## 9.5 Discussion of Results

The field and analytical results indicate that historical landuse has not resulted in gross soil contamination for common contaminants with long term soil residence rates.

Creek sampling is difficult to interpret due to the high variability of creek runoff water quality. Both the background and impacted creek analytical results are representative of general creek conditions, and no obvious leachate pollution is noted.

Given the position of the former landfill on a ridgeline separated from the Site with an incised gully between, plus fine grained bedrock that is impermeable with a limited groundwater aquifer, groundwater impacts are not suspected at the Site.

# 10 Conclusions and Recommendations

A Preliminary Environmental Site Assessment has been undertaken at 218 East Bank Road, Coramba. The historical desktop review and site inspection shows that there is a low risk of significant contamination being present that would preclude the proposed residential subdivision development of the Site.

The PESA has identified that the subject property was developed and partially cleared prior to 1958, and likely used for limited cattle grazing and horse use for the entirety of this time. There is a low risk of residual contamination from cattle grazing. The PESA has identified that potential runoff and leaching due to activities of the former landfill and waste transfer facility located offsite to the southwest are negligible, and there is a low risk of contamination (if present) from this facility impacting the Site.

Based on this PESA it is concluded that the Site is suitable for the proposed residential subdivision without further investigation.

# 11 References

ANZECC/ARMCANZ. 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment Conservation Council 2000.

NEPC. 2013. National Environment Protection (Assessment of Site Contamination) Measure. Schedule B1-Schedule B1 Guideline on Investigation Levels For Soil and Groundwater. National Environment Protection Council.

NSW EPA. 2016. Environmental Guidelines Solid Waste Landfills. NSW Environment Protection Authority. 2nd Ed.

# TABLES

## Table LR1: Summary of Soil Discrete Analytical Results

| Sample ID | Units | LOR | | | S-1 | S-2 | S-3 |
|---|---|---|---|---|---|---|---|
| Date Collected | | Eurofins | NEPM | | 23/06/2022 | | |
| Depth Collected | | | HIL (A) | EIL | 0-75 | 0-75 | 0-75 |
| | | | | | | | |
| **% Moisture** | % | 1 | - | - | | | |
| **Heavy Metals** | | | | | | | |
| Arsenic | mg/kg | 2 | 100 | 100 | 1.3 | 2.4 | 2.3 |
| Cadmium | mg/kg | | 20 | - | <0.5 | <0.5 | <0.5 |
| Chromium | mg/kg | | 100 | 190 | 3.3 | 7.1 | 8.4 |
| Copper | mg/kg | | 6,000 | 80 | 4.4 | 4.4 | 3.5 |
| Lead | mg/kg | 5 | 300 | 1100 | 3.8 | 4.1 | 4.3 |
| Mercury | mg/kg | | 40 | - | <0.2 | <0.2 | <0.2 |
| Nickel | mg/kg | | 400 | 25 | 1.1 | 1.9 | 1.8 |
| Zinc | mg/kg | | 7,400 | 570 | 15 | 8.3 | 8.8 |
| **Organochlorine Pesticides** | | | | | | | |
| Hexachlorobenzene (HCB) | mg/kg | 0.01 | - | - | <0.01 | <0.01 | <0.01 |
| Heptachlor | mg/kg | 0.01 | - | - | <0.01 | <0.01 | <0.01 |
| Heptachlor Epoxide | mg/kg | 0.01 | - | 180 | <0.01 | <0.01 | <0.01 |
| Aldrin | mg/kg | 0.01 | - | - | <0.01 | <0.01 | <0.01 |
| gamma BHC (Lindane) | mg/kg | 0.01 | - | - | <0.01 | <0.01 | <0.01 |
| alpha BHC | mg/kg | 0.01 | 6 | - | <0.01 | <0.01 | <0.01 |
| beta BHC | mg/kg | 0.01 | - | - | <0.01 | <0.01 | <0.01 |
| delta BHC | mg/kg | 0.01 | 50 | - | <0.01 | <0.01 | <0.01 |
| trans Chlordane | mg/kg | 0.01 | - | - | <0.01 | <0.01 | <0.01 |
| cis Chlordane | mg/kg | 0.01 | 240 | - | <0.01 | <0.01 | <0.01 |
| Oxychlordane | mg/kg | 0.01 | - | - | <0.01 | <0.01 | <0.01 |
| Dieldrin | mg/kg | 0.01 | 270 | - | <0.01 | <0.01 | <0.01 |
| DDE pp | mg/kg | 0.01 | | - | <0.01 | <0.01 | <0.01 |
| DDD pp | mg/kg | 0.01 | - | - | <0.01 | <0.01 | <0.01 |
| DDT pp | mg/kg | 0.01 | 10 | - | <0.01 | <0.01 | <0.01 |
| Endrin | mg/kg | 0.01 | - | - | <0.01 | <0.01 | <0.01 |
| Endrin aldehyde | mg/kg | 0.01 | - | - | <0.01 | <0.01 | <0.01 |
| Endrin Ketone | mg/kg | 0.01 | - | - | <0.01 | <0.01 | <0.01 |
| alpha Endosulfan | mg/kg | 0.01 | 6 | - | <0.01 | <0.01 | <0.01 |
| beta Endosulfan | mg/kg | 0.01 | - | - | <0.01 | <0.01 | <0.01 |
| Endosulfan sulphate | mg/kg | 0.01 | 10 | - | <0.01 | <0.01 | <0.01 |
| Methoxychlor | mg/kg | 0.01 | 300 | - | <0.01 | <0.01 | <0.01 |
| **Organophosphate Pesticides** | | | | | | | |
| Dichlorvos | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Demeton-S-methyl | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Diazinon | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Dimethoate | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Chlorpyrifos | mg/kg | 0.1 | 160 | - | <0.1 | <0.1 | <0.1 |
| Chlorpyrifos-methyl | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Malathion | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Fenthion | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Ethion | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Fenitrothion | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Chlorfenvinphos (E) | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Chlorfenvinphos (Z) | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Parathion Ethyl | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Parathion Methyl | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Pirimiphos Methyl | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Pirimiphos Ethyl | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Azinphos Methyl | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |
| Azinphos ethyl | mg/kg | 0.1 | - | - | <0.1 | <0.1 | <0.1 |

**Notes**

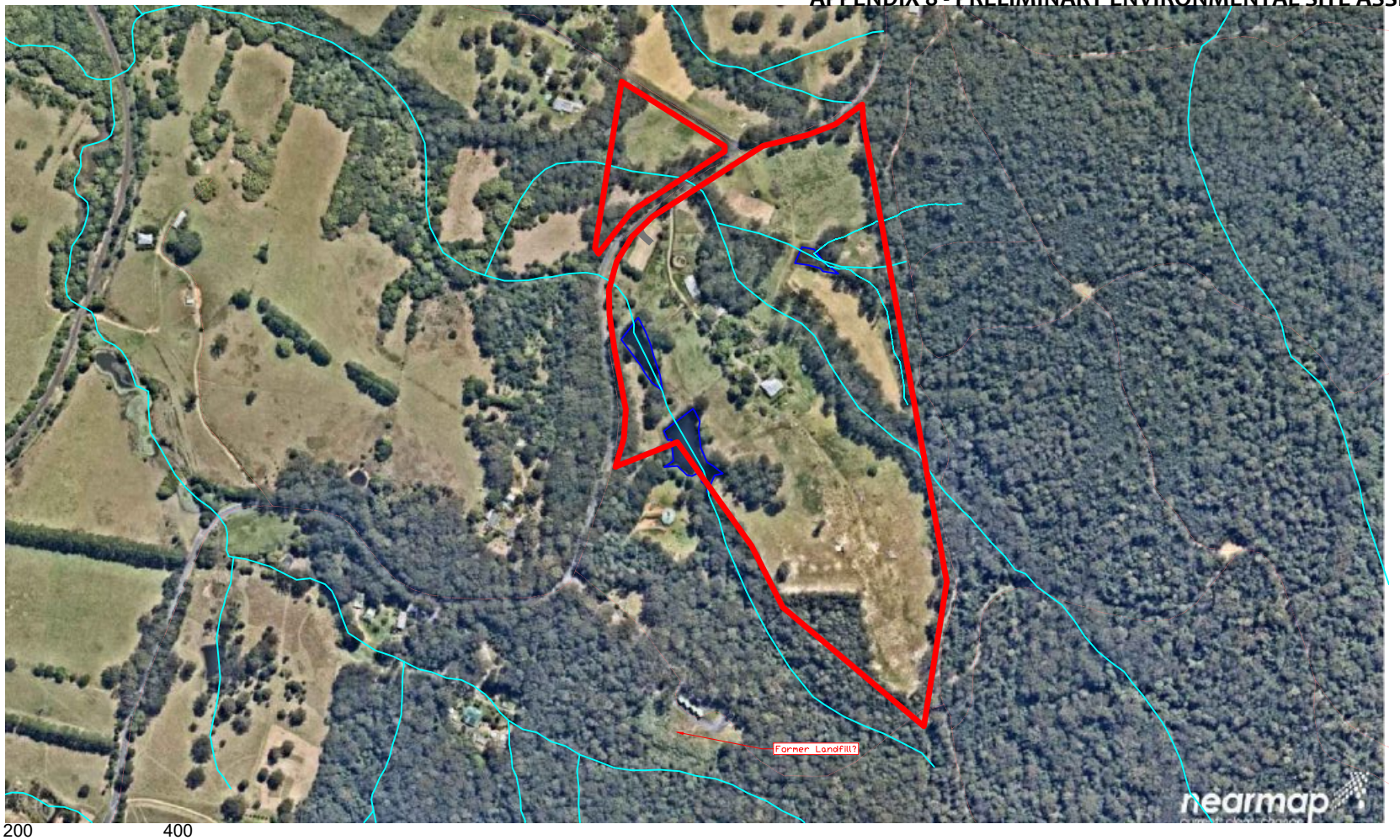
Indicates sample concentration exceeds investigation

Indicates sample concentration exceeds investigation criteria value by >250%

## Table LR2: Summary of Water Analytical Results

| Sample ID | Units | LOR | Investigation Criteria | | W-1 | W-2 |
|---|---|---|---|---|---|---|
| Date Collected | | CHL | ANZECC 2000 | | 23/06/2022 | |
| Location Collected | | | Table 3.3.2 and 3.3.3 | Table 3.4.1 | Background Creek | Landfill Creek |
| | | | | | | |
| Total Suspended Solids | mg/L | 2 | - | - | 19 | <2 |
| Total Dissolved Solids | mg/L | 0.5 | - | - | 33 | 120 |
| Total Organic Carbon | mg/L | 0.5 | - | - | 5.1 | 2.1 |
| Potassium | mg/L | 0.1 | - | - | 1.9 | 1.5 |
| Ammonia Nitrogen | mg/L | 0.02 | 0.01-0.04 | 0.3 | 0.03 | 0.1 |
| Total Coliforms | mpn/100ml | | - | | 1155 | 660 |
| pH | pH Unit | 0.1 | 6.5-8 | - | 6 | 5.2 |
| EC | uS/cm | 0.5 | 30-350 | - | 48.5 | 191 |
| Dissolved Oxygen | mg/L | 1 | - | - | >1 | >1 |

# FIGURES




0 200 400

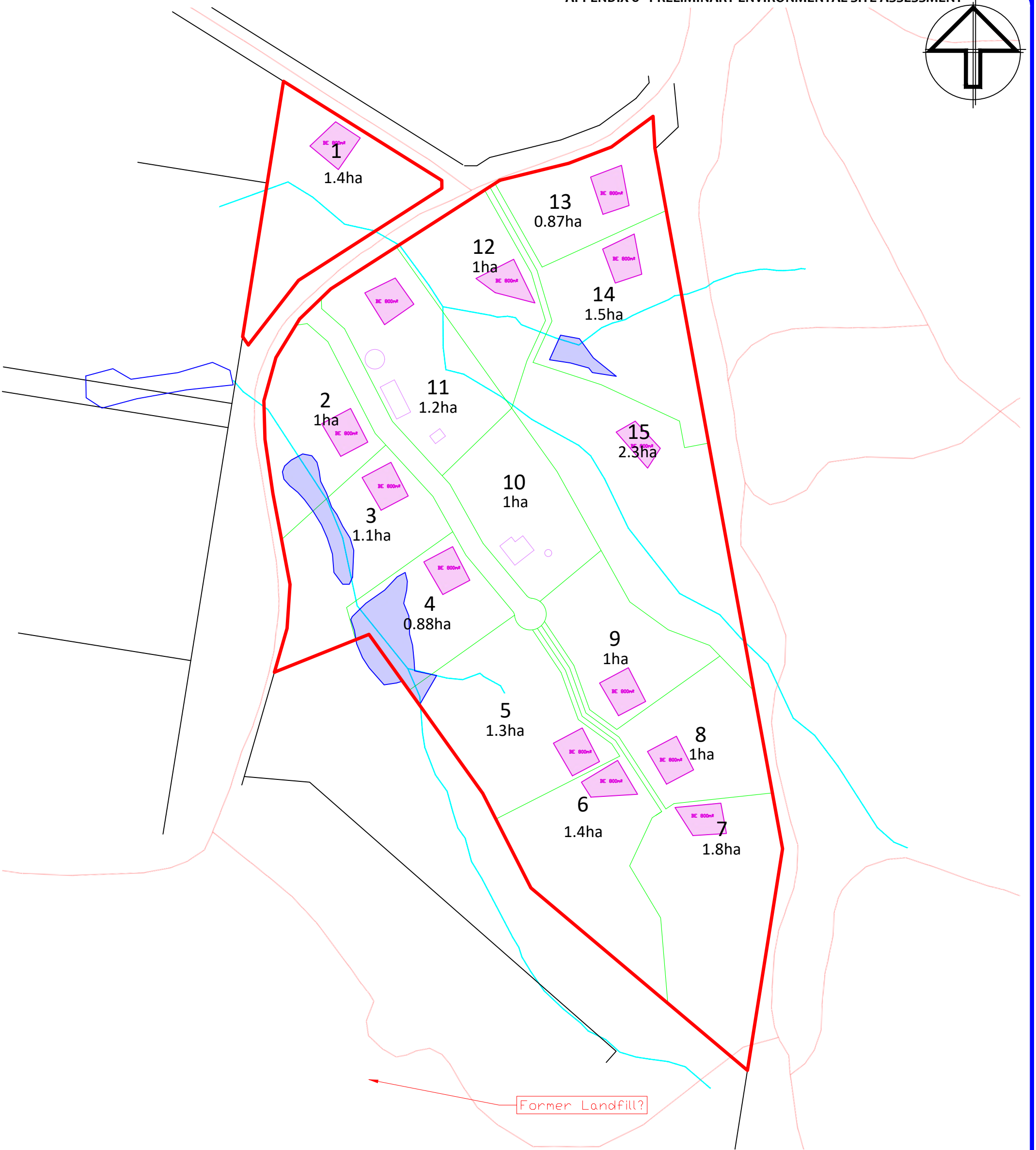
Horizontal Scale (metres) 1:8000

EARTH WATER CONSULTING

LEGEND

- Property Boundary
- Contour (10m)
- Drainage Alignment

| | | | | | |
|---|---|---|---|---|---|
| TITLE: Site Location | | | PROJECT: ESA for 218 East Bank Road Coramba | | CLIENT: Jim Cleary |
| FIGURE: Figure 1 | | | | | |
| SHEET: 1 OF 1 | ISSUE: A | AUTHOR: SD | DATE: 20/7/22 | SCALE: 1:8000 | PROJECT: 2021-204 |




0 50 100 150

Horizontal Scale (metres) 1:3000

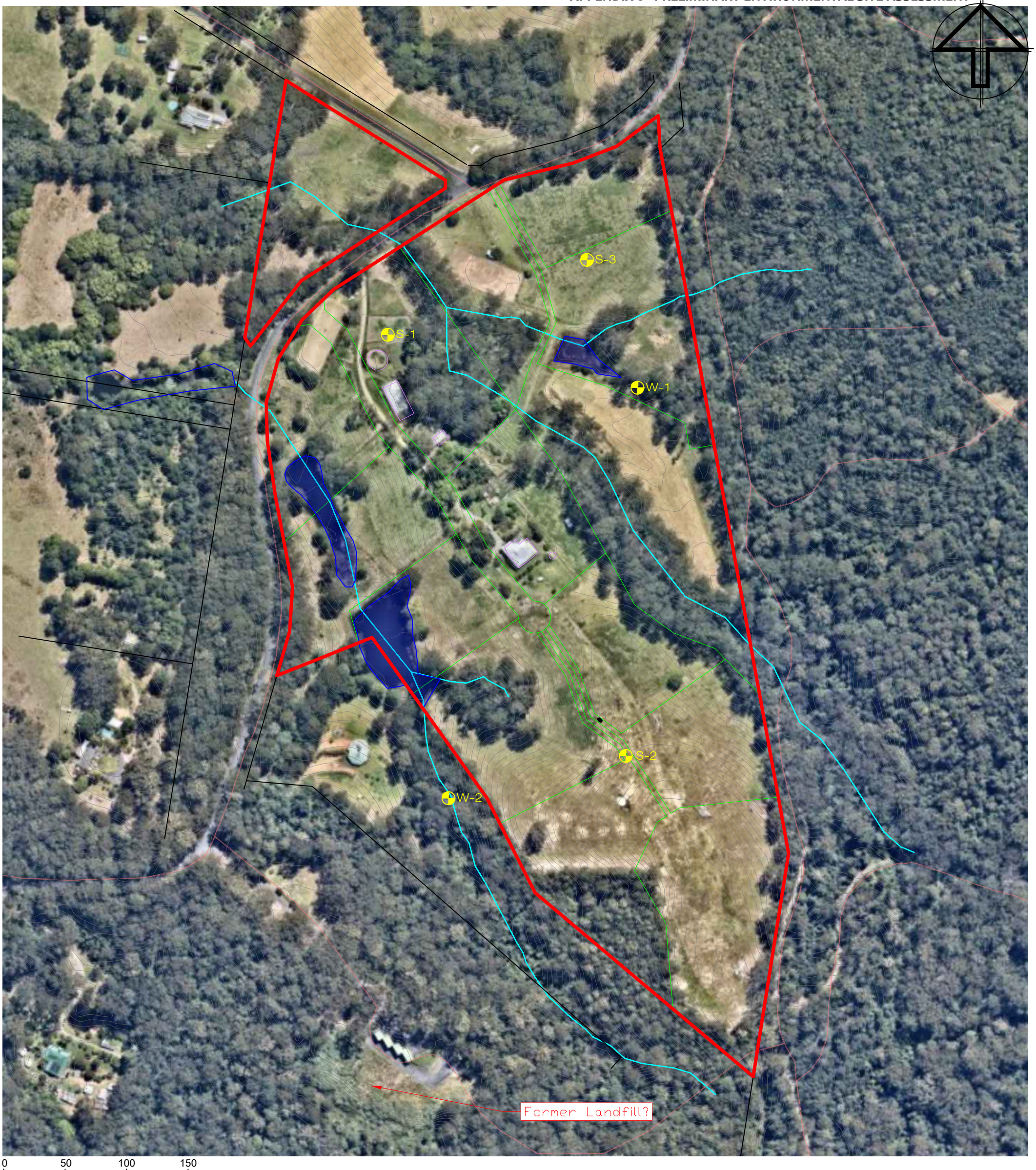
LEGEND

Property Boundary

Proposed Subdivision Boundary

EARTH WATER CONSULTING

| | | | |
|---|---|---|---|
| TITLE: Proposed Development Layout | | | FIGURE: Figure 2 |
| | | | SHEET: 1 OF 1 / ISSUE: A |
| PROJECT: ESA for 218 East Bank Road Coramba | | | CLIENT: Jim Cleary |
| AUTHOR: SD | DATE: 20/07/22 | SCALE: 1:3000 | PROJECT: 2021-204 |




0 50 100 150

Horizontal Scale (metres) 1:3000

LEGEND

- Property Boundary
- Proposed Subdivision Boundary
- Approximate Borehole Location

EARTH WATER CONSULTING

| | | | |
|---|---|---|---|
| TITLE: Site Layout and Sample Locations | | | FIGURE: Figure 3 |
| | | | SHEET: 1 OF1 ISSUE: A |
| PROJECT: ESA for 218 East Bank Road Coramba | | | CLIENT: Jim Cleary |
| AUTHOR: SD | DATE: 20/07/22 | SCALE: 1:3000 | PROJECT: 2021-204 |

# APPENDIX A

# Aerial Imagery 2021

**218 East Bank Road, Coramba, NSW 2450**


| Scale: | Data Source Aerial Imagery: © 2022 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc. | Coordinate System: GDA 1994 MGA Zone 56 | Date: 20 June 2022 |
|---|---|---|---|

0 50 100 150 200 Meters

# Aerial Imagery 2013

**218 East Bank Road, Coramba, NSW 2450**


| Scale: 0 50 100 150 200 Meters | Data Source Aerial Imagery: © 2022 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc. | Coordinate System: GDA 1994 MGA Zone 56 | Date: 20 June 2022 |
|---|---|---|---|

# Aerial Imagery 2004

**218 East Bank Road, Coramba, NSW 2450**


| Scale: | Data Source Aerial Imagery: © 2022 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc. | Coordinate System: GDA 1994 MGA Zone 56 | Date: 20 June 2022 |
|---|---|---|---|

0 50 100 150 200
Meters

# Aerial Imagery 1994

**218 East Bank Road, Coramba, NSW 2450**


| Scale: | Data Source Aerial Imagery: | Coordinate System: | Date: 27 June 2022 |
|---|---|---|---|
| 0 50 100 150 200 Meters | © NSW Department of Customer Service | GDA 1994 MGA Zone 56 | |

# Aerial Imagery 1989

**218 East Bank Road, Coramba, NSW 2450**


Scale:
0 50 100 150 200
Meters

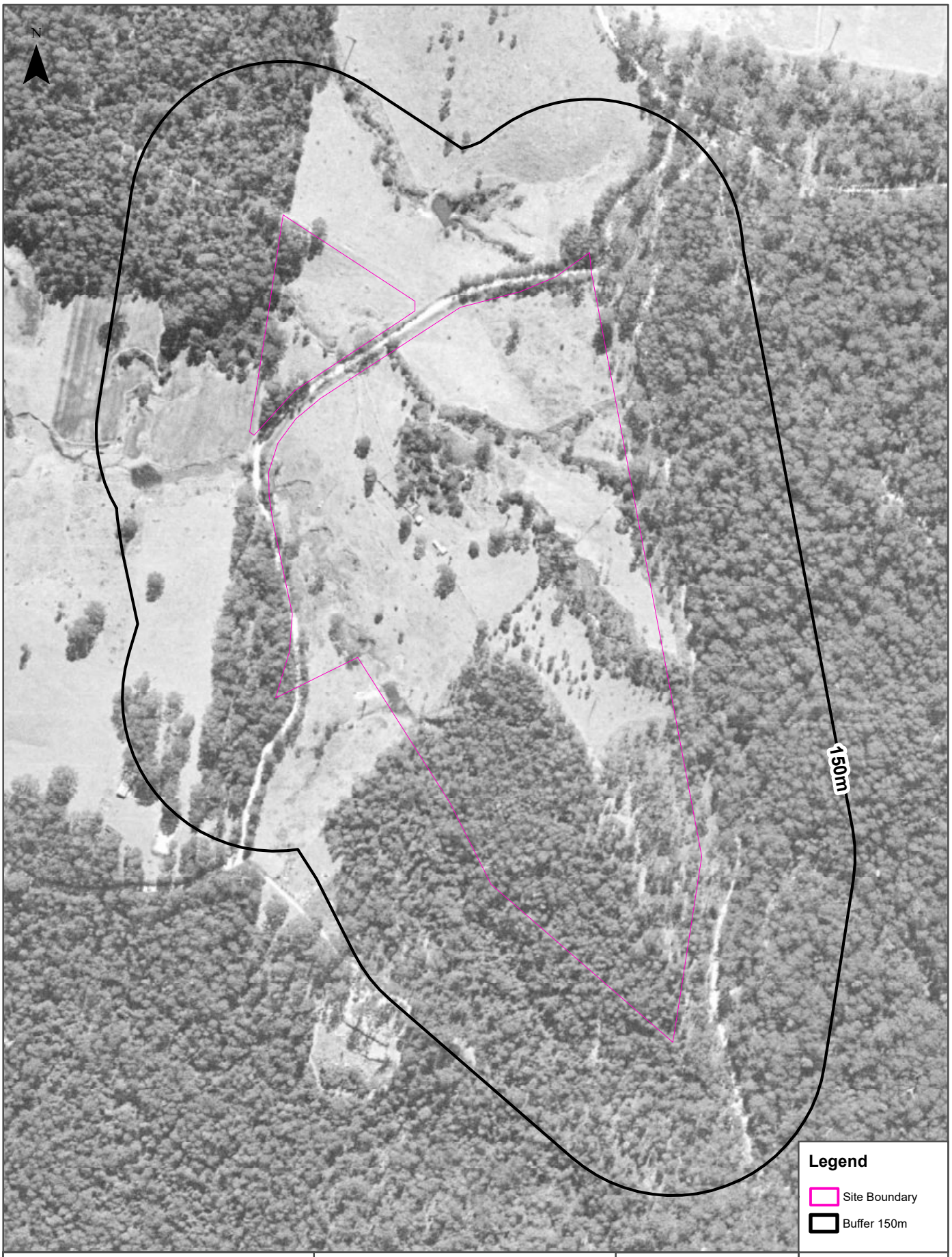
Data Source Aerial Imagery:
© NSW Department of Customer Service

Coordinate System:
GDA 1994 MGA Zone 56

Date: 27 June 2022

# Aerial Imagery 1974

**218 East Bank Road, Coramba, NSW 2450**




Scale:
0 50 100 150 200
Meters

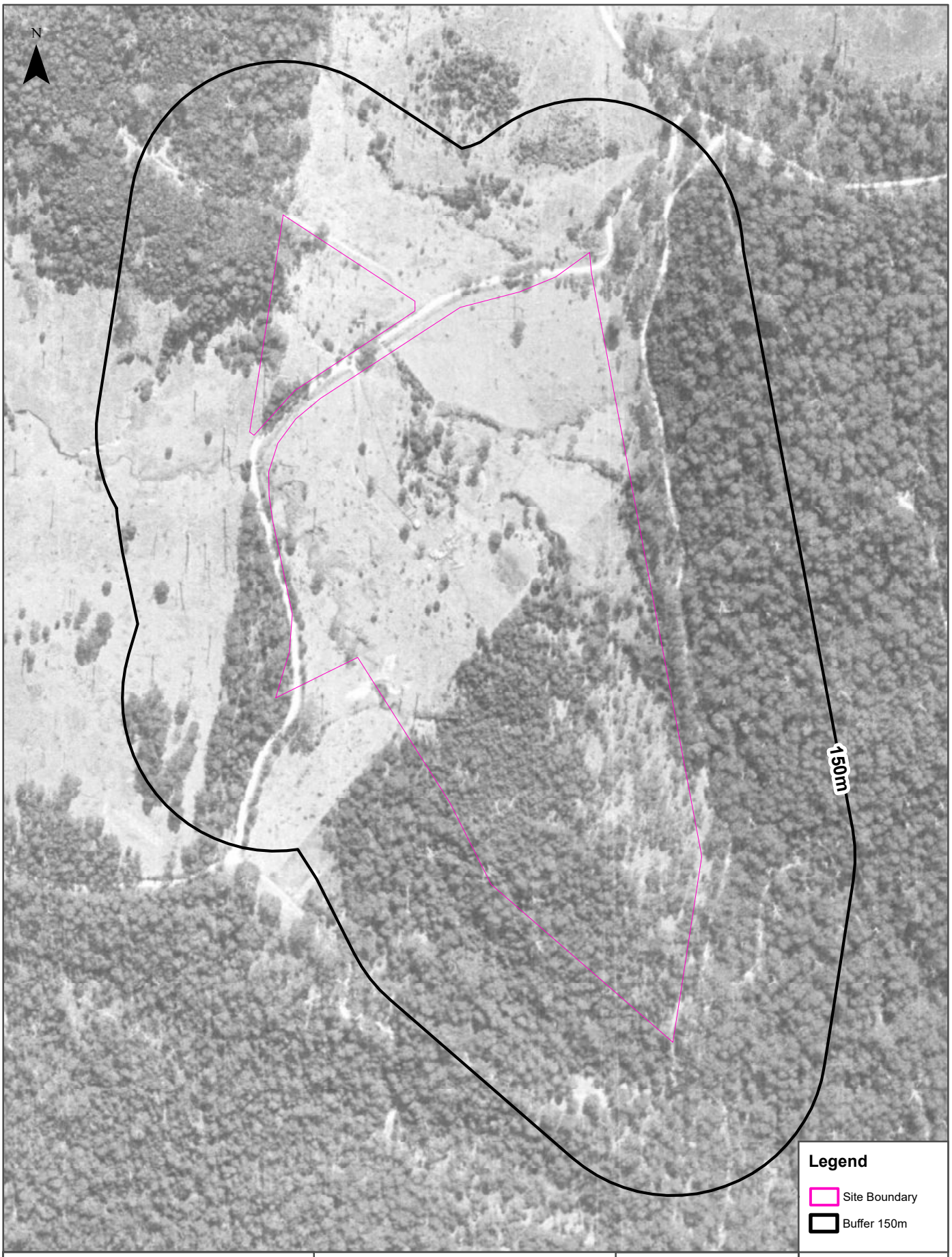
Data Source Aerial Imagery:
© NSW Department of Customer Service

Coordinate System:
GDA 1994 MGA Zone 56

Date: 27 June 2022

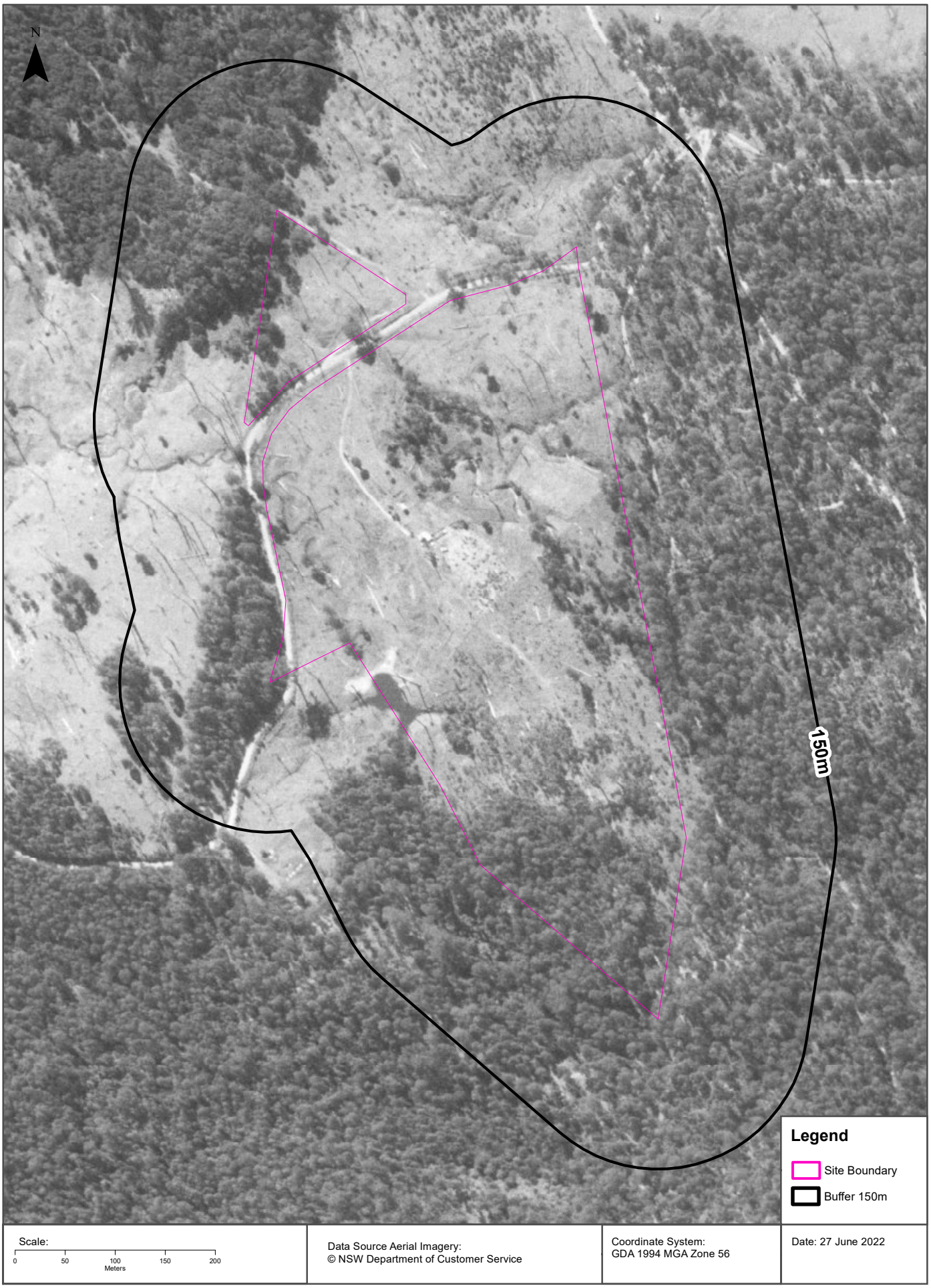
# Aerial Imagery 1964

**218 East Bank Road, Coramba, NSW 2450**



# Aerial Imagery 1954

**218 East Bank Road, Coramba, NSW 2450**

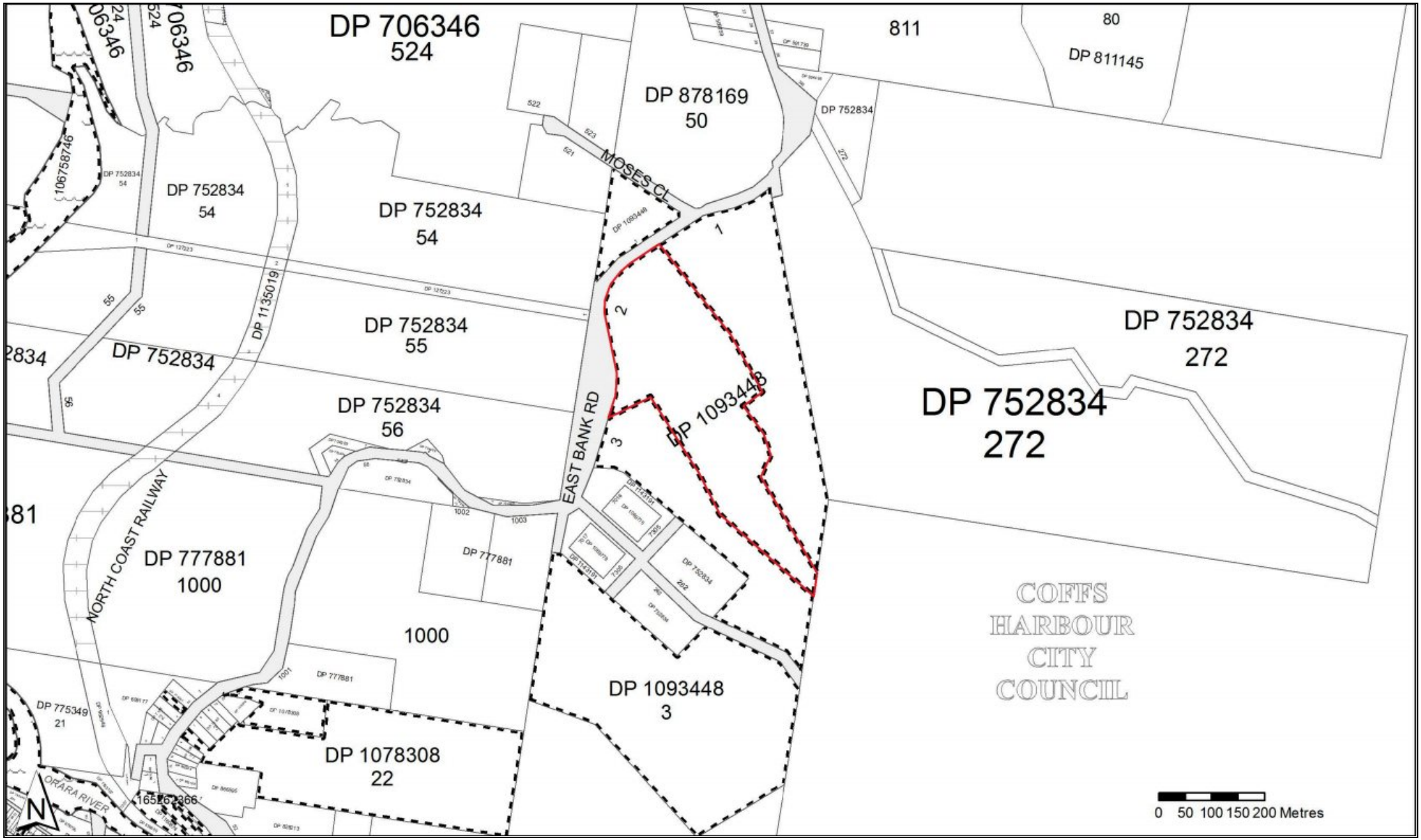


# APPENDIX B

# Cadastral Records Enquiry Report : Lot 2 DP 1093448



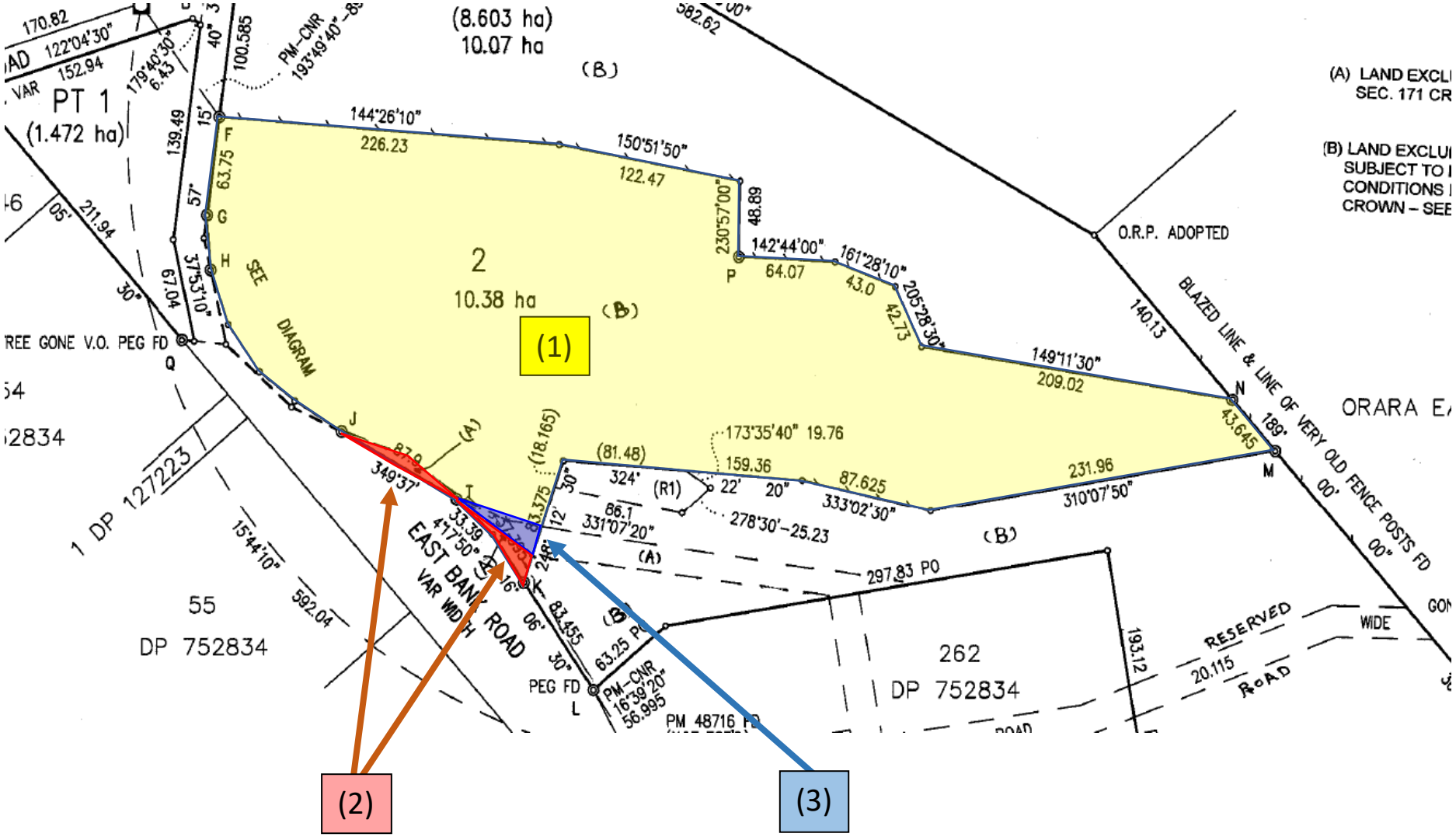
**Locality :** CORAMBA
**Parish :** MOONEE
**LGA :** COFFS HARBOUR
**County :** FITZROY

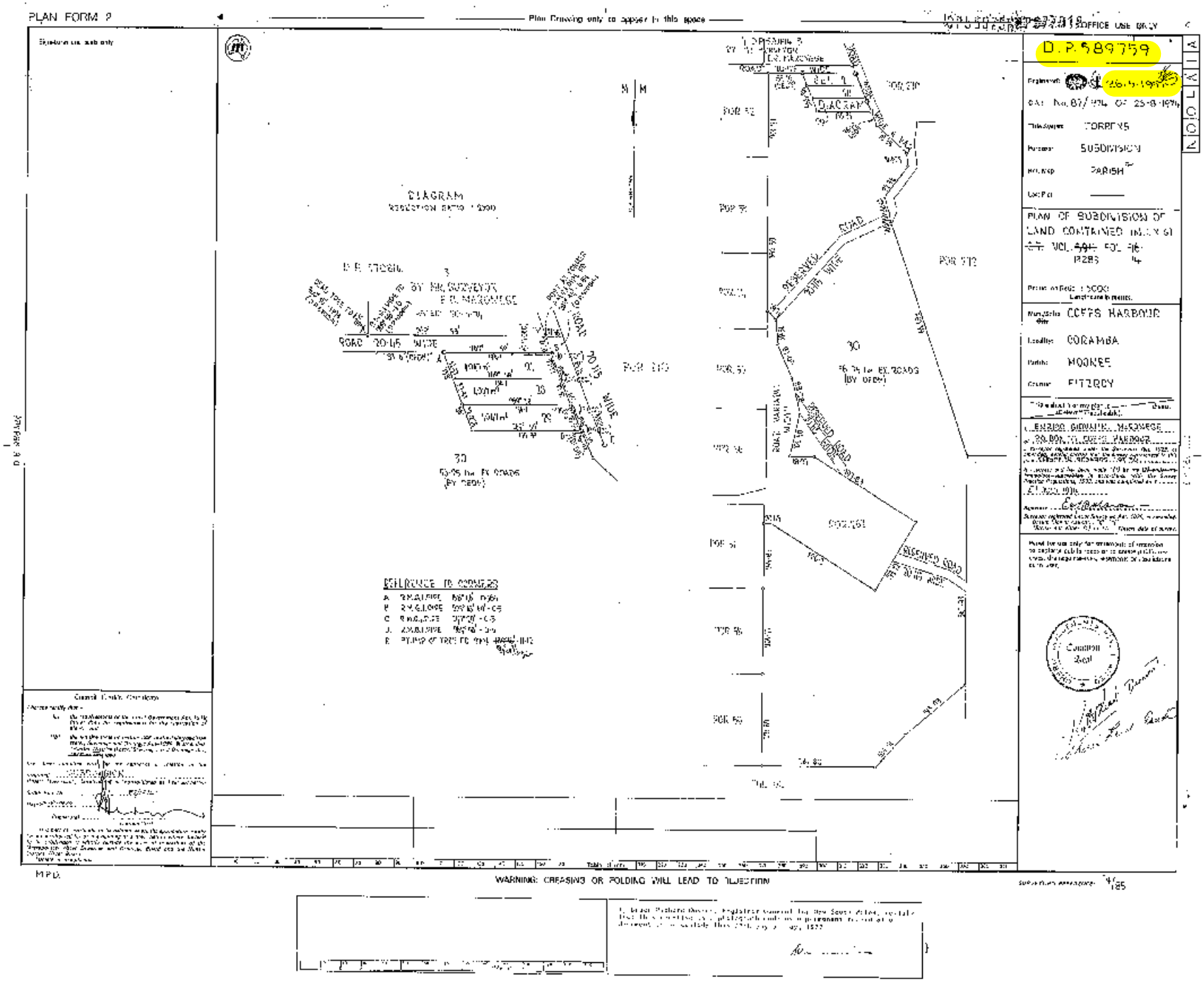






**This information is provided as a searching aid only.Whilst every endeavour is made to ensure that current map, plan and titling information is accurately reflected, the Registrar General cannot guarantee the information provided. For ALL ACTIVITY PRIOR TO SEPTEMBER 2002 you must refer to the RGs Charting and Reference Maps**


(8.603 ha)
10.07 ha
(B)
PT 1
(1.472 ha)
2
10.38 ha
(B)
(1)
SEE DIAGRAM
144°26'10"
226.23
150°51'50"
122.47
230°57'00"
48.89
142°44'00"
64.07
161°28'10"
43.0
205°28'30"
42.73
149°11'30"
209.02
140.13
O.R.P. ADOPTED
BLAZED LINE & LINE OF VERY OLD FENCE POSTS FD
(A) LAND EXCL
SEC. 171 CR
(B) LAND EXCLU
SUBJECT TO
CONDITIONS
CROWN – SEE
ORARA E
TREE GONE V.O. PEG FD
1 DP 127223
55
DP 752834
262
DP 752834
EAST BANK ROAD
VAR WIDTH
PEG FD
PM 48716
RESERVED ROAD
WIDE
(2)
(3)



PLAN FORM 2 — Plan Drawing only to appear in this space — *OFFICE USE ONLY

DP 878169

SIGNATURE AND SEALS ONLY.

Registered: 10.7.1998

C.A. No 63/98 of 10.6.98

Title System: TORRENS

Purpose: SUBDIVISION

Ref. Map: PARISH *

Last Plan: D P 716207

PLAN OF SUBDIVISION OF LOT 5 D.P. 716207

Lengths are in metres. Reduction Ratio 1: 6000

LGA COFFS HARBOUR

Suburb/Locality: CORAMBA

Parish: MOONEE

County: FITZROY (63)

This is sheet 1 of my plan in sheets. (Delete if inapplicable)

I, MARTIN SUNDY of BLAIR & LANSKEY of P.O. BOX 2453 COFFS HARBOUR

a surveyor registered under the Surveyors Act 1929, hereby certify that the survey represented in this plan is accurate, has been made in accordance with the Surveyors (Practice) Regulation 1990 and was completed on 29 MAY, 1998.

The survey relates to PART LOT 50 & RD. WIDEN. NG (here specify the land actually surveyed, or specify any land shown in the plan that is not the subject of the survey)

(Signature) ... Datum Line: 'X' 'Y' Zone: Submer. County

Surveyor registered under the Surveyors Act 1929

Plans used in preparation of survey/compilation.

D.P. 716207 DP 706346
D.P. 589759
D.P. 633471
D.P. 824495

PANEL FOR USE ONLY for statements of intention to dedicate public roads, to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants.

IT IS INTENDED TO DEDICATE THE ROAD WIDENING VARIABLE WIDTH TO THE PUBLIC.

PLAN AMENDED LTO AT SURVEYORS REQUEST

DP 878169

PM STRIVS CHECKED TO 26.6.98

Crown Lands Office Approval

PLAN APPROVED ... (Authorised Officer)

Land District ...

Paper No. ...

Field Book ... pages ...

Council's Certificate

I hereby certify that –

(a) the requirements of the Local Government Act, 1919 (other than the requirements for the registration of plans), and

(b) the requirements of † Part 3 Division 2 of the Water Boards Act 1987, or † Part 6 Division 4 of the Hunter Water Board (Corporatisation) Act 1991

have been complied with by the applicant in relation to the proposed ... SUBDIVISION (Insert "new road", "subdivision" or "consolidation (of)" as set out herein)

Subdivision No. 5209

Date 10/6/98

(Signature) ... General Manager / Authorised Person

Council File No. ...

*This part of certificate to be deleted where the application is only for a consolidation lot or the opening of a new road or where the land to be subdivided is wholly outside the areas of operations of the Water Board and the Hunter Water Corporation Ltd.

†Delete if inapplicable

SURVEYOR'S REFERENCE: 5209 (COMP. 98-956)

DIAGRAM
REDUCTION RATIO 1:500

Table of mm

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

PLAN FORM 2 (APPROVED FORM 9) — Plan Drawing only to appear in this space — OFFICE USE ONLY

SIGNATURES AND SEALS ONLY

DP1081766

Registered: 25.5.2005

Title System: CROWN LAND

Purpose: FIRST TITLE ISSUE

Ref map: PARISH

Last Plan: DP878169

PLAN FOR FIRST TITLE CREATION AND ROAD CLOSING UNDER THE ROADS ACT 1993

Lengths are in Metres — Reduction Ratio 1: 2000

L.G.A. COFFS HARBOUR

Locality CORAMBA

Parish MOONEE

County FITZROY (63)

This sheet is ... sheets.

Survey Certificate

Surveying Regulation 2001

I, MARTIN PUNDYK & BLAIR J LANSKEY

of PO BOX 6195 COFFS HARBOUR

a surveyor registered under the Surveying Act 2002, hereby certify that the survey represented in this plan is accurate, has been made in accordance with the Surveying Regulation 2001 and was completed on 8 SEPTEMBER 2004

The survey relates to LOTS 1, 2, 3, 4

Signature: ... Dated: 18.9.2005

Surveyor registered under the Surveying Act 2002.

Datum Line: X — Y

Type: Urban/Rural

Plans used in preparation of Survey/Compilation

| | |
|---|---|
| F 2992 180 | PLAN BY |
| D.P. 878169 | D.M. STEWART |
| D.P. 633471 | 25-02-1986 |
| D.P. 704284 | |

PART FOR USE ONLY for statements of intention to dedicate public roads, to create public reserves, drainage reserves, easements, restrictions on the use of land, or positive covenants

LOTS 1, 2, 3 AND 4, PUBLIC ROAD PROPOSED TO BE CLOSED.

This Plan is Exempt from the provisions of the Conveyancing Act, 1919, by Section 23G(b) of the Conveyancing Act, 1919.

Department of Lands Approval

I, ... (Authorised Officer) ... approving this plan certify that all necessary approvals in regard to the allocation of the land shown hereon have been given.

Signature: ...

Date: 28 FEBRUARY 2005

File Number: GF03 H 140

Office: GRAFTON

Subdivision Certificate

I hereby note the provisions of s.109J of the Environmental Planning and Assessment Act 1979 have been complied in relation to the proposed

- the proposed subdivision of Lots ... and does not require
- the subdivision of Lots ... is consistent with a subdivision complying development certificate
- the subdivision of Lots ... is for the purpose of a kind referred to in section ... of the Conveyancing Act 1919

Authorised Person/General Manager/Accredited Certifier

Consent Authority: ...

Date of Endorsement: ...

Accreditation No: ...

Subdivision Certificate No: ...

File No: ...

Note: Where the plan is to be lodged electronically in the Land Titles Office, it should not be signed or sealed but a certificate in an electronic or digital format approved by the Registrar-General is acceptable.

DIAGRAM 'B'
1:800

DIAGRAM 'A'
1:600

EAST BANK ROAD

MOSES (20.115 WIDE & VAR) ROAD

ROAD (20.115 WIDE)

EAST BANK (20.115 WIDE & VAR) ROAD

ROAD 20.115 WIDE

ROAD 20.115 WIDE

542.7 m²

812.5 m²

165 m²

542.7 m²

| SURVEYING REGULATION 2001 | | | | | |
|---|---|---|---|---|---|
| | M.G.A. CO-ORDINATES | | | | |
| MARK | EASTING | NORTHING | ZONE | CLASS | ORDER |
| PM 109671 | 502 638.341 | 6657 886.521 | 56 | B | C |
| SSM 59491 | 502 804.115 | 6659 062.602 | 56 | B | C |
| SSM 84792 | 502 780.304 | 6658 785.196 | 56 | B | C |
| SOURCE S.C.M.G. 27-5 2004 | | | | | |
| COMBINED SCALE FACTOR 0.99958 | | | | | |

SURVEYORS REFERENCE: 5209 '2004 MTIQC (312) COMP'

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

STATE OF NEW SOUTH WALES

[redacted]

# CROWN GRANT



13283014

No. ~~19~~ 43968

Vol. 13283 Fol. 14
Registered 23-3-1977

Registrar-General

(Page 1) Vol. 13283 Fol. 14

We, Elizabeth the Second, by the Grace of God Queen of Australia and Her other Realms and Territories, Head of the Commonwealth, do hereby grant to the person described in the First Schedule an Estate in Fee Simple in the land within described, subject nevertheless to such reservations, conditions and other provisions as are shown in the Second Schedule. In testimony whereof We have caused this Our Grant to be sealed with the seal of Our said State

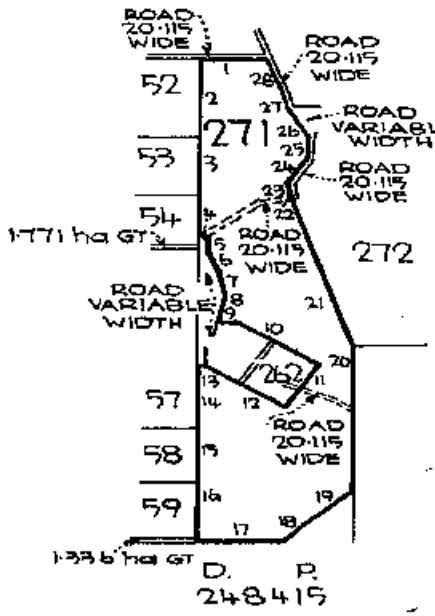
Witness Our Governor of Our State of New South Wales and its Dependencies in the Commonwealth of Australia, at Sydney in Our said State, this **eighteenth** day of **March** in the **twenty sixth** year of Our Reign and in the year of Our Lord one thousand nine hundred and **seventy seven.**

A. K. Cutler

Governor

PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES




| REFERENCE | |
|---|---|
| 1 | 217·26 |
| 2 | 201·27 |
| 3 | 356·59 |
| 4 | 29·23 |
| 5 | 59·51 |
| 6 | 87·05 |
| 7 | 88·78 |
| 8 | 106·48 |
| 9 | 83·25 |
| 10 | 247·83 |
| 11 | 193·12 |
| 12 | 300·3 |
| 13 | 20·115 |
| 14 | 155·86 |
| 15 | 201·17 |
| 16 | 221·89 |
| 17 | 281·8 |
| 18 | 105·8 |
| 19 | 193·93 |
| 20 | 548 |
| 21 | 582·4 |
| 22 | 26·295 |
| 23 | 40·155 |
| 24 | 92·34 |
| 25 | 31·925 |
| 26 | 98·35 |
| 27 | 61·78 |
| 28 | 71·92 |

CANCELLED

AREA: 54·47 ha
THIS AREA DOES NOT INCLUDE THE AREAS OF THE ROADS

REDUCTION RATIO 1:20000

LAND REFERRED TO

**Portion 271 in the Shire of Coffs Harbour Parish of Moonee and County of Fitzroy. EXCEPTING THEREOUT the roads shown in the plan hereon.**

FIRST SCHEDULE

**CHERIE INVESTMENTS PTY. LIMITED.**

SECOND SCHEDULE

1. The reservation and exception unto Us Our Heirs and Successors of:–
   (a) all minerals which the said land contains with full power and authority for Us Our Heirs and Successors and such person or persons as shall from time to time be authorised by Us or Them to enter upon the said land and to search for mine dig and remove the said minerals;
   (b) all such parts and so much of the said land as may hereafter be required for public ways in over and through the same to be set out by Our Governor for the time being of Our said State or some person by him authorised in that respect with full power for Us Our Heirs and Successors and for Our Governor as aforesaid by such person or persons as shall be by Us Them or him authorised in that behalf to make and conduct all such public ways; and
   (c) the right of full and free ingress egress and regress into out of and upon the said land for the several purposes aforesaid or any of them.
2. Restrictions on dealings - see section **272 Crown Lands Consolidation Act, 1913 (C.P.1976/14 Bellingen).**



RG 2/123 NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

DP 589759 # 1/471



Vol 13283 Fol 14

## FIRST SCHEDULE (continued)

| REGISTERED PROPRIETOR | INSTRUMENT NATURE | INSTRUMENT NUMBER | REGISTERED | Signature of Registrar General |
|---|---|---|---|---|
| This deed is cancelled as to the whole<br>New Certificates of Title have issued on 22-6-1977<br>for lots in Deposited Plan No. 589759 as follows:<br>Lots 27 to 30 Vol. 13552 Fol. 169 to 172 respectively.<br>REGISTRAR GENERAL | | | | |

LAND CONTRACT OF SALE DEALING DP 589759
NO DEALING TO BE REGISTERED WITHOUT REFERENCE TO

## SECOND SCHEDULE (continued)

| INSTRUMENT NATURE | INSTRUMENT NUMBER | PARTICULARS | REGISTERED | Signature of Registrar General | CANCELLATION | |
|---|---|---|---|---|---|---|
| | | | | | | |

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

13352152

NEW SOUTH WALES

# [redacted]ICATE OF TITLE

[redacted] PROPERTY ACT, 1900

Vol. 13352 Fol. 152

Prior Title (Crown Grant)
Volume 13283 Folio 14

EDITION ISSUED
23 6 1977

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

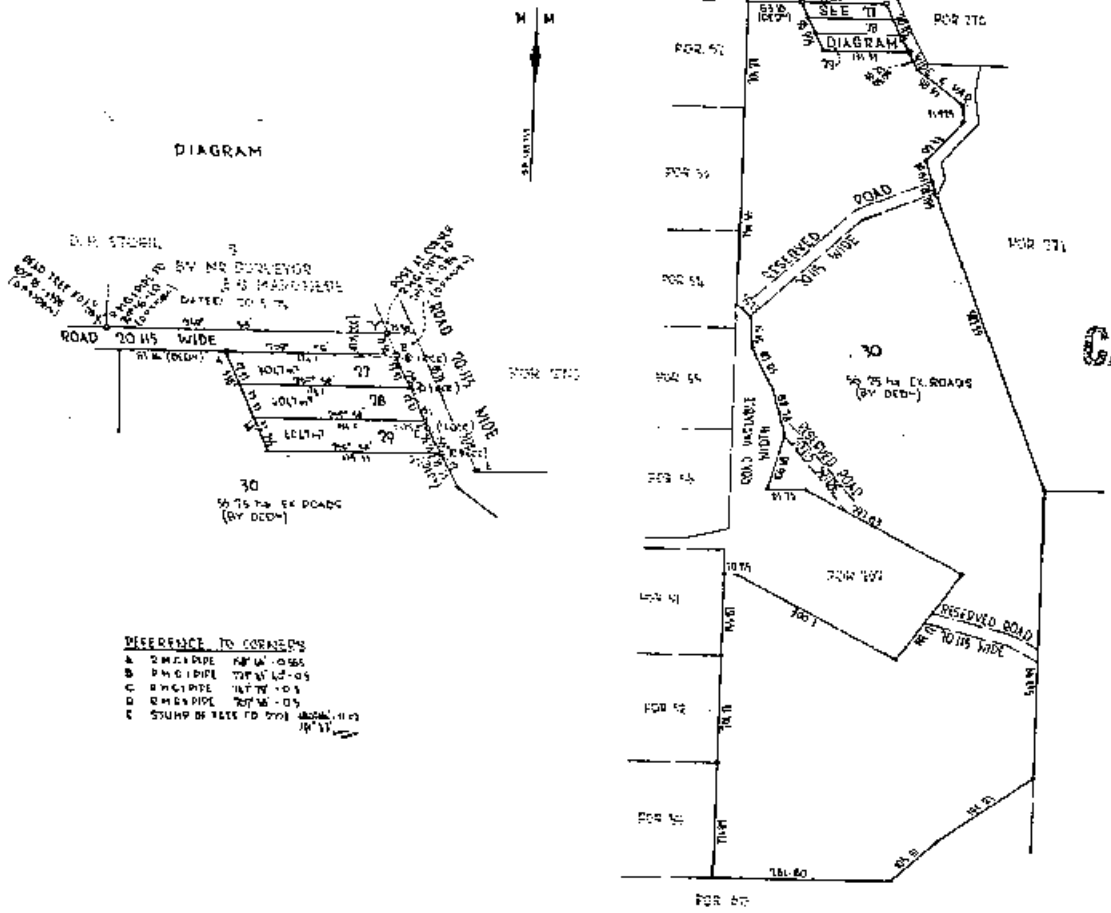
Registrar General.

(Page 1) Vol. 13352 Fol. 152

## PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES

DIAGRAM




CANCELLED

## ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 30 in Deposited Plan 589759 in the Shire of Coffs Harbour Parish of Moonee and County of Fitzroy. EXCEPTING THEREOUT the roads shown in the plan hereon and the minerals reserved by the Crown Grant.

## FIRST SCHEDULE

~~CHERIB INVESTMENTS PTY. LIMITED.~~

## SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grant above referred to.
2. Restriction on dealings – see section 272 Crown Lands Consolidation Act, 1913.

## FIRST SCHEDULE (continued)

| REGISTERED PROPRIETOR | INSTRUMENT NATURE | INSTRUMENT NUMBER | INSTRUMENT DATE | ENTERED | Signature of Registrar General |
|---|---|---|---|---|---|
| James Patrick Cleary of Randwick, Police officer and Jennifer Ann Cleary, his wife as joint tenants | Transfer | S151783 | — | 10-11-1980 | |
| Title issued in substitute | | | | | |
| New Certificate of Title issued on 27.9.1983 | | | | | |
| Registered No. 633471 | | | | | |
| Book 519 No. 520 No. 115127 Fol. 223/224 respectively | | | | | |

S151783 ✓
T601613 ✓
D.P. 633471 ✓

## SECOND SCHEDULE (continued)

| INSTRUMENT NATURE | INSTRUMENT NUMBER | INSTRUMENT DATE | PARTICULARS | ENTERED | Signature of Registrar General | CANCELLATION | | |
|---|---|---|---|---|---|---|---|---|
| | | | T607613 Mortgage to Commonwealth Trading Bank of Australia. Registered 27-6-1983. | | | | | |

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED



Vol. 13352 Fol. 152

[redacted] APPENDIX A PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

15127223

NEW SOUTH WALES 14 [redacted] L PROPERTY ACT, 1900

First Title : Vol.13283 Fol. [redacted]

Prior Title : Vol.13352 Fol.152

Vol. 15127 Fol. 223

EDITION ISSUED 2 12 1983

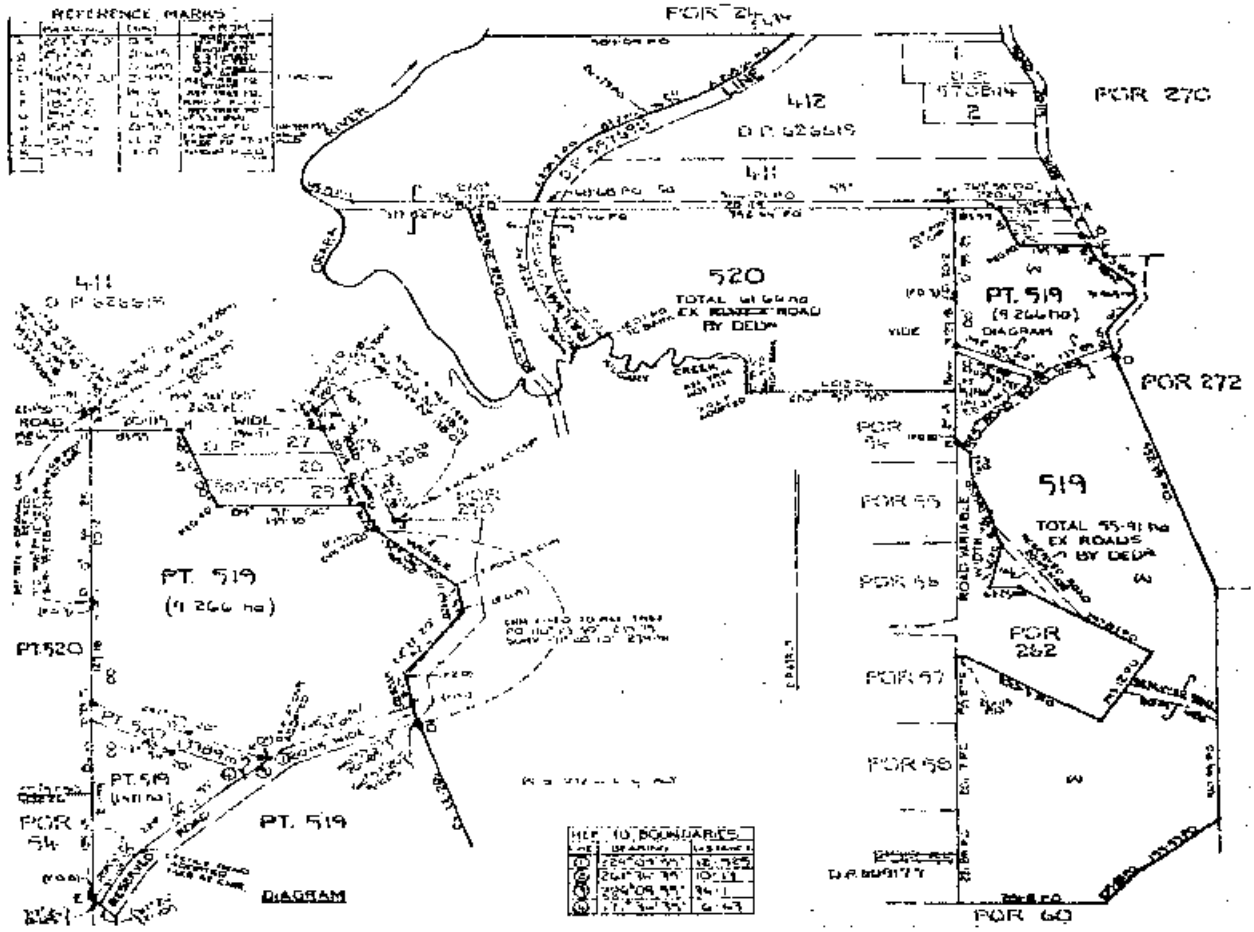
I certify that the person named in the First Schedule is the registered proprietor of an estate in fee simple (or such other estate or interest as is set out below) in the land described subject to the recordings appearing in the Second Schedule and to the provisions of the Real Property Act, 1900.

Registrar General.

CANCELLED

PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES




DP633471 pps.

LAND REFERRED TO

Lot 519 in Deposited Plan 633471 at Coramba in the Shire of Coffs Harbour Parish of Moonee and County of Fitzroy.

FIRST SCHEDULE

~~JAMES PATRICK CLEARY and JENNIFER ANN CLEARY as Joint Tenants.~~

SECOND SCHEDULE

GRM 1. Land excludes minerals and is subject to reservations and conditions in favour of the Crown - see Crown Grant.

AA 2. Land excludes the road shown on ~~Deposited Plan~~ 633471.

AB 3. Restrictions on dealings - see section 272 Crown Lands ~~Consolidation~~ Act, 1913 (C.P.1976/14 Ballingen) ~~affecting the part of the land above described shown so burdened on Deposited Plan 633471.~~

~~4. T607613 Mortgage to Commonwealth Trading Bank of Australia.~~ Discharged V431625

DP633471 pps

Reg. Gen. 6-9-1984

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON (Page 1) Vol. 15127 Fol. 223

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

RG 2/64

APPENDIX 8 - PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

L.O. 1666 D. West, Government Printer

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR

Registrar General

~~James Patrick Cleary by Transfer V431626. Registered 30-4-1985~~

James Patrick Cleary and Linda Fay Young as joint tenants by Transfer V753848. Registered 20-6-1985.

SECOND SCHEDULE (continued)

PARTICULARS

Registrar General

CANCELLATION

V845473 Mortgage to Commonwealth Savings Bank of Australia. Registered 2.8.1985.

[redacted] 716207 Registered 28-8-1985

The folio is cancelled as to whole/[redacted] upon creation of computer folios for lots 5/6 in the abovementioned plan.

NOTATIONS AND UNREGISTERED DEALINGS

V431626 30-4-85

V753848

V845473

DP716207

NOTE: ENTRIES RULED

NEW SOUTH WALES — REAL PROPERTY ACT, 1900

Register

Vol. 15127 Fol. 223

First Titles: ~~Vol. 2545 Fol. 76~~ Vol.13283 Fol. 14

Prior Titles: Vol.13352 Fol.152 ~~Vol.14952 Fol. 80~~

EDITION ISSUED 27 9 1983

I certify that the person named in the First Schedule is the registered proprietor of an estate in fee simple (or such other estate or interest as is set out below) in the land described subject to the recordings appearing in the Second Schedule and to the provisions of the Real Property Act, 1900.

DP633471 pps

Reg. Gen. 22-11-1983

Registrar General.

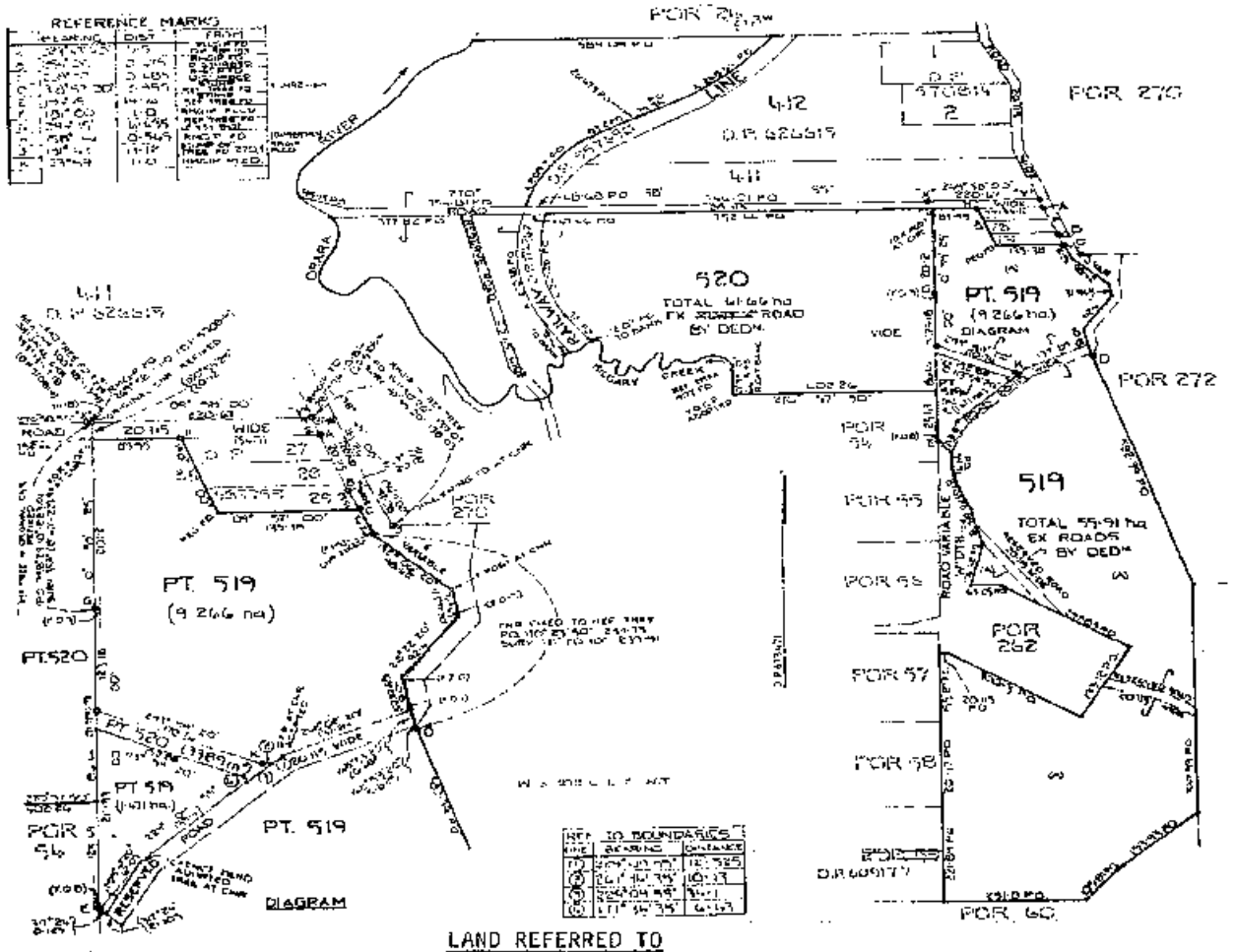
Vol. 15127 Fol. 223 (Page 1)

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

## PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES




## LAND REFERRED TO

DP633471 pps

Lot 519 in Deposited Plan 633471 at Coramba in the Shire of Coffs Harbour Parish of Moonee and County of Fitzroy.

## FIRST SCHEDULE

DP633471 pps

JAMES PATRICK CLEARY and JENNIFER ANN CLEARY as Joint Tenants ~~of part formerly in Volume 13352 Folio 152, ANDREW JOHN MORTON in ½ share and DAVID EARL MORTON in ½ sha~~ as Tenants in Common ~~of part formerly in Volume 14952 Folio 80.~~

Reg. Gen. 22-11-1983

## SECOND SCHEDULE

1. Land excludes minerals and is subject to reservations and conditions in favour of the Crown - see Crown Grant.
2. Land excludes the road shown on Deposited Plan 633471.
3. Restrictions on dealings - see Section 272 Crown Lands Consolidation Act, 1913 (C.P. 1976/14 Bellingen) ~~affecting the part of the land above described shown so burdened on Deposited Plan 633471~~.

DP633471 pps

~~4. S996661 Mortgage to National Commercial Banking Corporation of Australia Limited affecting the part of the land above described formerly comprised in Certificate of Title Volume 3570 Folio 244.~~

Reg. Gen. 22-11-1983 RG 2/64

4. ~~5.~~ T607613 Mortgage to Commonwealth Trading Bank of Australia ~~affecting the part of the land above~~ described ~~formerly comprised in Certificate of Title Volume 13352 Folio 152~~.

DP633471 pps

Reg. Gen. 6-3-1984

903461D 8.81 D. West, Government Printer

FIRST SCHEDULE (continued)

| REGISTERED PROPRIETOR | Registrar General |
|---|---|
| CANCELLED<br>See new edition issued 2-12-1983<br>DP633471 Pt. 15127-223<br>REGISTRAR GENERAL | |

SECOND SCHEDULE (continued)

| PARTICULARS | Registrar General | CANCELLATION |
|---|---|---|
| | | |

NOTATIONS AND UNREGISTERED DEALINGS

DP 633471 (Mult.)

NOTE: ENTRIES RULED THROUGH ARE CANCELLED

LAND REGISTRY SERVICES

# Historical Title

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE
20/6/2022 4:59PM

FOLIO: 5/716207

First Title(s): VOL 13283 FOL 14
Prior Title(s): VOL 15127 FOL 223

| Recorded | Number | Type of Instrument | C.T. Issue |
|---|---|---|---|
| 29/8/1985 | DP716207 | DEPOSITED PLAN | FOLIO CREATED<br>EDITION 1 |
| 8/6/1993 | I394516 | MORTGAGE | EDITION 2 |
| 16/6/1998 | 5056907 | DISCHARGE OF MORTGAGE | |
| 16/6/1998 | 5056908 | DISCHARGE OF MORTGAGE | |
| 13/7/1998 | DP878169 | DEPOSITED PLAN | FOLIO CANCELLED<br>RESIDUE REMAINS |

*** END OF SEARCH ***

LAND REGISTRY SERVICES Historical Search

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE
20/6/2022 4:58PM

FOLIO: 51/878169

First Title(s): VOL 13283 FOL 14
Prior Title(s): 5/716207

| Recorded | Number | Type of Instrument | C.T. Issue |
|---|---|---|---|
| 13/7/1998 | DP878169 | DEPOSITED PLAN | FOLIO CREATED EDITION 1 |
| 1/3/2006 | DP1093448 | DEPOSITED PLAN | FOLIO CANCELLED RESIDUE REMAINS |

*** END OF SEARCH ***

LS033467_EP 218 East Bank Rd Coramba PRINTED ON 20/6/2022

LAND REGISTRY SERVICES Historical Search

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE
20/6/2022 4:58PM

FOLIO: 1/1081766

First Title(s): THIS FOLIO
Prior Title(s): CROWN LAND

| Recorded | Number | Type of Instrument | C.T. Issue |
|---|---|---|---|
| 25/5/2005 | DP1081766 | DEPOSITED PLAN | FOLIO CREATED<br>CT NOT ISSUED |
| 6/10/2005 | AB816813 | DEPARTMENTAL DEALING | |
| 23/2/2006 | AC91744 | REQUEST | |
| 23/2/2006 | AC91745 | TRANSFER | |
| 1/3/2006 | DP1093448 | DEPOSITED PLAN | FOLIO CANCELLED |

*** END OF SEARCH ***

LAND REGISTRY SERVICES Historical Search

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE
20/6/2022 4:58PM

FOLIO: 2/1081766

First Title(s): THIS FOLIO
Prior Title(s): CROWN LAND

| Recorded | Number | Type of Instrument | C.T. Issue |
|---|---|---|---|
| 25/5/2005 | DP1081766 | DEPOSITED PLAN | FOLIO CREATED<br>CT NOT ISSUED |
| 6/10/2005 | AB816813 | DEPARTMENTAL DEALING | |
| 23/2/2006 | AC91744 | REQUEST | |
| 23/2/2006 | AC91745 | TRANSFER | |
| 1/3/2006 | DP1093448 | DEPOSITED PLAN | FOLIO CANCELLED |

*** END OF SEARCH ***

LS033467_EP 218 East Bank Rd Coramba PRINTED ON 20/6/2022

Form: 11R
Release: 2.0
www.lands.nsw.gov.au

# REQUEST

New South Wales
Real Property Act 1900

AC91744H

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the Registrar General to collect the information required by this form for the establishment and maintenance of the Real Property Act Register. Section 96B RP Act requires that the Register is made available to any person for search upon payment of a fee, if any.

(A) **STAMP DUTY** — If applicable. Office of State Revenue use only

(B) **LAND** — Torrens Title: Lot 1 DP 1081766, Lot 2 DP 1081766, Lot 3 DP 1081766

(C) **REGISTERED DEALING** — Number: | Torrens Title:

(D) **LODGED BY**

| Document Collection Box | Name, Address or DX and Telephone | CODE |
|---|---|---|
| 486S | ~~COFFS HARBOUR CITY COUNCIL~~ LLPN:123346X<br>~~LOCKED BAG 155~~<br>~~COFFS HARBOUR NSW 2450~~<br>LEGAL LIAISON SERVICES<br>FOR: CRANE<br>486S<br>Reference: ~~379888 (P/N 86465)~~ L- CRANE | R |

(E) **APPLICANT** — COFFS HARBOUR CITY COUNCIL ABN 79 126 214 487

(F) **NATURE OF REQUEST** — To issue Certificates of Title in relation to the closure of roads under Section 38 Roads Act 1993

(G) **TEXT OF REQUEST**

THE APPLICANT, in consequence of the road closure notified in Government Gazette dated 26 August 2005, folio 6126, a copy of which is annexed, requests the Registrar General to:

Make or remove such recordings in the Register as may be necessary to give effect to the provisions of section 38(1)(a) of the Roads Act, 1993 consequent upon the publication of the notice of closure of road as far as it relates to the land referred to above in that the land referred to above has ceased to be public road.

DATE 9/11/05

(H) Certified correct for the purposes of the Real Property Act 1900 by the corporation named below the common seal of which was affixed pursuant to the authority specified and in the presence of the authorised person(s) whose signature(s) appear(s) below.

Corporation: COFFS HARBOUR CITY COUNCIL
Authority: Resolution of Council dated 23 May 2002

Signature of authorised person:
Name of authorised person: Colin Spring
Office held: Manager Property & Commercial Services

Signature of authorised person:
Name of authorised person:
Office held:



OFFAA-, NB2-A81683

## NOTIFICATION OF CLOSING OF ROAD

In pursuance of the provisions of the Roads Act 1993, the road hereunder described is closed and the land comprised therein ceases to be a public road and the rights of passage and access that previously existed in relation to the road are extinguished. On road closing, title to the land comprising the former public road vests in the body specified in the Schedule hereunder.

TONY KELLY, M.L.C.,
Minister for Lands

Description

*Land District – Bellingen;*
*L.G.A. – Coffs Harbour City Council*

Roads Closed: Lots 1, 2, 3 and 4, DP 1081766 at Coramba, Parish Moonee, County Fitzroy.

File Nos: GF22H222 and GF03H140.

SCHEDULE

On closing, the land within Lots 1, 2 and 3, DP 1081766 remains vested in Coffs Harbour Shire Council as operational land for the purposes of the Local Government Act 1993.

Councils Reference: 379888 (P/N86465).

Note: On closing, the land within Lot 4, DP 1081766 remains vested in the State of New South Wales as Crown Land.

---

## MAITLAND OFFICE

**Cnr Newcastle Road & Banks Street (PO Box 6), East Maitland NSW 2323**
**Phone: (02) 4934 2280 Fax: (02) 4934 2252**

## APPOINTMENT OF CORPORATION TO MANAGE RESERVE TRUST

PURSUANT to section 95 of the Crown Lands Act 1989, the corporation specified in Column 1 of the Schedule hereunder, is appointed to manage the affairs of the reserve trust specified opposite thereto in Column 2, which is trustee of the reserve referred to in Column 3 of the Schedule.

TONY KELLY, M.L.C.,
Minister for Lands

SCHEDULE

| *COLUMN 1* | *COLUMN 2* | *COLUMN 3* |
|---|---|---|
| Delando Corporation Limited. | Delando Crescent Welfare Corporation Trust. | Reserve No.: 86343. Public Purpose: School for sub-normal children. Notified: 28 July 1967. File No.: MD80 R 116/2. |

For a term commencing this day.

---

Form: 01T
Licence: 01-05-025
Licensee: CRANE BUTCHER MCKINNON

# TRANSFER

New South Wales
Real Property Act 1900

AC91745F

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the Registrar General to collect the information required by this form for the establishment and maintenance of the Real Property Act Register. Section 96B RP Act requires that the Register is made available to any person for search upon payment of a fee, if any.

STAMP DUTY — Office of State Revenue use only

3

NEW SOUTH WALES DUTY
30-01-2006 0003239349-001
TRANSFER- TRANSFER
DUTIABLE AMOUNT $ **********800.00
DUTY $ **********10.00

(A) TORRENS TITLE — If appropriate, specify the part transferred
Folio Identifiers 1/1081766, 2/1081766 and 3/1081766

(B) LODGED BY

| Delivery Box | Name, Address or DX and Telephone | CODES |
|---|---|---|
| 4865 | LLPN:123346X LEGAL LIAISON SERVICES FOR: CRANE 485S<br>Reference (optional): L - CRANE | T TW (Sheriff) |

(C) TRANSFEROR — COFFS HARBOUR CITY COUNCIL

(D) CONSIDERATION — The transferor acknowledges receipt of the consideration of $1.00 and as regards
(E) ESTATE — the land specified above transfers to the transferee an estate in fee simple.
(F) SHARE TRANSFERRED

(G) Encumbrances (if applicable):

(H) TRANSFEREE — James Patrick CLEARY and Linda Fay YOUNG

(I) TENANCY: Joint Tenants

DATE

(J) Certified correct for the purposes of the Real Property Act 1900 and executed on behalf of the corporation named below by the authorised person(s) whose signature(s) appears(s) below pursuant to the authority specified.

Corporation: Coffs Harbour City Council
Authority: Resolution of Council dated 23 May 2002

Signature of authorised person:

Name of authorised person: Colin Spring
Office held: Manager Property and Commercial Services

Signature of authorised person:

Name of authorised person:
Office held:

Certified correct for the purposes of the Real Property Act 1900 by the person whose signature appears below.

Signature:

Signatory's name: Paul Kenneth Crane
Signatory's capacity: Solicitor for the Transferee



ALL HANDWRITING MUST BE IN BLOCK CAPITALS

LAND REGISTRY SERVICES Historical Search

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE
20/6/2022 4:58PM

FOLIO: 4/1081766

First Title(s): THIS FOLIO
Prior Title(s): CROWN LAND

| Recorded | Number | Type of Instrument | C.T. Issue |
|---|---|---|---|
| 25/5/2005 | DP1081766 | DEPOSITED PLAN | FOLIO CREATED<br>CT NOT ISSUED |
| 6/9/2005 | AB748962 | REQUEST | EDITION 1 |
| 6/10/2005 | AB816813 | DEPARTMENTAL DEALING | |
| 23/2/2006 | AC91746 | TRANSFER | |
| 1/3/2006 | DP1093448 | DEPOSITED PLAN | FOLIO CANCELLED |

*** END OF SEARCH ***

Form: 11R
Release: 1.1
www.lpi.nsw.gov.au

APPENDIX [illegible] PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

# REQUEST

New South Wales
Real Property Act 1900

AB748962N

PRIVACY NOTE: this information is legally required and wi

(A) **STAMP DUTY**

If applicable. Office of State Revenue use only

(B) **LAND**

Torrens Title
Folio Identifier 4/1081766

(C) **REGISTERED DEALING**

| Number | Torrens Title |
|---|---|
| | |

(D) **LODGED BY**

| Delivery Box | Name, Address or DX and Telephone | CODE |
|---|---|---|
| 469S | Manager Crown Lands NSW Far North Coast<br>PO Box 272<br>GRAFTON 2460<br>Reference (optional): GF03 H 140 | |

(E) **APPLICANT**

THE STATE OF NEW SOUTH WALES

(F) **NATURE OF REQUEST**

First Title Issue

Section 37 Crown Lands Act 1989

(G) **TEXT OF REQUEST**

In respect of lot 4, the Registrar General is requested to:

1. Remove the notification in teh Second Schedule stating the land is public road; and

2. Issue parchment Certificate of Title for subject lands.

**DATE** 02 September 2005

I certify that the person(s) signing opposite, with whom I am personally acquainted or as to whose identity I am otherwise satisfied, signed this instrument in my presence.

Signature of witness:

Name of witness: Frank James McDonald
Address of witness: 18 Bacon St
Grafton NSW

Certified correct for the purposes of the Real Property Act 1900 by the authorised officer named below.

Signature of authorised officer:

Authorised officer's name: Karen Hembrow
Authority of officer: Real Property Act 1900
Signing on behalf of: The Minister for Lands

(Manager, CL, NSW, Far North Coast)

All handwriting must be in block capitals.



OFF AA

LAND AND PROPERTY INFORMATION NSW

## NOTIFICATION OF CLOSING OF ROAD

In pursuance of the provisions of the Roads Act 1993, the road hereunder described is closed and the land comprised therein ceases to be a public road and the rights of passage and access that previously existed in relation to the road are extinguished. On road closing, title to the land comprising the former public road vests in the body specified in the Schedule hereunder.

TONY KELLY, M.L.C.,
Minister for Lands

Description

*Land District – Bellingen;*
*L.G.A. – Coffs Harbour City Council*

Roads Closed: Lots 1, 2, 3 and 4, DP 1081766 at Coramba, Parish Moonee, County Fitzroy.

File Nos: GF22H222 and GF03H140.

SCHEDULE

On closing, the land within Lots 1, 2 and 3, DP 1081766 remains vested in Coffs Harbour Shire Council as operational land for the purposes of the Local Government Act 1993.

Councils Reference: 379888 (P/N86465).

Note: On closing, the land within Lot 4, DP 1081766 remains vested in the State of New South Wales as Crown Land.

## MAITLAND OFFICE

**Cnr Newcastle Road & Banks Street (PO Box 6), East Maitland NSW 2323**
**Phone: (02) 4934 2280 Fax: (02) 4934 2252**

## APPOINTMENT OF CORPORATION TO MANAGE RESERVE TRUST

PURSUANT to section 95 of the Crown Lands Act 1989, the corporation specified in Column 1 of the Schedule hereunder, is appointed to manage the affairs of the reserve trust specified opposite thereto in Column 2, which is trustee of the reserve referred to in Column 3 of the Schedule.

TONY KELLY, M.L.C.,
Minister for Lands

SCHEDULE

| *COLUMN 1* | *COLUMN 2* | *COLUMN 3* |
|---|---|---|
| Delando Corporation Limited. | Delando Crescent Welfare Corporation Trust. | Reserve No.: 86343.<br>Public Purpose: School for sub-normal children.<br>Notified: 28 July 1967.<br>File No.: MD80 R 116/2. |

For a term commencing this day.

Form: 01T
Release: 2.1
www.lpi.nsw.gov.au

# TRANSFER

New South Wales
Real Property Act 1900

AC91746D

PRIVACY NOTE: this information is legally required and will

**STAMP DUTY** Office of State Revenue use only

Office of State Revenue
NSW Treasury
Client No: 4176931 671
Duty: $31.25 Trans No: 3198186
Asst details:

(A) **TORRENS TITLE** Folio Identifier 4/1081766

(B) **LODGED BY**

| Delivery Box | Name, Address or DX and Telephone | CODES |
|---|---|---|
| 486S | LLPN:123346X LEGAL LIAISON SERVICES FOR: CRANE 486S<br>Reference: L-CRANE | T<br>TW (Sheriff) |

(C) **TRANSFEROR** THE STATE OF NEW SOUTH WALES

(D) **CONSIDERATION** The transferor acknowledges receipt of the consideration of $ 2,500.00 and as regards

(E) **ESTATE** the land specified above transfers to the transferee an estate in fee simple

(F) **SHARE TRANSFERRED**

(G) Encumbrances (if applicable):

(H) **TRANSFEREE** JAMES PATRICK CLEARY
LINDA FAY ~~CLEARY~~ YOUNG

OFFICE OF STATE REVENUE (N.S.W. TREASURY) 4176931 671 ALTERATION NOTED

(I) **TENANCY:** Joint Tenants

(J) **DATE** 20 OCT 2005

I certify that the person(s) signing opposite, with whom I am personally acquainted or as to whose identity I am otherwise satisfied, signed this instrument in my presence.

Signature of witness:

Name of witness: Frank James McDonald
Address of witness: 18 Bacon St
Grafton NSW 2460

Certified correct for the purposes of the Real Property Act 1900 by the authorised officer named below.

Signature of authorised officer:

Authorised officer's name: Nessbit Hurcum
Authority of officer: Real Property Act 1900
Signing on behalf of: Minister for Lands

I certify that the person(s) signing opposite, with whom I am personally acquainted or as to whose identity I am otherwise satisfied, signed this instrument in my presence.

Signature of witness:

Name of witness: SARAH HUDSON
Address of witness: JP 100812

Certified correct for the purposes of the Real Property Act 1900 by the transferee.

Signature of transferee:



All handwriting must be in block capitals.

LAND REGISTRY SERVICES

# Historical Search

InfoTrack

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE
20/6/2022 4:47PM

FOLIO: 2/1093448

First Title(s): VOL 13283 FOL 14 1/1081766
2/1081766 4/1081766
Prior Title(s): 51/878169 1-2/1081766
4/1081766

| Recorded | Number | Type of Instrument | C.T. Issue |
|---|---|---|---|
| 1/3/2006 | DP1093448 | DEPOSITED PLAN | FOLIO CREATED EDITION 1 |

*** END OF SEARCH ***

LAND REGISTRY SERVICES

# Title Search



NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

---

FOLIO: 2/1093448

---

| SEARCH DATE | TIME | EDITION NO | DATE |
|---|---|---|---|
| 20/6/2022 | 4:47 PM | 1 | 1/3/2006 |

LAND

---

LOT 2 IN DEPOSITED PLAN 1093448
AT CORAMBA
LOCAL GOVERNMENT AREA COFFS HARBOUR
PARISH OF MOONEE COUNTY OF FITZROY
TITLE DIAGRAM DP1093448

FIRST SCHEDULE

---

JAMES PATRICK CLEARY
LINDA FAY YOUNG
AS JOINT TENANTS

SECOND SCHEDULE (2 NOTIFICATIONS)

---

1 LAND EXCLUDES MINERALS AND IS SUBJECT TO RESERVATIONS AND CONDITIONS IN FAVOUR OF THE CROWN WITHIN THE PART SHOWN SO INDICATED IN THE TITLE DIAGRAM - SEE CROWN GRANT
2 LAND EXCLUDES MINERALS (S.171 CROWN LANDS ACT 1989) WITHIN THE PART SHOWN SO INDICATED IN THE TITLE DIAGRAM

NOTATIONS

---

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

# APPENDIX C

# COFFS HARBOUR LABORATORY

Environmental Analysis



EARTHWATER CONSULTING
STRIDER DUERINCKX
PO BOX 50
BELLINGEN NSW 2454

BATCH NUMBER: 22/1250
No. of SAMPLES: 5
DATE COLLECTED: 23/06/22
DATE RECEIVED: 23/06/22
TIME RECEIVED: 14:15
DATE TESTING COMMENCED: 23/06/22

## REPORT OF ANALYSIS

**PROJECT REFERENCE:** 2021-204

| SAMPLE REFERENCE | SAMPLE DESCRIPTION |
|---|---|
| 22/1250/1 | W-1 |
| 22/1250/2 | W-2 |
| 22/1250/3 | S- 1 |
| 22/1250/4 | S- 2 |
| 22/1250/5 | S- 3 |

| ANALYSIS | UNITS | 22/1250/1 | 22/1250/2 | 22/1250/3 | 22/1250/4 | METHOD NO |
|---|---|---|---|---|---|---|
| Total Suspended Solids | mg/L | 19 | <2 | - | - | APHA 2540 D |
| Total Dissolved Solids | mg/L | 33 | 120 | - | - | EL7B |
| Total Organic Carbon# | mg/L | 5.1 | 2.1 | - | - | APHA 5310B |
| Potassium | mg/L | 1.9 | 1.5 | - | - | EL9A |
| Ammonia Nitrogen | mg/L | 0.03 | 0.10 | - | - | EL13F |
| Total Coliforms | mpn/100mL | 1,155 | 660 | - | - | APHA 9223 |
| pH | pH unit | 6.0 | 5.2 | - | - | APHA 4500-H+ B |

| ANALYSIS | UNITS | 22/1250/5 | | | | METHOD NO |
|---|---|---|---|---|---|---|
| Total Suspended Solids | mg/L | - | | | | APHA 2540 D |
| Total Dissolved Solids | mg/L | - | | | | EL7B |
| Total Organic Carbon# | mg/L | - | | | | APHA 5310B |
| Potassium | mg/L | - | | | | EL9A |
| Ammonia Nitrogen | mg/L | - | | | | EL13F |
| Total Coliforms | mpn/100mL | - | | | | APHA 9223 |
| pH | pH unit | - | | | | APHA 4500-H+ B |

NATA

Accredited for compliance with ISO/IEC 17025 - Testing
[Accreditation Numbers: 12359 (Chemical) & 14565 (Microbiological)]

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian and International standards.

Batch no: 22/1250

| ANALYSIS | UNITS | 22/1250/1 | 22/1250/2 | 22/1250/3 | 22/1250/4 | METHOD NO |
|---|---|---|---|---|---|---|
| **NMI METALS NT_249** | | | | | | |
| Arsenic* | mg/kg | - | - | 1.3 | 2.4 | NT2_49 |
| Cadmium* | mg/kg | - | - | <0.5 | <0.5 | NT2_49 |
| Chromium* | mg/kg | - | - | 3.3 | 7.1 | NT2_49 |
| Copper* | mg/kg | - | - | 4.4 | 4.4 | NT2_49 |
| Lead* | mg/kg | - | - | 3.8 | 4.1 | NT2_49 |
| Mercury* | mg/kg | - | - | <0.2 | <0.2 | NT2_49 |
| Nickel* | mg/kg | - | - | 1.1 | 1.9 | NT2_49 |
| Zinc* | mg/kg | - | - | 15 | 8.3 | NT2_49 |
| Total Solids* | % | - | - | 72.5 | 77.9 | NT2_49 |
| **ORGANOCHLORINE PESTICIDES *** | | | | | | |
| Hexachlorobenzene (HCB) | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| Heptachlor | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| Heptachlor Epoxide | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| Aldrin | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| gamma BHC (Lindane) | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| alpha BHC | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| beta BHC | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| delta BHC | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| trans Chlordane | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| cis Chlordane | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| Oxychlordane | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| Dieldrin | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| DDE pp | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| DDD pp | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| DDT pp | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| Endrin | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| Endrin Aldehyde | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| Endrin Ketone | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| alpha Endosulfan | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| beta Endosulfan | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| Endosulfan sulphate | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| Methoxychlor | mg/kg | - | - | <0.01 | <0.01 | NR_19 |
| **ORGANOPHOSPHATE PESTICIDES *** | | | | | | |
| Dichlorvos | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Demeton-S-methyl | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Diazinon | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Dimethoate | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Chlorpyrifos | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Chlorpyrifos-methyl | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Malathion | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Fenthion | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Ethion | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Fenitrothion | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Chlorfenvinphos (E) | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Chlorfenvinphos (Z) | mg/kg | - | - | <0.1 | <0.1 | NR_19 |

NATA

Accredited for compliance with ISO/IEC 17025 - Testing
[Accreditation Numbers: 12359 (Chemical) & 14565 (Microbiological)]

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian and International standards.

Batch no: 22/1250

| ANALYSIS | UNITS | 22/1250/1 | 22/1250/2 | 22/1250/3 | 22/1250/4 | METHOD NO |
|---|---|---|---|---|---|---|
| Parathion Ethyl | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Parathion Methyl | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Pirimiphos Methyl | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Pirimiphos Ethyl | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Azinphos Methyl | mg/kg | - | - | <0.1 | <0.1 | NR_19 |
| Azinphos ethyl | mg/kg | - | - | <0.1 | <0.1 | NR_19 |

| ANALYSIS | UNITS | 22/1250/5 | | | | METHOD NO |
|---|---|---|---|---|---|---|
| **NMI METALS NT_249** | | | | | | |
| Arsenic* | mg/kg | 2.3 | | | | NT2_49 |
| Cadmium* | mg/kg | <0.5 | | | | NT2_49 |
| Chromium* | mg/kg | 8.4 | | | | NT2_49 |
| Copper* | mg/kg | 3.5 | | | | NT2_49 |
| Lead* | mg/kg | 4.3 | | | | NT2_49 |
| Mercury* | mg/kg | <0.2 | | | | NT2_49 |
| Nickel* | mg/kg | 1.8 | | | | NT2_49 |
| Zinc* | mg/kg | 8.8 | | | | NT2_49 |
| Total Solids* | % | 72.6 | | | | NT2_49 |
| **ORGANOCHLORINE PESTICIDES *** | | | | | | |
| Hexachlorobenzene (HCB) | mg/kg | <0.01 | | | | NR_19 |
| Heptachlor | mg/kg | <0.01 | | | | NR_19 |
| Heptachlor Epoxide | mg/kg | <0.01 | | | | NR_19 |
| Aldrin | mg/kg | <0.01 | | | | NR_19 |
| gamma BHC (Lindane) | mg/kg | <0.01 | | | | NR_19 |
| alpha BHC | mg/kg | <0.01 | | | | NR_19 |
| beta BHC | mg/kg | <0.01 | | | | NR_19 |
| delta BHC | mg/kg | <0.01 | | | | NR_19 |
| trans Chlordane | mg/kg | <0.01 | | | | NR_19 |
| cis Chlordane | mg/kg | <0.01 | | | | NR_19 |
| Oxychlordane | mg/kg | <0.01 | | | | NR_19 |
| Dieldrin | mg/kg | <0.01 | | | | NR_19 |
| DDE pp | mg/kg | <0.01 | | | | NR_19 |
| DDD pp | mg/kg | <0.01 | | | | NR_19 |
| DDT pp | mg/kg | <0.01 | | | | NR_19 |
| Endrin | mg/kg | <0.01 | | | | NR_19 |
| Endrin Aldehyde | mg/kg | <0.01 | | | | NR_19 |
| Endrin Ketone | mg/kg | <0.01 | | | | NR_19 |
| alpha Endosulfan | mg/kg | <0.01 | | | | NR_19 |
| beta Endosulfan | mg/kg | <0.01 | | | | NR_19 |
| Endosulfan sulphate | mg/kg | <0.01 | | | | NR_19 |
| Methoxychlor | mg/kg | <0.01 | | | | NR_19 |
| **ORGANOPHOSPHATE PESTICIDES *** | | | | | | |
| Dichlorvos | mg/kg | <0.1 | | | | NR_19 |
| Demeton-S-methyl | mg/kg | <0.1 | | | | NR_19 |
| Diazinon | mg/kg | <0.1 | | | | NR_19 |
| Dimethoate | mg/kg | <0.1 | | | | NR_19 |

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The results of the tests, calibrations and/or measurements included in this document are traceable to Australian and International standards.

Batch no: 22/1250

| ANALYSIS | UNITS | 22/1250/5 | | | | METHOD NO |
|---|---|---|---|---|---|---|
| Chlorpyrifos | mg/kg | <0.1 | | | | NR_19 |
| Chlorpyrifos-methyl | mg/kg | <0.1 | | | | NR_19 |
| Malathion | mg/kg | <0.1 | | | | NR_19 |
| Fenthion | mg/kg | <0.1 | | | | NR_19 |
| Ethion | mg/kg | <0.1 | | | | NR_19 |
| Fenitrothion | mg/kg | <0.1 | | | | NR_19 |
| Chlorfenvinphos (E) | mg/kg | <0.1 | | | | NR_19 |
| Chlorfenvinphos (Z) | mg/kg | <0.1 | | | | NR_19 |
| Parathion Ethyl | mg/kg | <0.1 | | | | NR_19 |
| Parathion Methyl | mg/kg | <0.1 | | | | NR_19 |
| Pirimiphos Methyl | mg/kg | <0.1 | | | | NR_19 |
| Pirimiphos Ethyl | mg/kg | <0.1 | | | | NR_19 |
| Azinphos Methyl | mg/kg | <0.1 | | | | NR_19 |
| Azinphos ethyl | mg/kg | <0.1 | | | | NR_19 |

**Comments**

Sample(s) collected by client and analysed as received in accordance with "Standard Methods for the Examination of Water & Wastewater", 23rd Edition, 2017, APHA. Raw data sheets stating analysis dates are available upon request.
Tests marked with '#' are not covered by NATA Accreditation.
Note: Microbiological results are membrane presumptive.
Measurement Uncertainty is available upon request.
*Analysis conducted by a subcontracted laboratory (NATA Accreditation Number 198) RN1357849.
Solids samples are reported on a dry weight basis.
Report Date: 12/07/22

Approved:

Shane Ewart
Technical Supervisor
Microbiology and Chemistry

NATA

Accredited for compliance with ISO/IEC 17025 - Testing
[Accreditation Numbers: 12359 (Chemical) & 14565 (Microbiological)]

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian and International standards.

# Wastewater Capability Assessment for 218 East Bank Road Coramba

8 December 2022

For: Jim Cleary:

Authored by: Strider Duerinckx

| Ref | Ver | Date | Distribution |
|---|---|---|---|
| **2021-204-02** | A | 21/2/22 | Client, Planner |
| | B | 16/3/22 | Client, Planner |
| | C | 8/12/22 | Client, Planner |

# 1 Table of Contents



**Figures**

**Appendices**

# 1 Introduction

Earth Water Consulting Pty Limited (EWC) were engaged by Jim Cleary to undertake a Minimum Lot Size (MLS) and Land Capability Assessment (LCA) for the proposed subdivision of 218 East Bank Road Coramba, as shown on Figure 1.

The purpose of the MLS and LCA is to show that wastewater from an On-site Sewage Management System (OSMS) can be sustainably applied on each of the proposed lots.

# 2 Proposed Development

Based on plans of the proposed subdivision layout by Land Metrics Pty Ltd, it is understood that it is proposed to subdivide the subject properties as follows in **Table 1** and shown in Figure 2.

**Table 1: Property Details**

| Existing Property | Lot & DP | Existing Size ($m^2$) | Proposed No. of Lots | Proposed Lot Sizes ($m^2$) |
|---|---|---|---|---|
| **No. 218** | L1 & 2, DP1093448 | 204,500 | 15 | 8,700-23,000 |

# 3 Scope of Work

The MLS and LCA were undertaken by Strider Duerinckx of EWC. The study methodology included:

- A desktop review of Site conditions including geology, hydrogeology, soils, and landscape features;
- A site inspection to map site and soil constraints plus an audit of the existing dwelling OSMS in relation to the proposed subdivision boundary;
- Drilling of seven (7) boreholes to assess soil conditions across the Site;
- Assessment of a range of site constraints including landform, slope, aspect, drainage, flooding and proximity to sensitive environments;
- A minimum lot size analysis involving the review of a number of nearby lot sizes, developed, constrained and available land area footprints;
- Analysis of two selected soil samples for a range of chemical properties including pH, EC, dispersibility, PSorp, CEC and ESP;
- Estimation of likely wastewater loads (quantity and quality) from future dwellings on the proposed lots, and undertake confirmation water and nutrient balance modelling to size suitable land application areas;
- Determining an appropriate level of wastewater treatment and the preferred method of land application of effluent to overcome the constraints on the proposed lots.

# 4 Site Details

The Site is primarily located on the southern side of East Bank Road, with a small portion which lies directly opposite on the corner of East Bank Road and Moses Close. The property is flanked on the east by Orara East State Forest, and otherwise bordered by private properties. The North Coast rail line runs approximately 700 metres to the west, and the Orara River approximately 1,500 metres to the west. The property is zoned RU2 (rural landscape). The proposed disturbance zones for dwellings and wastewater are located in the existing cleared areas.

The property is a combination of cleared zones and forested areas, with ridge and gully systems which generally drain to the northwest. The southern portion of the property is dominated by an elevated ridgeline, which continues through the centre of the property to the northwest until it meets the road edge. The existing dwelling and other structures are located midslope on this ridgeline, and stables, arena and yards for horses further downslope. The proposed access road for the development will track along this ridgeline.

A series of mapped intermittent drainage lines are located across the property, and the most densely forested areas are generally located on these gully lines. Drainage lines on the western side of the ridge line contain two large dams, and a smaller dam is located on one of the intermittent drainage lines on the eastern side of the property.

## 4.1 Existing OSMS

The existing dwelling, productive and ornamental gardens and trees, and shed are located in the central portion of the proposed Lot 10. The existing OSMS consists of an older concrete septic tank ~ 2.4kL and a single absorption trench located to the northwest of the dwelling. The absorption trench will be located within required buffers to the proposed lot boundary and will need to be upgraded as part of the subdivision.

Photograph 1 – Looking southeast along the edge of the existing dwelling on proposed Lot 10.

Photograph 2 – Looking northwest across the existing driveway access for the existing dwelling on proposed Lot 10. The two large dams are located downslope of the fenceline to the LH.

Photograph 3 – The concrete septic tank servicing the existing dwelling on proposed Lot 10.

Photograph 4 – Looking southeast across Proposed Lots6- 9.

Photograph 5 – Looking northwest across proposed Lots 5-6.

Photograph 6 – Looking southwest towards Lot 3, with Lot 4 behind.

Photograph 7 – Looking northeast across proposed Lot 11-13.

Photograph 8 –Looking northeast from Lot 15, with Lots 13-14 in the distance.

## 4.2 Site Constraints

Table 2 summarises the Site constraints for the primary and reserve EMAs for each of the proposed lots. These are discussed in terms of the degree of limitation they present (i.e. minor, moderate or major limitation) for on-site effluent application. Reference is made to the rating scale described in Table 4 of DLG (1998). Site features are presented in Figure 3.

**Table 2: Site Constraints**

| Constraint | Degree of Limitation | | |
|---|---|---|---|
| | Minor | Moderate | Major |
| **Landform:**<br>Linear divergent lower slope<br>Linear divergent mid slope<br>Linear planar mid slope<br>Waning divergent mid slope<br>Linear convergent mid slope | Lot 1<br>Lot 6, 9, 12, 13, 14 | Lot 2, 3, 4, 7, 8, 10<br>Lot 11 | Lot 15 |
| **Exposure:**<br>Good exposure. Minimal trees near the proposed EMAs. | Lot 1, 2, 3, 4, 5, 6, 7,8, 9, 10, 11, 12, 13, 14 | | |

| Constraint | Degree of Limitation | | |
|---|---|---|---|
| | Minor | Moderate | Major |
| Some shading to the east. | | Lot 15 | |
| **Slope:**<br>Lots 121, 171 - Gentle slopes of 0-10% to the west, north and east.<br>Lot 911 – Moderate slopes of 10-20% to the west, north and east. | Lot 1, 11, 12, 15 | Lot 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14 | |
| **Rocks and Rock Outcrops:**<br>No rock outcrops were observed on the Site. | All lots | | |
| **Erosion Potential:**<br>Active erosion risk is lower on the gentle slopes and higher on steeper. Erodible subsoils are present. | Lot 1, 11, 12, 15 | Lot 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14 | |
| **Climate:**<br>The Site experiences a sub-tropical-temperate climate, typical of north-eastern NSW. | All lots | | |
| **Vegetation:**<br>All lots – relatively cleared with forest margins | All lots | | |
| **Fill:**<br>No filling on the proposed EMAs | All lots | | |
| **Surface Waters:**<br>Intermittent drainage lines pass through several of the proposed Lots, however these drainage lines are outside the buffer restriction for the EMA for all Lots except Lot 15.<br>All Lots except 15- >40m | All Lots except 2, 3, 4 and 15 | | Lots 2, 3, 4, 15 |
| **Groundwater: (NSW Office of Water: Groundwater Bore Search)**<br>A number of licensed bores are located around in the vicinity of the property, mainly to the north. | | | All lots |

| Constraint | Degree of Limitation | | |
|---|---|---|---|
| | Minor | Moderate | Major |
|  <br>There are no registered bores on the property. The closest bore is located approximately 215m to the west of the Proposed EMA on Lot 1. This bore (GW062636) was drilled to a final depth of 30 metres, and intersected shale aquifers at between 17 and 19 metres, and between 23 and 25 metres. GW300596 was drilled to 38m depth with a shale aquifer encountered at between 33 and 38 metres. An examination of other local bores shows that water bearing zones are generally not located shallower than the bores described here.<br>Groundwater vulnerability? Clay subsoil, distance and deep groundwater depth indicate that the risk to groundwater would be minimal. | | | |
| **Stormwater run-on and upslope seepage:**<br>Mid to lower slope position with runon risk.<br>Mid slope position. | Lots 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14 | Lots 1, 11, 12, 15 | |
| **Flood Potential:** | All lots | | |

| Constraint | Degree of Limitation | | |
|---|---|---|---|
| | Minor | Moderate | Major |
| The proposed EMAs are not impacted by 1:100-year flood extents on the CHCC flood mapping. | | | |

## 4.3 Soil Survey and Description

### 4.3.1 Regional Soils

We reviewed the Soil Landscapes of the Coffs Harbour 1:100,000 Sheet (Milford, 1999) which indicates that the properties are generally underlain by either the Ulong or Megan Soil Landscapes (Table 3).

**Table 3: Soil Landscape**

| Proposed Lots | Soil Landscape | Type | Typical Profile | Limitations |
|---|---|---|---|---|
| Lots 1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15 | Ulong | Erosional | Moderately deep to deep (>100cm) Red and Brown Earths, Red and Yellow Podzolic Soils, Krasnozems in moistest sites, and Yellow Earths and Yellow Podzolic Soils in drier areas. | Strongly to very strongly acid soils with low wet bearing strength, aluminium toxicity potential and low subsoil fertility, water erosion (localised), steep slopes (localised), high run-on (localised). |
| Lots 5, 6, 7 | Megan | Erosional | moderately deep to deep (>100 cm), well drained structured Red Earths, Brown Earths, Yellow Earths, Brown, Yellow or Red Podzolic Soils and Krasnozems. | strongly acid, aluminium toxicity potential and low subsoil fertility, stony (localised) steep slopes (localised), high water erosion hazard (localised). |

Soils were assessed by drilling a total of seven (7) boreholes across the Site (Figure 3) to 1.2m depth. Three different toil profiles were encountered.

For boreholes 1 to 5 these soils comprised:

- Between 150 - 300mm of sandy clay loam topsoil, black through to orange brown, occasional slight orange mottling, with strong structure and >10% coarse fragments; overlying
- Approximately 400 - 700mm of light clay, silty clay or sandy clay subsoil, with occasional brown grey or white mottling, with strong structure and >5% coarse fragments, overlying;

- Approximately 250 - 500mm of light clay, silty clay or sandy clay, orange red, yellow brown or pale yellow to white, with occasional white or orange to yellow brown mottling; overlying
- (Boreholes 1 and 4 only) At least 150mm of extremely weathered bedrock, White to pale yellow brown grey with slight orange mottling.

For Borehole 6, soils comprised:

- Approximately 150mm of clay loam topsoil, black, with strong structure and >5% coarse fragments; overlying
- Approximately 150mm of clay loam, pale brown with dark brown mottling, overlying;
- At least 900mm of clay loam, red brown with strong structure and >5% coarse fragments.

For borehole 7, soils comprised:

- Approximately 200mm of sandy clay loam topsoil, black, with strong structure and >5% coarse fragments; overlying
- Approximately 500mm of sandy clay loam, pale brown, alluvial/transferal in origin, with strong structure and >5% coarse fragments; overlying
- At least 500mm of sandy clay loam, pale yellow brown, transferal in origin, with strong structure and >5% coarse fragments.

There was variability in the soil profile with position on the landscape, but all generally fit the profile or either the Megan or Ulong soil landscapes.

Competent bedrock was not encountered in the boreholes. The borehole logs are provided in Appendix A.

Photograph 9 – BH3 soil profile.

Photograph 10 – BH6 soil profile.

Photograph 11 – BH7 soil profile.

## 4.4 Soil Chemistry

Table 4 summarises the key soil physical and chemical assessments. Reference is made to the rating scale described in Table 6 of DLG (1998). Two samples were selected for laboratory analysis (BH2 0.6-0.8, BH6 0.6-0.8). The laboratory report is included in Appendix B.

**Table 4: Soil Assessment**

| Parameter | Constraint | | |
|---|---|---|---|
| | Minor | Moderate | Major |
| **Depth to bedrock or hardpan (m):**<br>Boreholes were terminated at 1.2m depth in soil.<br>It is believed that competent bedrock will be located at >1.5m based on soil landscape and position. | All lots | | |
| **Depth to high soil watertable:**<br>The depth of the vadose zone (i.e. non-saturated soil material above watertable) was greater than 1.2m at the time of the investigation. The depth to the permanent groundwater aquifer is expected to be more than 7m depth based on local groundwater bores. | All lots | | |
| **Coarse Fragments (%):**<br>The subsoils contained <10% coarse fragments. | All lots | | |
| **Hydraulic loading rate:**<br>Soil structure: Strong<br>Soil texture: Light clays<br>Permeability category: Category 4a/5a<br>Hydraulic loading recommended: 12-8mm/day for primary, and 20-12mm/day secondary treated effluent into an absorption bed field and 3.5-3mm/day for SSI.<br>Reasons for the hydraulic loading recommendation: Strongly structured clay loam/clay subsoils. | Lot 12, 13, 14, 15 | Lot1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 | |
| **pH:**<br>4.33-4.69 pH Units from. Acidic coastal soils. Not ASS. | | | All lots |
| **Electrical Conductivity (dS/m):**<br>0.104 -0.169 dS/m. Not saline. | All lots | | |

| Parameter | Constraint | | |
|---|---|---|---|
| | Minor | Moderate | Major |
| **Dispersiveness:** Class 3/6 (Slake 2/3). The instability of these aggregates is expected to increase slightly with the application of effluent. | | All lots | |
| **Sodicity (ESP):** ESP of 0.5-2.0%. The ESP infers a minimal potential for structural degradation. | All lots | | |
| **Cation Exchange Capacity:** CEC was measured at 3.5-7.2 cmol/kg, which indicates that the soils have a high ability to accept and release excess nutrients from effluent. | All lots | | |
| **Phosphorus Adsorption:** Psorp of 12, 820, 18,344kg/ha were reported in the subsoils. | All lots | | |

# 5 Minimum Lot Size (MLS) Analysis

A minimum lot size analysis and modelling were completed to determine the maximum lot density suitable for subdivision on the Site.

## 5.1 Methodology

When considering the suitability for a lot to sustainably manage wastewater on-site, we typically refer to 'available effluent management area'. This broadly refers to available areas (i.e. not built out or used for a conflicting purpose) where OSMS will not be unduly constrained by site and soil characteristics. Available area on a developed lot is determined by the following factors:

- total building area (including dwellings, sheds, pools etc.) which includes a defined building envelope but may extend beyond with additional improvements to a property, such as driveways and paths (impervious areas), and gardens/vegetated areas unsuitable for effluent reuse;
- dams, intermittent and permanent watercourses running through lots;
- maintenance of appropriate buffer distances from property boundaries, buildings, driveways and paths, dams and watercourses;
- flood prone land;
- excessive slope;

- excessively shallow soils;
- heavy (clay) soils with low permeability;
- excessively poor drainage, shallow groundwater and/or stormwater run-on; and
- excessive shading by vegetation.

The residual areas (areas not otherwise occupied by improvements, buffers, restrictions or conservation vegetation) were then calculated for the selected lots (Figure 8), and the available area compared to the wastewater envelope required.

## 5.2 MLS Buffer Distances

Buffer distances from EMAs are typically enforced to minimise risk to public health, maintain public amenity and protect sensitive environments. Generally, adopted environmental buffers for secondary treated effluent land applied into absorption trenches/ beds based on DLG (1998) are:

- 250m from domestic groundwater bores;
- 100m from permanent watercourses;
- 40m from intermittent watercourses and dams;
- 6m from downslope property boundaries and 3m from upslope property boundaries; and
- 6m from downslope buildings and 3m from upslope buildings.

In addition, developed areas such as inground water tanks and swimming pools were also buffered.

Primary treatment was selected as default due to proposed lots in the current investigation area being ~10,000m$^2$.

## 5.3 MLS Comparative Lots Assessed

Four nearby representative lots were selected that have already been subdivided (Table 5) (Figure 4). The lots ranged in size from 4,003m$^2$ – 11,550m$^2$ area. The next available lot sizes greater than this East Bank Road or Orara Way are approximately 20,000m$^2$ or larger, and given the 8,800-23,000m$^2$ proposed for the properties with the majority under 13,000m$^2$ the larger lot sizes were not considered appropriate to compare to. As such the smaller lots assessed provide a worst-case scenario of OSMS restrictions.

**Table 5: Comparative Lots Assessed**

| Address | Lot Area (m$^2$) | Zoning |
|---|---|---|
| **169 Orara Way** | 11,550 | C2 R5 |
| **173 Orara Way** | 10,850 | C2 R5 |
| **270 East Bank Road** | 4,003 | RU2 |
| **272 East Bank Road** | 4,021 | RU2 |

The properties typically included a dwelling, garage/shed, landscaped trees, shrubs and gardens, driveways, water tanks, and recreational space. This development style will be similar to that proposed for the Site and therefore minimum lot size and development potential should be consistent.

## 5.4 MLS Assessed Available EMA

**Table 6** shows the assessment of available effluent management areas for each of the assessed lots. As is evident, the variability of lot sizes, on-lot improvements and restrictions of developed lots makes selection of a "typical" lot difficult, however comparison of the site constraints indicates that minimum lot size is the most significant issue to address.

**Table 6: Minimum Lot Size Assessment Results**

| Id | Lot Area ($m^2$) | Developed Area ($m^2$)[1] | Total Restricted Area ($m^2$)[2] | Available Eff. Application Area ($m^2$) | Percent of Lot Available for Eff. Disp. (%) | >1,050$m^2$ Area Available for Primary Treatment? |
|---|---|---|---|---|---|---|
| **169** | 11,550 | 979 | 6,484 | 5,066 | 44 | Yes |
| **173** | 10,850 | 1,340 | 6,212 | 4,638 | 43 | Yes |
| **270** | 4,003 | 560 | 2,354 | 1,649 | 41 | Yes |
| **272** | 4,021 | 632 | 2,180 | 1,841 | 46 | Yes |

1. House, driveway, shed etc
2. Includes developed area, protected vegetation and buffers to waterways and boundaries

## 5.5 Discussion

A comparison of nearby properties suggests that:

- The assessed properties are between 4,000-11,000$m^2$ in footprint, providing a range suitable for analysis of the proposed Lot sizes ranging from 8,700$m^2$ to 23,000$m^2$.
- The larger properties have in excess of 4,000$m^2$ available for effluent management, and the two smaller properties still have in excess of 1,500$m^2$ available.
- Typically, available area for effluent application represents about 30-50% of the total lot area, the smaller the lot, the same development footprint requirements impact on land area available for effluent application;
- Allowing for additional developed footprint such as sheds and swimming pools that may not be present currently, and constraints such as buffers to gullies and protected forest vegetation, the minimum 1,050$m^2$ footprint typically required for a primary treatment and land application OSMS would still be able to be met in most lots;

- Due to the presence of gullies passing through Lots 2-4 and 15 the percentage of available area in relation to lot size is reduced on the Site in comparison to the lots assessed in the MLS. For Lots 2-4 and 15 secondary treatment and land application is required to meet buffers; and
- The Site is more heavily impacted by the presence of gullies and dams than the assessed properties, as such a minimum 8,000m$^2$ lot sizing would generally be considered acceptable with a minimum developable area of 4,000m$^2$.

# 6 Recommended OSMS Combination

Due to the cost of reticulated sewerage provision by Council, it is expected that the properties will not be sewered in the foreseeable future.

Based on the site and soil constraints and subdivision boundaries, the minimum treatment and land application combination selected for 218 East Bank Road Coramba are shown in **Table 7**.

**Table 7: Minimum OSMS Combination**

| Lot | Minimum Treatment Quality | Minimum Land Application Type |
|---|---|---|
| **1 and, 5-14** | Primary | Subsurface absorption |
| **2-4 and 15** | Secondary | Subsurface absorption or subsurface irrigation. |

Alternative OSMS combinations including compost with split greywater treatment, or primary treatment and polishing in Wisconsin sand mounds may also be suitable subject to site and soil constraints (e.g. slope).

# 7 Effluent Management Areas

## 7.1 Design Hydraulic Load

For hydraulic loading purposes a proposed dwelling of four bedrooms on tank water was assumed for the proposed lots. AS/NZS1547:2012 recommends that a wastewater generation load of 120L per person per day for households supplied by tank water be used as a basis for wastewater system design. The hydraulic load for the existing and proposed dwellings is based on 1.5 persons per bedroom. The design hydraulic loading for a four-bedroom dwelling under full occupancy is presented in Table 8.

**Table 8: Proposed Design Hydraulic Load**

| No. of Bedrooms | Design Wastewater Load (L/day) |
|---|---|
| **4** | 720 |

## 7.2 Sizing of Effluent Management Areas

Water balance modelling was undertaken to determine sustainable effluent application rates, and from this estimate the necessary size of the EMA required for effluent to be applied from a primary treatment system trench or beds. The procedures used in the water balance generally follow the *AS/NZS 1547:2012* standard and DLG (1998) Guideline. The water balance used is a monthly nominated area model. These calculations determined minimum EMAs for given effluent loads for each month of the year. The water balance can be expressed by the following equation:

Precipitation + Effluent Applied = Evapotranspiration + Percolation + Storage

The input data for the primary and secondary treated trench/ bed water balance are presented in Table 9, and calculation sheets in Appendix C. A cay subsoil across all proposed lots was conservatively assumed and modelled.

A conservative nutrient balance was also undertaken, which calculates the minimum buffer around a trench or bed to enable nutrients to be assimilated by the soils and vegetation. The nutrient balance used here is based on the simplistic DLG (1998) methodology but improves this by more accurately accounting for natural nutrient cycles and processes. It acknowledges that a proportion of nitrogen will be retained in the soil through processes such as ammonification (the conversion of organic nitrogen to ammonia) and a certain amount will be lost by denitrification, microbial digestion and volatilisation. A summary of the inputs for the nutrient calculations are provided in Table 9.

**Table 9: Inputs into Water and Nutrient Balance Modelling**

| Data Parameter | Units | Value | Comments |
|---|---|---|---|
| **Hydraulic load** | L/day | 720 | 6 persons occupancy. |
| **Precipitation** | mm/month | Coramba | BoM, Median monthly. |
| **Pan Evaporation** | mm/month | Coffs Harbour MO | BoM, mean monthly. |
| **Retained rainfall** | unitless | 0.9 | Proportion of rainfall that remains onsite and infiltrates the soil, allowing for 10% runoff. |
| **Crop Factor** | unitless | 0.6-0.8 | Expected annual range for vegetation based on monthly values. |
| **Design Loading Rate (DLR) - Primary** | mm/day | 8-12 | Maximum rate for design purposes, based on strongly structured clay subsoils. |
| **Effluent total nitrogen concentration** | mg/L | 60-30 | Target effluent quality for primary and secondary treatment systems. |
| **Effluent total phosphorus concentration** | mg/L | 15-12 | Target effluent quality for primary and secondary treatment systems. |

| Data Parameter | Units | Value | Comments |
|---|---|---|---|
| **Soil phosphorus sorption capacity** | kg/ha | 12,820 | Value based on soil testing. |
| **Nitrogen uptake rate by plants** | kg/Ha/yr | 250 | Conservative estimated value. |
| **Phosphorus uptake rate by plants** | kg/Ha/yr | 25 | Conservative estimated value. |
| **Design life of system (for nutrient management)** | years | 50 | Reasonable minimum service life for system. |

The results of the modelling are shown in **Error! Reference source not found.** and the proposed locations of the EMAs are shown on Figure 5. Based on modelling, Lots 1, and 5-14 have sufficient buffers to allow for a primary treated EMA and for Lots 2-4 and 15 for a secondary treated EMA.

**Table 10: Results of Treatment Modelling and Land Application Area Sizing**

| Parameter | Primary Treated EMA | Secondary Treated EMA |
|---|---|---|
| **Minimum primary treatment trench/ bed basal area for hydraulic load (m2)** | 102m$^2$ (244m$^2$ absorption trench field footprint) | 68m$^2$ (181m$^2$ absorption trench field footprint) |
| **Minimum area for total phosphorus load (m$^2$)** | 257m$^2$ | 206m$^2$ |
| **Minimum area for total nitrogen load (m$^2$)** | **505m$^2$** | **252m$^2$** |

A primary treatment EMA of 505m$^2$ plus that again in reserve (totalling 1010m$^2$) has been allocated for Lots 1, and 5-14, and a secondary treatment EMA of 252m$^2$ plus that again in reserve (totalling 504m$^2$) has been allocated for Lots 2-4 and 15.

The actual size and configuration of the EMAs will be dependent on a wastewater management plan at the time of dwelling development planning and application to install or upgrade an OSMS.

# 8 Upgrades to Existing OSMS

Upgrades to the existing OSMS are required for the existing dwelling on proposed Lot 10 to enable the proposed subdivision. The absorption trench is located on the proposed road to the south of the dwelling A replacement primary treatment EMA of 505m$^2$ has been allocated on the Lot plus a reserve EMA of 505m$^2$.

# 9 Buffers

Buffer distances or setbacks from EMAs are required to minimise risk to public health, maintain public amenity and protect sensitive environments. The buffers from DLG (1998) are presented in **Table 11** below.

**Table 11: Available Buffers**

| Site Feature | DLG (1998) Buffer | Achievable? |
|---|---|---|
| **Intermittent watercourses, drainage channels and dams** | 40m | **Yes** |
| **Permanent waterways** | 100m | **Yes** |
| **Domestic groundwater bore** | 250m | **No, 215m.** |
| **Property boundary** | Primary - 6m downslope / sideslope of, and 12m sideslope or upslope of | **Yes** |
| **Driveway and building** | 6m downslope of / 3m upslope of | **Yes** |

Although some of the recommended EMAs fall within the 250m buffer to a domestic groundwater bore required by DLG (1998), this guideline did not provide any scientific justification for that buffer and the document is dated about 22 years ago. Appendix R of AS/NZS1547:2012, a more recent document and a national standard provides the ability to risk assess buffers based on site and soil constraints.

The maximum risk assessed buffer in AS/NZS1547:2012 to bores or wells is 50m for high-risk scenarios such as shallow high resource groundwater, aquifers in highly porous soils or rock, and surface or above ground effluent land application.

The recommended minimum OSMS combination poses a lower risk than this worst case, and the local groundwater aquifer is relatively deep at >40m depth beneath a substantial clay soil layer. As such a lesser risk assessed buffer would be expected.

In any case, all recommended EMAs would be located >50m (200m min) from the nearest bores and the land application of effluent following the proposed subdivision would be considered to pose minimal risk to the source aquifer.

# 10 Conclusions & Recommendations

Having undertaken a minimum lot size and land capability assessment for the proposed subdivision of 218 East Bank Road Coramba, EWC consider that there is the opportunity for the sustainable application of wastewater following subdivision of the existing property into 15 smaller lots.

For Lots 1 and 5-14 a primary treatment and subsurface land application OSMS combination is recommended. For Lots 2-4 and 15 a secondary treatment and subsurface land application OSMS combination is recommended.

For any future system we recommend that:

- A dwelling specific OSMS should be designed by an experienced professional, taking into account the assumptions and recommendations contained in this report; and
- An OSMS should be installed by a suitably qualified plumber, ensuring that effluent is distributed evenly across the entire area serviced.

# 11 References

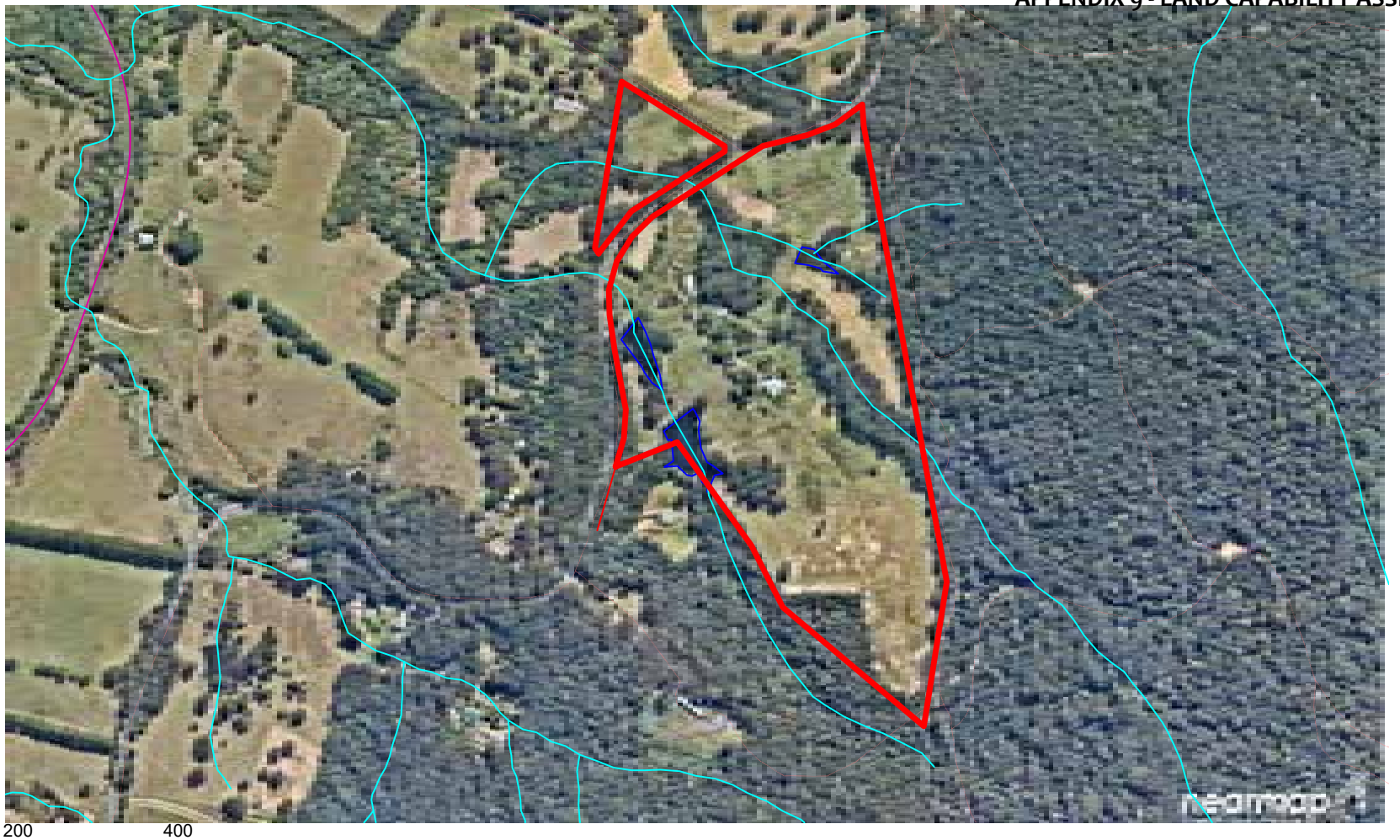
Coffs Harbour City Council (2015) *On-site Sewage Management Strategy 2015*, Coffs Harbour.

Department of Local Government et al. (1998). *Environment & Health Protection Guidelines: On-site Sewage Management for Single Households*.

Milford, H. B., (1999) *Soil Landscapes of the Coffs Harbour 1:100 000 Sheet*, Department of Land and Water Conservation Soil Landscape Series.

Standards Australia / Standards New Zealand (2012*). AS/NZS 1547:2012 On-site Domestic-wastewater Management*.

# FIGURES



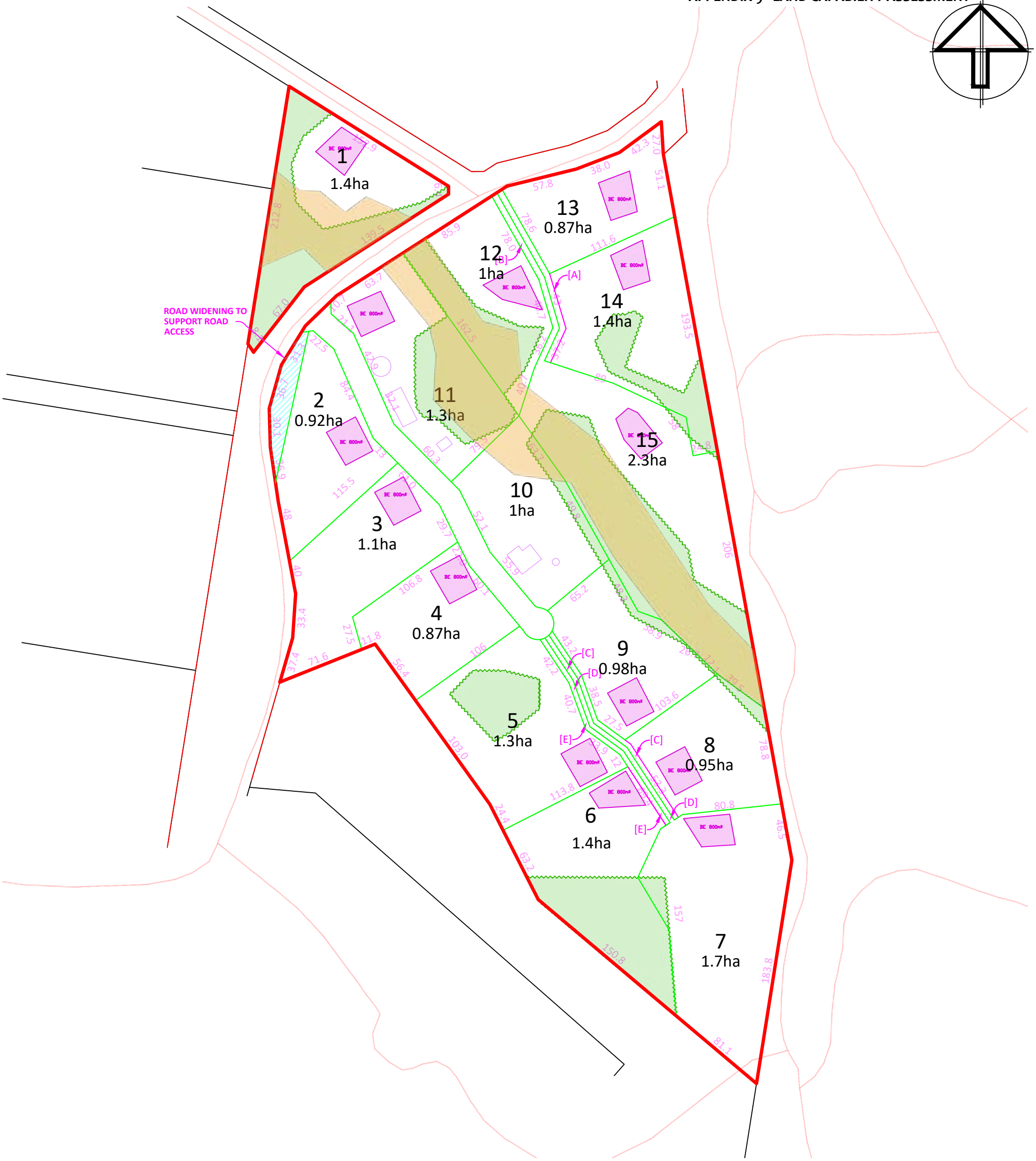

0 200 400

Horizontal Scale (metres) 1:8000

LEGEND

- Property Boundary
- Contour (10m)
- Drainage Alignment
- Proposed Building Envelope

| | | | | | |
|---|---|---|---|---|---|
| TITLE: Site Location | | | PROJECT: LCA for 218 East Bank Road Coramba | | CLIENT: Jim Cleary |
| FIGURE: Figure 1 | | | | | |
| SHEET: 1 OF 1 | ISSUE: B | AUTHOR: SD | DATE: 16/3/22 | SCALE: 1:8000 | PROJECT: 2021–204 |




0 50 100 150

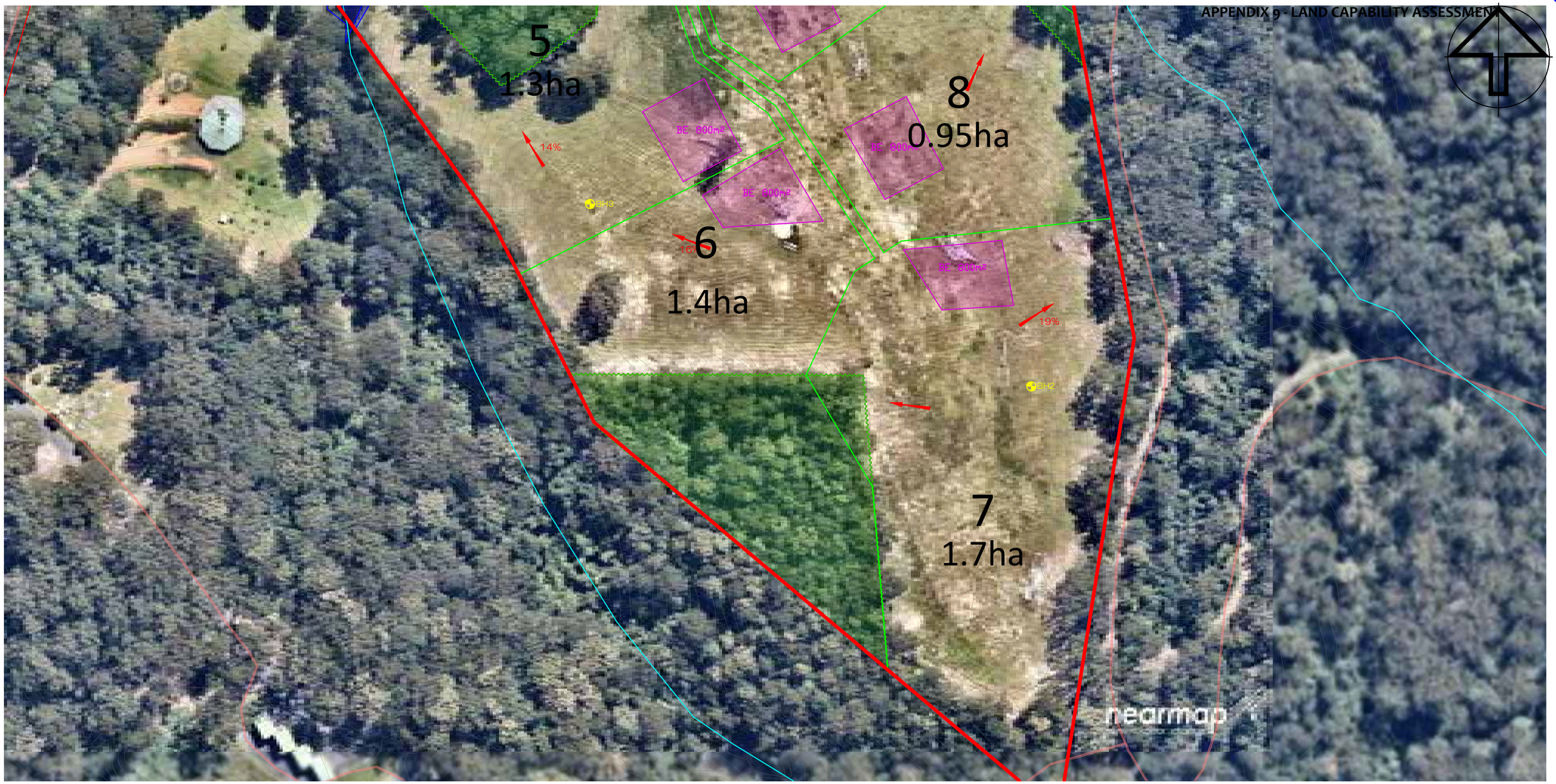
Horizontal Scale (metres) 1:3000

LEGEND

- Property Boundary
- Subdivison Boundary
- Drainage Alignment
- Proposed Building Envelope
- Existing Building
- Vegetation Line
- C2 Zoning

EARTH WATER CONSULTING

| | | | |
|---|---|---|---|
| TITLE: Proposed Development Layout | | | FIGURE: Figure 2 |
| | | | SHEET: 1 OF1 ISSUE: B |
| PROJECT: LCA for 218 East Bank Road Coramba | | | CLIENT: Jim Cleary |
| AUTHOR: SD | DATE: 5/12/22 | SCALE: 1:3000 | PROJECT: 2021-204 |



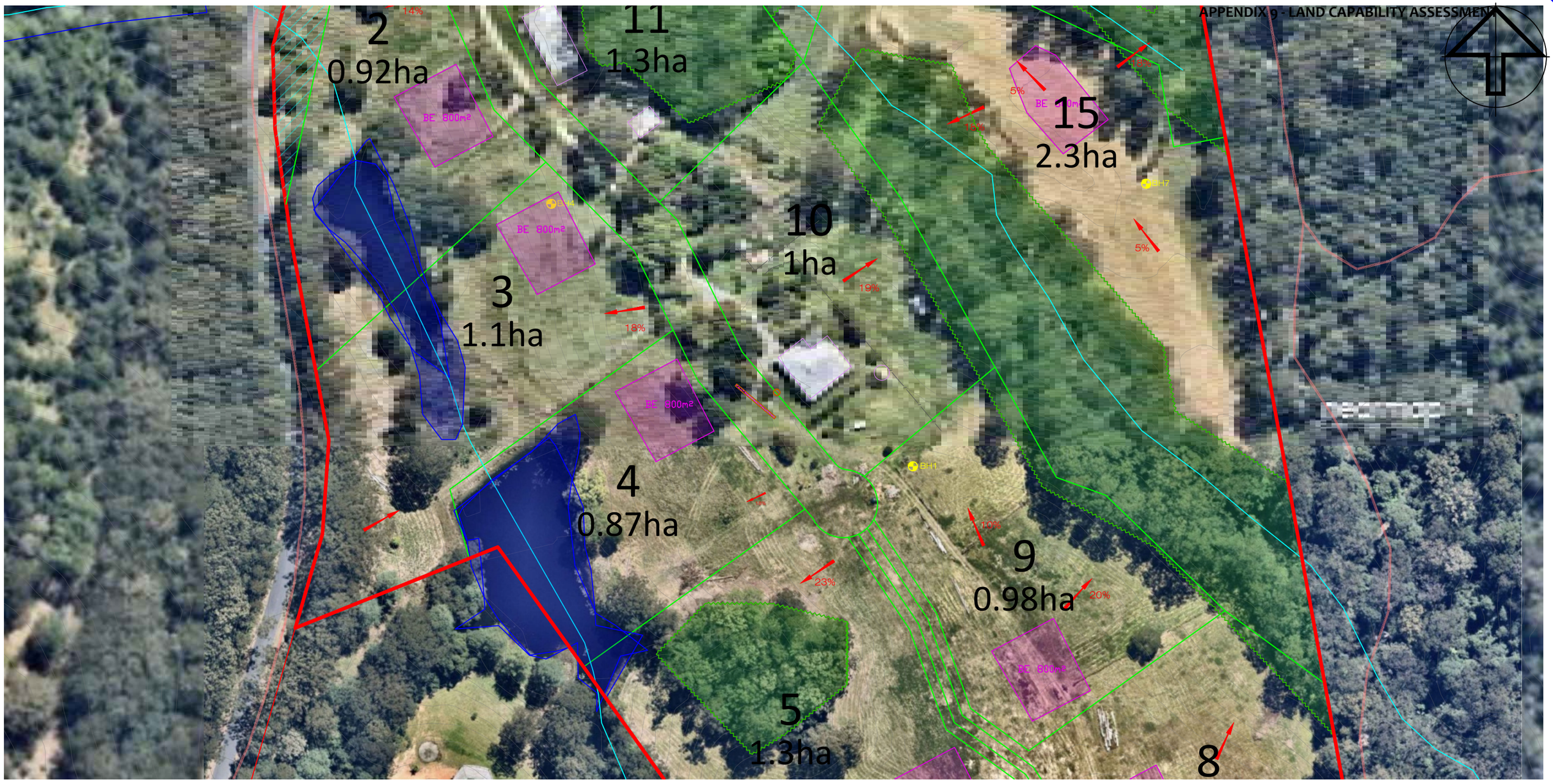

0 20 40 60 80

Horizontal Scale (metres) 1:1500

LEGEND

- Property Boundary
- Proposed Subdivision Boundary
- Proposed Building Envelope
- Drainage Alignment
- Edge of Vegetation Line
- Existing Building
- Existing OSMS
- Contour Line (1m)
- Slope % Slope Direction and Extent
- Approximate Borehole Location

| | | | |
|---|---|---|---|
| TITLE: Existing Site Layout | | | FIGURE: Figure 3 |
| | | | SHEET: 1 OF 3 / ISSUE: B |
| PROJECT: LCA for 218 East Bank Road Coramba | | | CLIENT: Jim Cleary |
| AUTHOR: SD | DATE: 5/12/22 | SCALE: 1:1500 | PROJECT: 2021-204 |



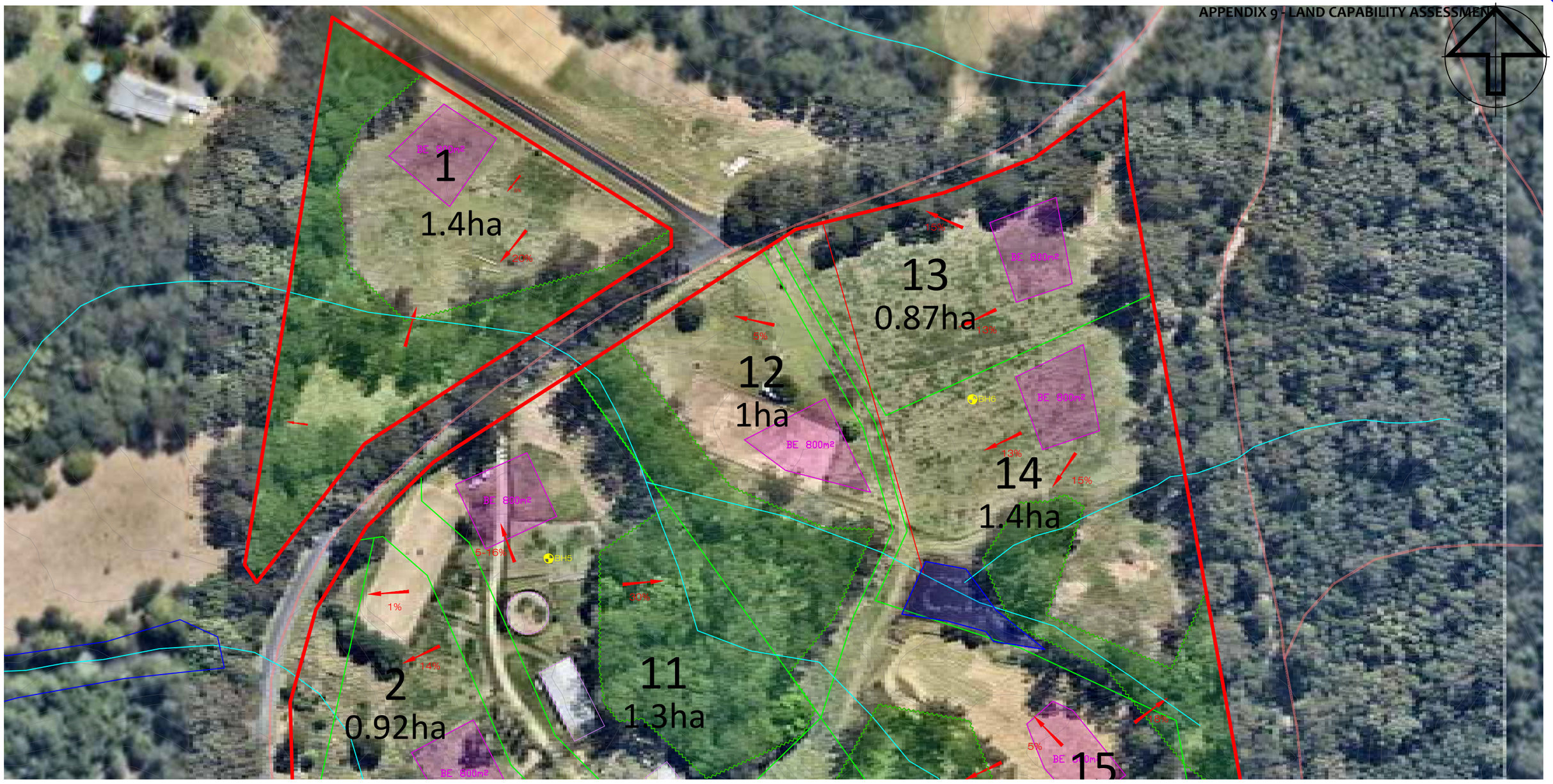

0 20 40 60 80

Horizontal Scale (metres) 1:1500

LEGEND

- Property Boundary
- Proposed Subdivision Boundary
- Proposed Building Envelope
- Drainage Alignment
- Edge of Vegetation Line
- Existing Building
- Existing OSMS
- Contour Line (1m)
- Slope % Slope Direction and Extent
- Approximate Borehole Location

| | | | |
|---|---|---|---|
| TITLE: Existing Site Layout | | | FIGURE: Figure 3 |
| | | | SHEET: 2 OF 3 / ISSUE: A |
| PROJECT: LCA for 218 East Bank Road Coramba | | | CLIENT: Jim Cleary |
| AUTHOR: SD | DATE: 5/12/22 | SCALE: 1:1500 | PROJECT: 2021-204 |




0 20 40 60 80

Horizontal Scale (metres) 1:1500

LEGEND

- Property Boundary
- Proposed Subdivision Boundary
- Proposed Building Envelope
- Drainage Alignment
- Edge of Vegetation Line
- Existing Building
- Existing OSMS
- Contour Line (1m)
- Slope % Slope Direction and Extent
- Approximate Borehole Location

| | | | |
|---|---|---|---|
| TITLE: Existing Site Layout | | | FIGURE: Figure 3 |
| | | | SHEET: 3 OF 3 / ISSUE: B |
| PROJECT: LCA for 218 East Bank Road Coramba | | | CLIENT: Jim Cleary |
| AUTHOR: SD | DATE: 5/12/22 | SCALE: 1:1500 | PROJECT: 2021-204 |

0 25 50

Horizontal Scale (metres) 1:1000

169 & 173 Orara Way Coramba

270 and 272 East Bank Road Coramba

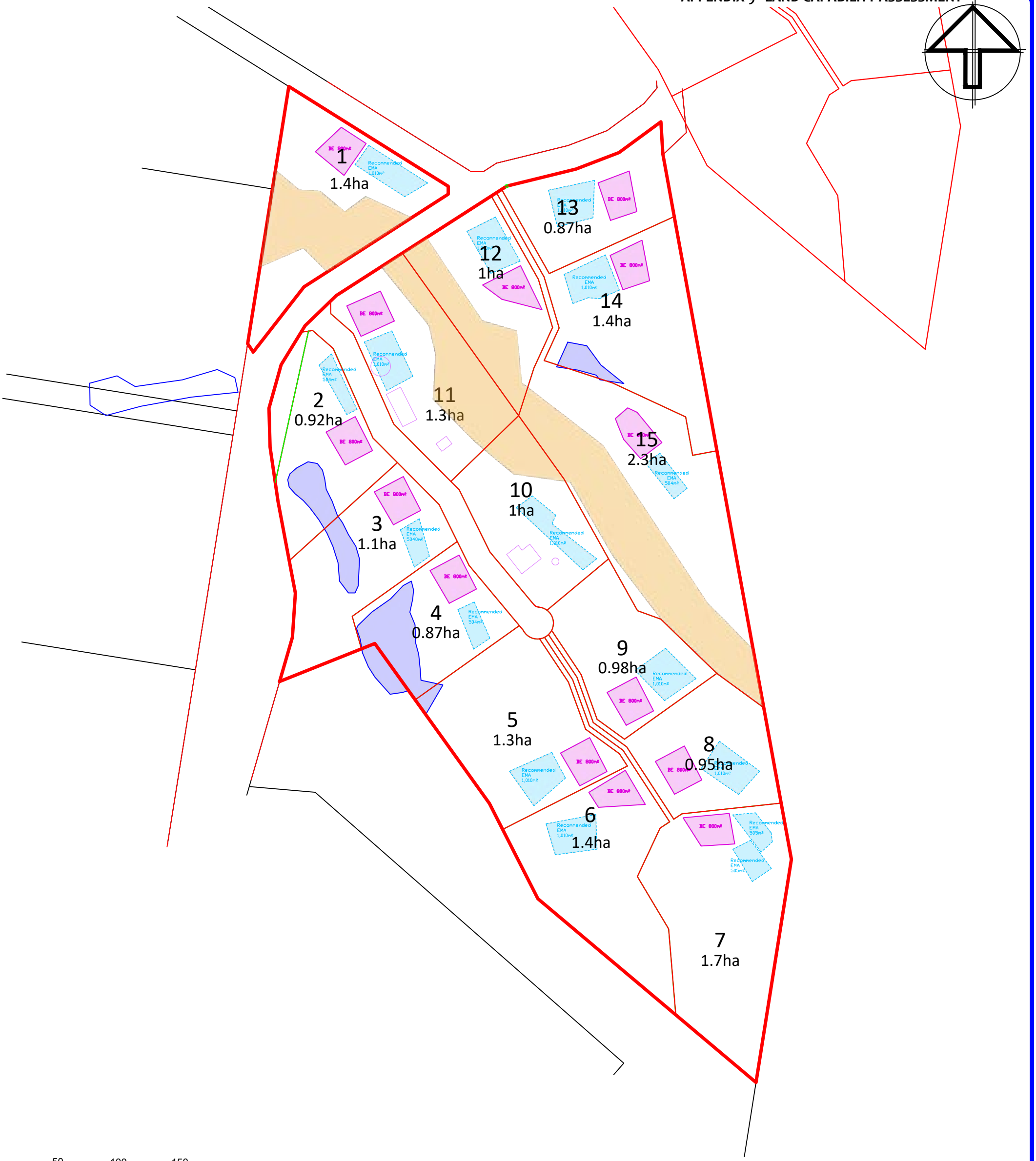
LEGEND

Property Boundary

EMA Available Area

EMA Restricted Area

| | | | |
|---|---|---|---|
| TITLE: Comparative Lot Size Constraints | | | FIGURE: Figure 4 |
| | | | SHEET: 1 OF1 ISSUE: A |
| PROJECT: LCA for 218 East Bank Road Coramba | | | CLIENT: Jim Cleary |
| AUTHOR: SD | DATE: 08/02/22 | SCALE: 1:1000 | PROJECT: 2021-204 |




0 50 100 150

Horizontal Scale (metres) 1:3000

LEGEND

- Property Boundary
- Proposed Subdivision Boundary
- Proposed Building Envelope
- Recommended EMA Outline

| | | | |
|---|---|---|---|
| TITLE: Recommended Effluent Management Areas | | | FIGURE: Figure 5 |
| | | | SHEET: 1 OF3 ISSUE: A |
| PROJECT: LCA for 218 East Bank Road Coramba | | | CLIENT: Jim Cleary |
| AUTHOR: SD | DATE: 5/12/22 | SCALE: 1:3000 | PROJECT: 2021-204 |

3
1.1ha
4
0.87ha
5
1.3ha
6
1.4ha
7
1.7ha
8
0.95ha
9
0.98ha

Recommended EMA 5040m²
Recommended EMA 504m²
Recommended EMA 1,010m²
Recommended EMA 505m²
BE 800m²
[C]
[D]
[E]

0 20 40 60 80
Horizontal Scale (metres) 1:1500

LEGEND
- Property Boundary
- Proposed Subdivision Boundary
- Proposed Building Envelope
- Recommended EMA Outline

| | | | |
|---|---|---|---|
| TITLE: Recommended Effluent Management Areas | | | FIGURE: Figure 5 |
| | | | SHEET: 2 OF3 ISSUE: A |
| PROJECT: LCA for 218 East Bank Road Coramba | | | CLIENT: Jim Cleary |
| AUTHOR: SD | DATE: 5/12/22 | SCALE: 1:1500 | PROJECT: 2021-204 |

3
1.1ha

4
0.87ha

5
1.3ha

6
1.4ha

7
1.7ha

8
0.95ha

9
0.98ha

Recommended EMA 5040m²
Recommended EMA 504m²
Recommended EMA 1,010m²
Recommended EMA 505m²
BE 800m²
[C]
[D]
[E]

0 20 40 60 80
Horizontal Scale (metres) 1:1500

LEGEND
- Property Boundary
- Proposed Subdivision Boundary
- Proposed Building Envelope
- Recommended EMA Outline

EARTH WATER CONSULTING

| | | | |
|---|---|---|---|
| TITLE: Recommended Effluent Management Areas | | | FIGURE: Figure 5 |
| | | | SHEET: 3 OF3 ISSUE: A |
| PROJECT: LCA for 218 East Bank Road Coramba | | | CLIENT: Jim Cleary |
| AUTHOR: SD | DATE: 5/12/22 | SCALE: 1:1500 | PROJECT: 2021-204 |

# APPENDIX A

# Soil Borelog

| | |
|---|---|
| **Borehole No:** | **BH1** |
| Logged by: | AS |
| Drilling date: | 28/07/2021 |
| Drilling method: | Powered Auger |
| Borehole location: | Figure 2 |
| Borehole coords: | 502753, 6657514 |

| | |
|---|---|
| Project ref: | 2021-204 |
| Client: | Jim Cleary |
| Address: | 218 East Bank Road Coramba |

## PROFILE DESCRIPTION

| Depth (m) | Sampling depth/name | Graphic Log | Horizon | Texture | Structure | Colour | Mottles | Coarse Fragments | Moisture Condition | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | | | A1 | Sandy Clay Loam | Strong | Orange Brown | Nil | < 5% | SM | Topsoil |
| 0.2 | | | B1 | Light Clay | Strong | Orange | Nil | Nil | SM | Residual |
| 0.3 | | | | | | | | | | |
| 0.4 | | | | | | | | | | |
| 0.5 | | | | | | | | | | |
| 0.6 | | | B2 | Light Clay | Strong | Orange | 10% Grey White | Nil | SM | Residual |
| 0.7 | | | | | | | | | | |
| 0.8 | | | | | | | | | | |
| 0.9 | | | B3 | Silty Clay | Strong | White and Orange | 10% Grey White | Nil | SM | Residual |
| 1.0 | | | | | | | | | | |
| 1.1 | | | B4 | Extremely Weathered Bedrock | Moderate | White | Orange | Nil | SM to D | XWB |
| 1.2 | | | | | | | | | | |
| 1.3 | | | Borehole terminated at 1.2m | | | | | | | |
| 1.4 | | | | | | | | | | |
| 1.5 | | | | | | | | | | |

## Moisture condition

| | | | | | |
|---|---|---|---|---|---|
| D | Dry | M | Moist | W | Wet / saturated |
| SM | Slightly moist | VM | Very moist | | |

# Soil Borelog

| | |
|---|---|
| **Borehole No:** | **BH2** |
| Logged by: | AS |
| Drilling date: | 28/07/2021 |
| Drilling method: | Powered Auger |
| Borehole location: | Figure 2 |
| Borehole coords: | 502894, 6657289 |

| | |
|---|---|
| Project ref: | 2021-204 |
| Client: | Jim Cleary |
| Address: | 218 East Bank Road Coramba |

## PROFILE DESCRIPTION

| Depth (m) | Sampling depth/name | Graphic Log | Horizon | Texture | Structure | Colour | Mottles | Coarse Fragments | Moisture Condition | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | | | A1 | Sandy Clay Loam | Strong | Grey Brown | 5% Orange | < 5% | SM | Topsoil Quartz Fragments |
| 0.2 | | | B1 | Sandy Clay Loam | Strong | Orange Brown | Slight Orange Brown | Nil | SM | |
| 0.3 | | | | | | | | | | |
| 0.4 | | | B2 | Light Clay | Strong | Orange | 5% Brown | Nil | SM | Residual |
| 0.5 | | | | | | | | | | |
| 0.6 | | | | | | | | | | |
| 0.7 | S | | | | | | | | | |
| 0.8 | | | | | | | | | | |
| 0.9 | | | | | | | | | | |
| 1.0 | S | | B3 | Light Clay | Strong | Yellow Orange | Nil | Nil | SM to D | Residual |
| 1.1 | | | | | | | | | | |
| 1.2 | | | | | | | | | | |
| 1.3 | | | | | Borehole terminated at 1.2m | | | | | |
| 1.4 | | | | | | | | | | |
| 1.5 | | | | | | | | | | |

## Moisture condition

| | | | | | |
|---|---|---|---|---|---|
| D | Dry | M | Moist | W | Wet / saturated |
| SM | Slightly moist | VM | Very moist | | |

# Soil Borelog

| | |
|---|---|
| **Borehole No:** | **BH3** |
| Logged by: | SD |
| Drilling date: | 28/07/2021 |
| Project ref: | 2021-204 |
| Drilling method: | Powered Auger |
| Client: | Jim Cleary |
| Borehole location: | Figure 2 |
| Address: | 218 East Bank Road Coramba |
| Borehole coords: | 502726, 6657359 |

## PROFILE DESCRIPTION

| Depth (m) | Sampling depth/name | Graphic Log | Horizon | Texture | Structure | Colour | Mottles | Coarse Fragments | Moisture Condition | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | | | A1 | Sandy Clay Loam | Strong | Black | Nil | 5 - 10% | SM | Topsoil |
| 0.2 | | | B1 | Sandy Clay Loam | Strong | Pale Brown | Slight Orange Brown | 5 - 10% | SM | |
| 0.3 | | | | | | | | | | |
| 0.4 | | | B2 | Light Clay | Strong | Orange to Red Brown | 5% Brown | < 5% | SM | Residual Some sand visible |
| 0.5 | | | | | | | | | | |
| 0.6 | | | | | | | | | | |
| 0.7 | | | | | | | | | | |
| 0.8 | | | | | | | | | | |
| 0.9 | | | | | | | | | | |
| 1.0 | | | B3 | Light Clay | Strong | Orange to Red Brown | Nil | 5 - 10% | SM to D | Residual Gravelly layer |
| 1.1 | | | | | | | | | | |
| 1.2 | | | | | | | | | | |
| 1.3 | | | | | Borehole terminated at 1.2m | | | | | |
| 1.4 | | | | | | | | | | |
| 1.5 | | | | | | | | | | |

## Moisture condition

| | | | | | |
|---|---|---|---|---|---|
| D | Dry | M | Moist | W | Wet / saturated |
| SM | Slightly moist | VM | Very moist | | |

# Soil Borelog

| | |
|---|---|
| **Borehole No:** | **BH4** |
| Logged by: | SD |
| Drilling date: | 28/07/2021 |
| Project ref: | 2021-204 |
| Drilling method: | Powered Auger |
| Client: | Jim Cleary |
| Borehole location: | Figure 2 |
| Address: | 218 East Bank Road Coramba |
| Borehole coords: | 502612, 6657615 |

## PROFILE DESCRIPTION

| Depth (m) | Sampling depth/name | Graphic Log | Horizon | Texture | Structure | Colour | Mottles | Coarse Fragments | Moisture Condition | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | | | A1 | Sandy Clay Loam | Strong | Black | Nil | < 5% | SM | Topsoil |
| 0.2 | | | B1 | Sandy Clay Loam | Strong | Pale Orange Brown | Pale Brown | Nil | SM | |
| 0.3 | | | | | | | | | | |
| 0.4 | | | B2 | Silty Clay | Strong | Pale Orange Brown | Nil | < 5% | SM | Residual |
| 0.5 | | | | | | | | | | |
| 0.6 | | | | | | | | | | |
| 0.7 | | | | | | | | | | |
| 0.8 | | | B3 | Silty Clay | Strong | Pale Yellow Brown | Slight Pale Orange Brown | Nil | SM | Residual |
| 0.9 | | | | | | | | | | |
| 1.0 | | | | | | | | | | |
| 1.1 | | | B3 | Extremely Weathered Bedrock | Strong | Pale Yellow Brown | Nil | Nil | SM | XWB |
| 1.2 | | | | | | | | | | |
| 1.3 | | | Borehole terminated at 1.2m | | | | | | | |
| 1.4 | | | | | | | | | | |
| 1.5 | | | | | | | | | | |

## Moisture condition

| | | | | | |
|---|---|---|---|---|---|
| D | Dry | M | Moist | W | Wet / saturated |
| SM | Slightly moist | VM | Very moist | | |

# Soil Borelog

| | |
|---|---|
| **Borehole No:** | **BH5** |
| Logged by: | SD |
| Drilling date: | 28/07/2021 |
| Project ref: | 2021-204 |
| Drilling method: | Powered Auger |
| Client: | Jim Cleary |
| Borehole location: | Figure 2 |
| Address: | 218 East Bank Road Coramba |
| Borehole coords: | 502607, 6657729 |

## PROFILE DESCRIPTION

| Depth (m) | Sampling depth/name | Graphic Log | Horizon | Texture | Structure | Colour | Mottles | Coarse Fragments | Moisture Condition | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | | | A1 | Sandy Clay Loam | Strong | Black | Nil | < 5% | SM | Topsoil |
| 0.2 | | | B1 | Sandy Clay Loam | Strong | Brown | Slight Orange Brown | Nil | SM | |
| 0.3 | | | | | | | | | | |
| 0.4 | | | B2 | Sandy Clay Loam | Strong | Orange Brown | Nil | < 5% | SM | Residual |
| 0.5 | | | | | | | | | | |
| 0.6 | | | | | | | | | | |
| 0.7 | | | | | | | | | | |
| 0.8 | | | B3 | Sandy Clay Loam | Strong | Orange Brown | Slight Yellow Brown | Nil | SM | Residual |
| 0.9 | | | | | | | | | | |
| 1.0 | | | | | | | | | | |
| 1.1 | | | | | | | | | | |
| 1.2 | | | | | | | | | | |
| 1.3 | | | | | Borehole terminated at 1.2m | | | | | |
| 1.4 | | | | | | | | | | |
| 1.5 | | | | | | | | | | |

## Moisture condition

| | | | | | |
|---|---|---|---|---|---|
| D | Dry | M | Moist | W | Wet / saturated |
| SM | Slightly moist | VM | Very moist | | |

# Soil Borelog

| | |
|---|---|
| **Borehole No:** | **BH6** |
| Logged by: | SD |
| Drilling date: | 28/07/2021 |
| Project ref: | 2021-204 |
| Drilling method: | Powered Auger |
| Client: | Jim Cleary |
| Borehole location: | Figure 2 |
| Address: | 218 East Bank Road Coramba |
| Borehole coords: | 502770, 6657790 |

## PROFILE DESCRIPTION

| Depth (m) | Sampling depth/name | Graphic Log | Horizon | Texture | Structure | Colour | Mottles | Coarse Fragments | Moisture Condition | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | | | A1 | Clay Loam | Strong | Black | Nil | < 5% | M | Topsoil |
| 0.2 | | | | Clay Loam | Strong | Pale Brown | Dark Brown | Nil | SM | |
| 0.3 | | | | | | | | | | |
| 0.4 | | | B1 | Clay Loam | Strong | Red Brown | Nil | < 5% | SM | Residual |
| 0.5 | | | | | | | | | | |
| 0.6 | | | | | | | | | | |
| 0.7 | S | | | | | | | | | |
| 0.8 | | | | | | | | | | |
| 0.9 | | | | | | | | | | |
| 1.0 | | | | | | | | | | |
| 1.1 | | | | | | | | | | |
| 1.2 | | | | | | | | | | |
| 1.3 | | | | | Borehole terminated at 1.2m | | | | | |
| 1.4 | | | | | | | | | | |
| 1.5 | | | | | | | | | | |

## Moisture condition

| | | | | | |
|---|---|---|---|---|---|
| D | Dry | M | Moist | W | Wet / saturated |
| SM | Slightly moist | VM | Very moist | | |

# Soil Borelog

| | |
|---|---|
| **Borehole No:** | **BH7** |
| Logged by: | SD |
| Drilling date: | 28/07/2021 |
| Project ref: | 2021-204 |
| Drilling method: | Powered Auger |
| Client: | Jim Cleary |
| Borehole location: | Figure 2 |
| Address: | 218 East Bank Road Coramba |
| Borehole coords: | 502843, 6657622 |

## PROFILE DESCRIPTION

| Depth (m) | Sampling depth/name | Graphic Log | Horizon | Texture | Structure | Colour | Mottles | Coarse Fragments | Moisture Condition | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | | | A1 | Sandy Clay Loam | Strong | Black | Nil | < 5% | M | Topsoil |
| 0.2 | | | | | | | | | | |
| 0.3 | | | B1 | Sandy Clay Loam | Strong | Pale Brown | Nil | < 5% | SM | Alluvial/Tansferral |
| 0.4 | | | | | | | | | | |
| 0.5 | | | | | | | | | | |
| 0.6 | | | | | | | | | | |
| 0.7 | | | | | | | | | | |
| 0.8 | | | B2 | Sandy Clay Loam | Strong | Pale Yellow Brown | Nil | < 5% | SM | Transferral |
| 0.9 | | | | | | | | | | |
| 1.0 | | | | | | | | | | |
| 1.1 | | | | | | | | | | |
| 1.2 | | | | | | | | | | |
| 1.3 | | | | | Borehole terminated at 1.2m | | | | | |
| 1.4 | | | | | | | | | | |
| 1.5 | | | | | | | | | | |

## Moisture condition

| | | | | | |
|---|---|---|---|---|---|
| D | Dry | M | Moist | W | Wet / saturated |
| SM | Slightly moist | VM | Very moist | | |

# APPENDIX B

## WASTEWATER DISPOSAL SOIL ASSESSMENT

2 samples supplied by Earth Water Consulting Pty Limited on 03/08/2021 - Lab Job No. K9860
Analysis requested by Strider Duerinckx. - **Your Project: 2021-204**
PO Box 50 BELLINGEN NSW 2454

| | **SAMPLE 1 BH2 0.6-0.8m** | **SAMPLE 2 BH6 0.6-0.8** |
|---|---|---|
| *Job No.* | *K9860/1* | *K9860/2* |
| Description | Light Clay | Clay Loam |
| Moisture Content (% moisture) | 6 | 7 |
| Emerson Aggregate Stability Test (SAR 5 Solution) note 12 | EAST Class 3/6, slake 3[see note 12] | EAST Class 3/6, slake 2[see note 12] |
| Soil pH (1:5 $CaCl_2$) | 4.33 | 4.64 |
| Soil Conductivity (1:5 water dS/m ) | 0.012 | 0.020 |
| Soil Conductivity (as $EC_e$ dS/m )[note 10] | 0.104 | 0.169 |
| Native NaOH Phosphorus (mg/kg P) | 1.00 | 9.12 |
| | | |
| Residual phosphorus remaining in solution from the initial phosphate phosphorus | | |
| Initial Phosphorus concentration (ppm P) | **28.2** | **28.2** |
| 72 hour - 3 Day (ppm P) | 8.82 | 3.49 |
| 120 hour - 5 Day (ppm P) | 8.52 | 3.41 |
| 168 hour - 7 Day (ppm P) | 7.70 | 3.22 |
| Equilibrium Phosphorus (ppm P) | 7.18 | 3.09 |
| **EXCHANGEABLE CATIONS** | | |
| Calcium (cmol+/kg) | 0.55 | 1.21 |
| Magnesium (cmol+/kg) | 0.53 | 1.62 |
| Potassium (cmol+/kg) | 0.09 | 0.08 |
| Sodium (cmol+/kg) | 0.03 | 0.07 |
| Aluminium (cmol+/kg) | 4.95 | 0.54 |
| Hydrogen (cmol+/kg) | 1.03 | 0.00 |
| ECEC (effective cation exchange capacity)(cmol+/kg) | 7.2 | 3.5 |
| Exchangeable Calcium % | 7.6 | 34.3 |
| Exchangeable Magnesium % | 7.4 | 45.9 |
| Exchangeable Potassium % | 1.2 | 2.3 |
| Exchangeable Sodium % (ESP) | 0.5 | 2.0 |
| Exchangeable Aluminium % | 68.9 | 15.4 |
| Exchangeable Hydrogen % | 14.3 | 0.0 |
| Calcium/ Magnesium Ratio | 1.03 | 0.75 |

**Notes:**

1: ECEC = Effective Cation Exchange Capacity = sum of the exchangeable Mg, Ca, Na, K, H and Al
2: Exchangeable bases determined using standard Ammonium Acetate extract (Method 15D3) with no pretreatment for soluble salts. When Conductivity ≥0.25 dS/m soluble salts are removed (Method 15E2).
3. ppm = mg/kg dried soil
4. Insitu P determined using 0.1M NaOH and shaking for 24 hrs before determining phosphate
5. Soils were crushed using a ceramic grinding head and mill; five 1g subsamples of each soil were used to which 40ml of 0.1M NaCl with Xppm phosphorus was added to each. The samples were shaken on an orbital shaker
6. Exchangeable sodium percentage (ESP) is calculated as sodium (cmol+/kg) divided by ECEC
7. All results as dry weight DW - soils were dried at 6OC for 48hrs prior to crushing and analysis.
8. Phosphorus Capacity method from Ryden and Pratt, 1980.
9. Aluminium detection limit is 0.05 cmol+/kg; Hydrogen detection limit is 0.1 cmol+/kg. However for calculation purposes a value of 0 is used.
10. For conductivity 1 dS/m = 1 mS/cm = 1000 µS/cm; $EC_e$ conversions: sand loam 14, loam 9.5; clay loam 8.6; heavy clay 5.8
11. 1 cmol+/kg = 1 meq/100g
12. Emerson Aggregate Stability Test (EAST) for Wastewater applications (see Sheet 3 - Patterson, 2015). MEAT Class 1: Slaking, complete dispersion; Class 2: Slaking, some dispersion; Class 3-6: Slaking 1 slight to 3 complete, No dispersion; Class 7: No slaking, yes swelling; Class 8: No slaking, no swelling.
13. Analysis conducted between sample arrival date and reporting date.
14. .. Denotes not requested.
15. This report is not to be reproduced except in full.
16. All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (refer scu.edu.au/eal or on request).



Checked:.....

# PHOSPHORUS SORPTION TRIAL

2 samples supplied by Earth Water Consulting Pty Limited on 03/08/2021 - Lab Job No. K9860
Analysis requested by Strider Duerinckx. - Your Project: 2021-204

### Calculations for Equilibrium Absorption Maximum for Soil provided

| I.D. | JOB NO. | Equilibrium P mg P/L (in solution) | Added P mg P/L | P Sorb at Equil. mg P/kg | Native P mg P/kg | Equilibrium P Sorption Level µg P/g soil | Divide Ø (from Table) | Equilibrium Absorption Maximum (B) µg P/g soil |
|---|---|---|---|---|---|---|---|---|
| **BH2 0.6-0.8m** | **K9860/1** | 7.2 | 28.248 | 843 | 1 | 844 | 0.72 | **1,175** |
| **BH6 0.6-0.8** | **K9860/2** | 3.1 | 28.248 | 1006 | 9 | 1016 | 0.60 | **1,691** |

**Calculations for phosphorus sorption capacity**

| | JOB NO. | Equilibrium Absorption Maximum (B) µg P/g soil | multiply by theta of wastewater to be applie (=X) | minus the native P (=Y) | **kg P sorption / hectare (to a depth of 15cm)** (1.95 is a correction factor for density, etc | **kg P sorption / hectare (to a depth of 100cm)** (1.95 is a correction factor for density, etc) |
|---|---|---|---|---|---|---|
| **BH2 0.6-0.8m** | *K9860/1* | 1175 | (=B x theta) | (=X -native P) | (=Y x 1.95) | (=Y x 1.95 x 100/15) |
| **BH6 0.6-0.8** | *K9860/2* | 1691 | (=B x theta) | (=X - native P) | (=Y x 1.95) | (=Y x 1.95 x 100/15) |

**EXAMPLE 1 - Calculations for phosphorus sorption capacity using a wastewater phosphorus of 15mg/L P**

| | JOB NO. | Equilibrium Absorption Maximum (B) µg P/g soil | multiply by theta of wastewater to be applie (ie. 0.84) | minus the native P (=Y) | **kg P sorption / hectare (to a depth of 15cm)** (1.95 is a correction factor for density, etc | **kg P sorption / hectare (to a depth of 100cm)** (1.95 is a correction factor for density, etc) |
|---|---|---|---|---|---|---|
| **BH2 0.6-0.8m** | *K9860/1* | 1175 | 987 | 986 | **1,923** | **12,820** |
| **BH6 0.6-0.8** | *K9860/2* | 1691 | 1420 | 1411 | **2,752** | **18,344** |



Checked:.....

# APPENDIX C

# Nominated Area Water Balance & Storage Calculations

**Site Address:** **218 East Bank Road Coramba**

**Proj Ref:** 2021-204

**Notes:**

| | | | |
|---|---|---|---|
| Flow Allowance | | 120 | l/p/d |
| No. of bedrooms | | 4 | bdr |
| Occupancy | | 1.5 | p/room |
| Design Wastewater Flow | Q | 720 | L/day |
| Daily DLR | | 8.0 | mm/day |
| Crop Factor | C | 0.6-0.8 | unitless |
| Retained Rainfall Coefficient | RRc | 0.9 | untiless |
| Void Space Ratio | V | 0.3 | unitless |
| Nominated Land Application Area | N | 102 | sqm |
| Trench/Bed wetted thickness | Ww | 0.15 | m |
| Rainfall Data | Coramba (monthly median) | | |
| Evaporation Data | Coffs Harbour Evap Data (monthly average) | | |

| Parameter | Symbol | Formula | Units | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Days in month | D | \ | days | 31 | 28 | 31 | 30 | 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 | **365** |
| Median Rainfall | R | \ | mm/month | 147.1 | 137.6 | 192.3 | 91.8 | 70 | 70.4 | 35.7 | 39.6 | 40.5 | 67.2 | 123.3 | 120.8 | 1506.7 |
| Average Evaporation | E | \ | mm/month | 192.2 | 156.8 | 148.8 | 117 | 86.8 | 69 | 77.5 | 105.4 | 135 | 161.2 | 171 | 192.2 | **0** |
| Crop Factor | C | | | 0.80 | 0.80 | 0.80 | 0.70 | 0.70 | 0.60 | 0.60 | 0.60 | 0.70 | 0.70 | 0.80 | 0.80 | |
| **OUTPUTS** | | | | | | | | | | | | | | | | |
| Evapotranspiration | ET | ExC | mm/month | 154 | 125 | 119 | 82 | 61 | 41 | 47 | 63 | 95 | 113 | 137 | 154 | **1189.94** |
| Percolation | B | DLRxD | mm/month | 248.0 | 224 | 248.0 | 240.0 | 248.0 | 240.0 | 248.0 | 248.0 | 240.0 | 248.0 | 240.0 | 248.0 | **2920.0** |
| Outputs | | ET+B | mm/month | 401.8 | 349.44 | 367.0 | 321.9 | 308.8 | 281.4 | 294.5 | 311.2 | 334.5 | 360.8 | 376.8 | 401.8 | **4109.9** |
| **INPUTS** | | | | | | | | | | | | | | | | |
| Retained Rainfall | RR | R*RRc | mm/month | 132.39 | 123.84 | 173.07 | 82.62 | 63 | 63.36 | 32.13 | 35.64 | 36.45 | 60.48 | 110.97 | 108.72 | **1022.67** |
| Effluent Irrigation | W | (QxD)/L | mm/month | 218.8 | 197.6 | 218.8 | 211.8 | 218.8 | 211.8 | 218.8 | 218.8 | 211.8 | 218.8 | 211.8 | 218.8 | **2576.5** |
| Inputs | | RR+W | mm/month | 351.2 | 321.5 | 391.9 | 294.4 | 281.8 | 275.1 | 251.0 | 254.5 | 248.2 | 279.3 | 322.7 | 327.5 | **3599.1** |
| **STORAGE CALCULATION** | | | | | | | | | | | | | | | | |
| Storage remaining from previous month | | | mm/month | | 0.0 | 0.0 | 82.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Storage for the month | S | (RR+W)-(ET+B) | mm/month | -168.5 | -93.2 | 82.8 | -91.7 | -89.8 | -20.9 | -145.2 | -189.3 | -287.6 | -271.8 | -180.2 | -247.4 | **-547.2** |
| Cumulative Storage | M | | mm | 0.0 | 0.0 | 82.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **82.8** |
| Maximum Bed Storage Depth for Area | BS | | mm | **82.85** | Is the calculated storage acceptable? | | | Yes, storage is conservative | | | | | | | | |

| | | |
|---|---|---|
| **Nominated trench width** | 0.9 | |
| **Total length based on nominated width** | 113.3 | |
| **No. of beds** | 6 | |
| **Individual bed lengths** | 18.9 | |
| **Individual Bed footprints** | 17.0 | |
| **Spacing between beds** | 1.5 | |
| **Width of bed area** | 12.9 | |
| **Total bed area** | 244 | |
| **Nutrient uptake zone** | 387 | 2m buffer nutrient uptake allowance |

# Nutrient Balance

**Proj Ref:** 2021-204

**Site Address:** 218 East Bank Road Coramba

**Notes:**

## INPUT DATA

| | | | | |
|---|---|---|---|---|
| Hydraulic Load | | 720 | L/Day | |
| Effluent N Concentration | | 60 | mg/L | |
| % Lost to Soil Processes | | 0.2 | Decimal | |
| Total N Loss to Soil | | 8640 | mg/day | |
| Effluent P Concentration | | 15 | mg/L | |
| Design Life of System | | 50 | yrs | |
| Crop N Uptake | 250 | kg/ha/yr = | 68 | $mg/m^2/day$ |
| Crop P Uptake | 25 | kg/ha/yr = | 7 | $mg/m^2/day$ |
| P-sorption analytical result in soil | | 12820 | kg/ha | |
| % of Predicted P-sorp | | 0.5 | Decimal | |

## Nitrogen Balance

| | | |
|---|---|---|
| Nitrogen uptake ability in vegetation | 68 | $mg/m^2/day$ |
| Nitrgen loading in wastewater | 34560 | mg/day |
| Area required for nitrogen | **505** | $m^2$ |

## Phosphorus Balance

| | | |
|---|---|---|
| P adsorbed | 0.641 | $kg/m^2$ |
| P uptake | 0.125 | $kg/m^2$ |
| P generated | 197.1 | kg |
| Area required for Phosphorus | **257** | $m^2$ |

# Nominated Area Water Balance & Storage Calculations

**Site Address:** **218 East Bank Road Coramba**

**Proj Ref:** 2021-204

**Notes:**

| | | | |
|---|---|---|---|
| Flow Allowance | | 120 | l/p/d |
| No. of Persons | | 4 | p |
| Occupancy | | 1.5 | p/room |
| Design Wastewater Flow | Q | 720 | L/day |
| Daily DLR | | 12.0 | mm/day |
| Crop Factor | C | 0.6-0.8 | unitless |
| Retained Rainfall Coefficient | RRc | 0.9 | untiless |
| Void Space Ratio | V | 0.3 | unitless |
| Nominated Land Application Area | N | 68 | sqm |
| Trench/Bed wetted thickness | Ww | 0.15 | m |
| Rainfall Data | Coramba (monthly median) | | |
| Evaporation Data | Coffs Harbour Evap Data (monthly average) | | |

| Parameter | Symbol | Formula | Units | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Days in month | D | \ | days | 31 | 28 | 31 | 30 | 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 | **365** |
| Median Rainfall | R | \ | mm/month | 147.1 | 137.6 | 192.3 | 91.8 | 70 | 70.4 | 35.7 | 39.6 | 40.5 | 67.2 | 123.3 | 120.8 | 1506.7 |
| Average Evaporation | E | \ | mm/month | 192.2 | 156.8 | 148.8 | 117 | 86.8 | 69 | 77.5 | 105.4 | 135 | 161.2 | 171 | 192.2 | **0** |
| Crop Factor | C | | | 0.80 | 0.80 | 0.80 | 0.70 | 0.70 | 0.60 | 0.60 | 0.60 | 0.70 | 0.70 | 0.80 | 0.80 | |
| **OUTPUTS** | | | | | | | | | | | | | | | | |
| Evapotranspiration | ET | ExC | mm/month | 154 | 125 | 119 | 82 | 61 | 41 | 47 | 63 | 95 | 113 | 137 | 154 | **1189.94** |
| Percolation | B | DLRxD | mm/month | 372.0 | 336 | 372.0 | 360.0 | 372.0 | 360.0 | 372.0 | 372.0 | 360.0 | 372.0 | 360.0 | 372.0 | **4380.0** |
| Outputs | | ET+B | mm/month | 525.8 | 461.44 | 491.0 | 441.9 | 432.8 | 401.4 | 418.5 | 435.2 | 454.5 | 484.8 | 496.8 | 525.8 | **5569.9** |
| **INPUTS** | | | | | | | | | | | | | | | | |
| Retained Rainfall | RR | R*RRc | mm/month | 132.39 | 123.84 | 173.07 | 82.62 | 63 | 63.36 | 32.13 | 35.64 | 36.45 | 60.48 | 110.97 | 108.72 | **1022.67** |
| Effluent Irrigation | W | (QxD)/L | mm/month | 328.2 | 296.5 | 328.2 | 317.6 | 328.2 | 317.6 | 328.2 | 328.2 | 317.6 | 328.2 | 317.6 | 328.2 | **3864.7** |
| Inputs | | RR+W | mm/month | 460.6 | 420.3 | 501.3 | 400.3 | 391.2 | 381.0 | 360.4 | 363.9 | 354.1 | 388.7 | 428.6 | 437.0 | **4887.4** |
| **STORAGE CALCULATION** | | | | | | | | | | | | | | | | |
| Storage remaining from previous month | | | mm/month | | 0.0 | 0.0 | 34.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Storage for the month | S | (RR+W)-(ET+B) | mm/month | -217.1 | -137.1 | 34.2 | -138.8 | -138.4 | -68.0 | -193.8 | -237.9 | -334.7 | -320.4 | -227.3 | -296.0 | **-879.7** |
| Cumulative Storage | M | | mm | 0.0 | 0.0 | 34.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **34.2** |
| Maximum Bed Storage Depth for Area | BS | | mm | **34.22** | Is the calculated storage acceptable? | | | Yes, storage is conservative | | | | | | | | |

| | | |
|---|---|---|
| **Nominated trench width** | 0.6 | |
| **Total length based on nominated width** | 113.3 | |
| **No. of beds** | 3 | |
| **Individual bed lengths** | 37.8 | |
| **Individual Bed footprints** | 22.7 | |
| **Spacing between beds** | 1.5 | |
| **Width of bed area** | 4.8 | |
| **Total bed area** | 181 | |
| **Nutrient uptake zone** | 368 | 2m buffer nutrient uptake allowance |

# Nutrient Balance

**Proj Ref:** 2021-204

**Site Address:** 218 East Bank Road Coramba

**Notes:**

## INPUT DATA

| | | | | |
|---|---|---|---|---|
| Hydraulic Load | | 720 | L/Day | |
| Effluent N Concentration | | 30 | mg/L | |
| % Lost to Soil Processes | | 0.2 | Decimal | |
| Total N Loss to Soil | | 4320 | mg/day | |
| Effluent P Concentration | | 12 | mg/L | |
| Design Life of System | | 50 | yrs | |
| Crop N Uptake | 250 | kg/ha/yr = | 68 | $mg/m^2/day$ |
| Crop P Uptake | 25 | kg/ha/yr = | 7 | $mg/m^2/day$ |
| P-sorption analytical result in soil | | 12820 | kg/ha | |
| % of Predicted P-sorp | | 0.5 | Decimal | |

## Nitrogen Balance

| | | |
|---|---|---|
| Nitrogen uptake ability in vegetation | 68 | $mg/m^2/day$ |
| Nitrgen loading in wastewater | 17280 | mg/day |
| Area required for nitrogen | **252** | $m^2$ |

## Phosphorus Balance

| | | |
|---|---|---|
| P adsorbed | 0.641 | $kg/m^2$ |
| P uptake | 0.125 | $kg/m^2$ |
| P generated | 157.68 | kg |
| Area required for Phosphorus | **206** | $m^2$ |

DOWNS ROADSIDE ENGINEERING

13th August 2024

# Flood Risk Assessment

## 218 EAST BANK ROAD
## CORAMBA NSW 2450

Prepared by: Downs Roadside Engineering

FOR: J. CLEARY

# DOCUMENT CONTROL

| REPORT DETAILS | |
|---|---|
| **Report Title:** | **Flood Risk Assessment** |
| **Project No.:** | **10101** |
| **Report Author:** | **Caleb Schipplock** |

| DOCUMENT CONTROL | | | | | |
|---|---|---|---|---|---|
| **Revision** | **Author** | **Reviewer** | **Approved for Issue** | | |
| | | | **Name** | **Signature** | **Date** |
| **0** | C. Schipplock | B. Tomkins | C. Schipplock |  | 13/08/2024 |

Disclaimer:
*The sole purpose of this report and the associated services performed by Downs Roadside Engineering Pty Ltd is to provide the information required in accordance with the scope of services set out in the contract between Downs Roadside Engineering Pty Ltd and the Client.*

*This report is a professional opinion based on the information available at the time of writing. It is not intended as a quote, guarantee or warranty and does not cover any latent defects.*

*Users should not solely rely on the contents of this report in isolation or draw inferences to other sites. Users must seek appropriate subject matter advice in relation to their own particular circumstances. Before relying on the information in this report, users should carefully evaluate the accuracy, completeness and relevance of the data for their purposes.*

# Contents

# Figures

# 1 INTRODUCTION

## 1.1 General

Downs Roadside Engineering Pty Ltd (DRE) has been commissioned by Jim Cleary, herein referred to as the Client, to prepare a Flood Risk and Management Assessment to support a development application at East Bank Road. The site is located within the Coffs Harbour City Council Local Government Area (LGA) at 218 East Bank Road, Coramba NSW 2450 on lots formally described as Lot 1 and Lot 2 on DP 1093448.

A flood model has been developed for the subject site which proposed to reconfigure the site from one lot into fifteen rural residential lots. A flood assessment was undertaken by DRE for the site to understand the flood risk and provide guidance for flood management strategies for the proposed development. This report addresses items specifically limited to the catchment/s affected by the subject development.

## 1.2 Basis of report

This report has been compiled based on:

- Discussions between DRE and the Client
- Discussions between DRE and Land Metrics Pty Ltd
- Gateway Determination from Department of Planning, Housing and Infrastructure dated 5th June 2024, specifically:

**Gateway Conditions**

1. The planning proposal is to be amended to include an appropriate level of investigation of the site's flood risk and management options, including the level of the PMF event, the level of hazard, potential flood evacuation routes, the time of isolation and compliance with the Department's draft shelter in place guideline.

2. Prior to exhibition and agency consultation, the proposal is to be amended in accordance with condition 1 and submitted to the Department for approval.

***Figure 1 – Gateway Determination by DPHI (05/06/2024)***

- Planning Proposal Concept Subdivision Plan Dwg No 2021-029 by Land Metrics Pty Ltd 09/10/2023
- Planning Proposal Proposed Land Use Zone(s) Dwg No 2021-029 by Land Metrics Pty Ltd 09/10/2023
- Draft Shelter-in-place Guideline – Preamble by NSW DPE
- Orara River Flood Study June 2012 by GHD
- NSW LiDAR Data - Coffs Harbour 2016-07-29 LiDAR Project
- Software:
    - RORB – Version 6.52
    - TUFLOW – Version 2023.03.AE.iSP

## 1.3 Report Limitations

This report is client/site specific for the subject development only and the provided engineering advice is provided solely for consideration by the Client and the NSW Department of Planning, Housing and Infrastructure. It should be noted that this report and its' content has been compiled based on information (including the proposed site layout arrangements) current at the time of the report printing, and that recommendations within this report are valid based solely on the above.

## 1.4 Site Description

The site is formally described as Lot 1 and Lot 2 on DP 1093448 and its locality is generally in **Figure 2**. The site covers an area of approximately 20.46 hectares and drains predominantly from south-east to west, toward two existing culvert crossings located on East Bank Road (west of the site). Two minor flow paths intersect the site, each with several stock dams located along their alignments. The site consists of large, grassed areas with an existing dwelling, various sheds and stables.

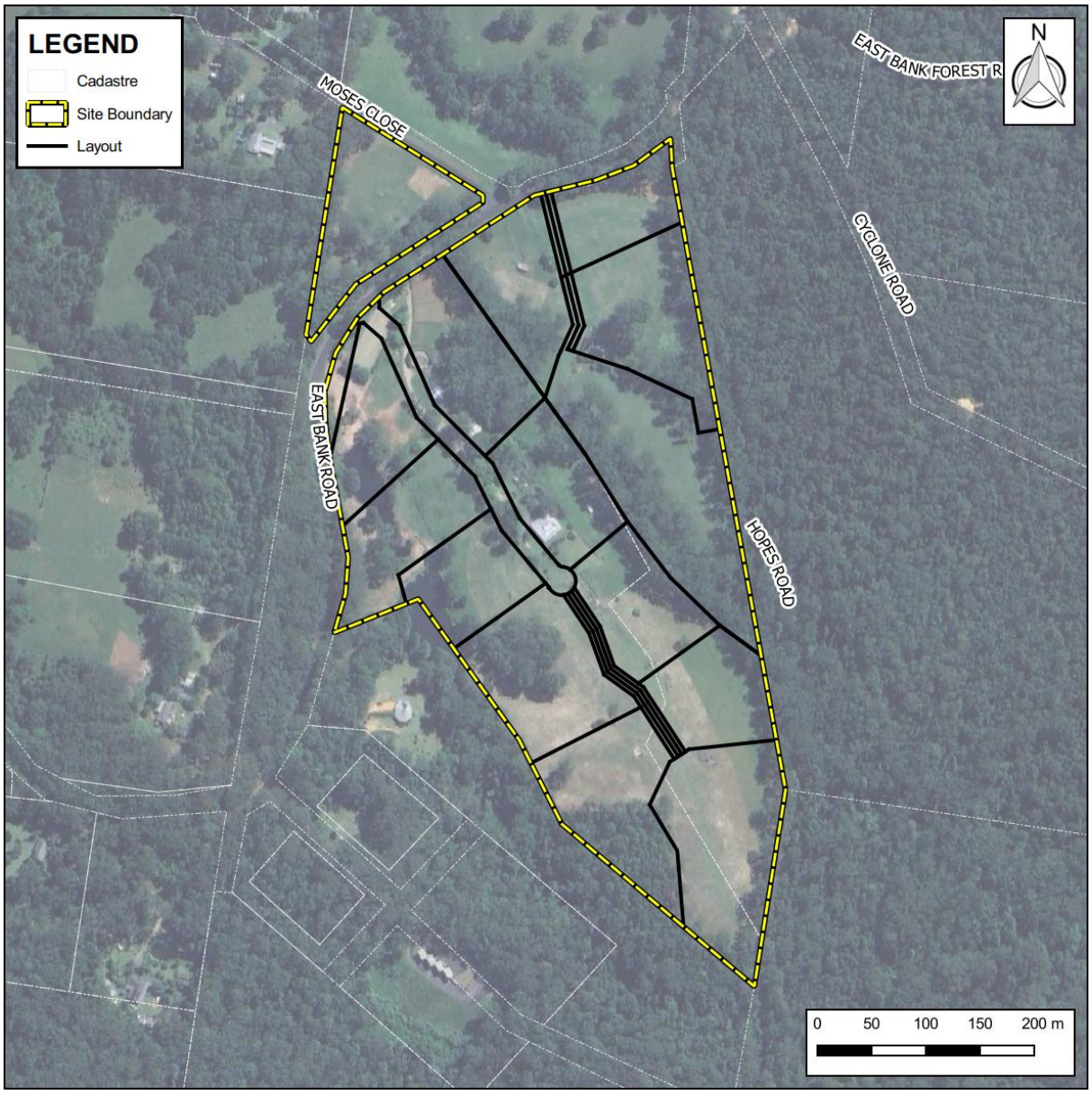



***Figure 2 – Locality Plan***

## 1.5 Clarifications

The primary objectives of this Flood Risk Assessment (FRA) are to resolve the points raised within the Gateway Determination notice from Department of Planning, Housing and Infrastructure dated 5th June 2024 as outlined in **Section 1.2** of this report.

## 1.6 Orara River Flood Study

A flood study was undertaken by GHD for the Orara River which is located approximately one kilometre east of the site. The flood study was in the context of the regional catchment and floodplain surrounding to the Orara River. The outputs of the flood study have mapped the site as directly flood affected by the Orara River catchment as generally shown in **Figure 3**. The mapped areas were developed through a 1D analysis, are coarse, which have produced inaccurate results which are not representative of the local topography and site

characteristics. The purpose of this report is to address these inaccuracies and provide a more detailed overview of the flood risk specific to this site.

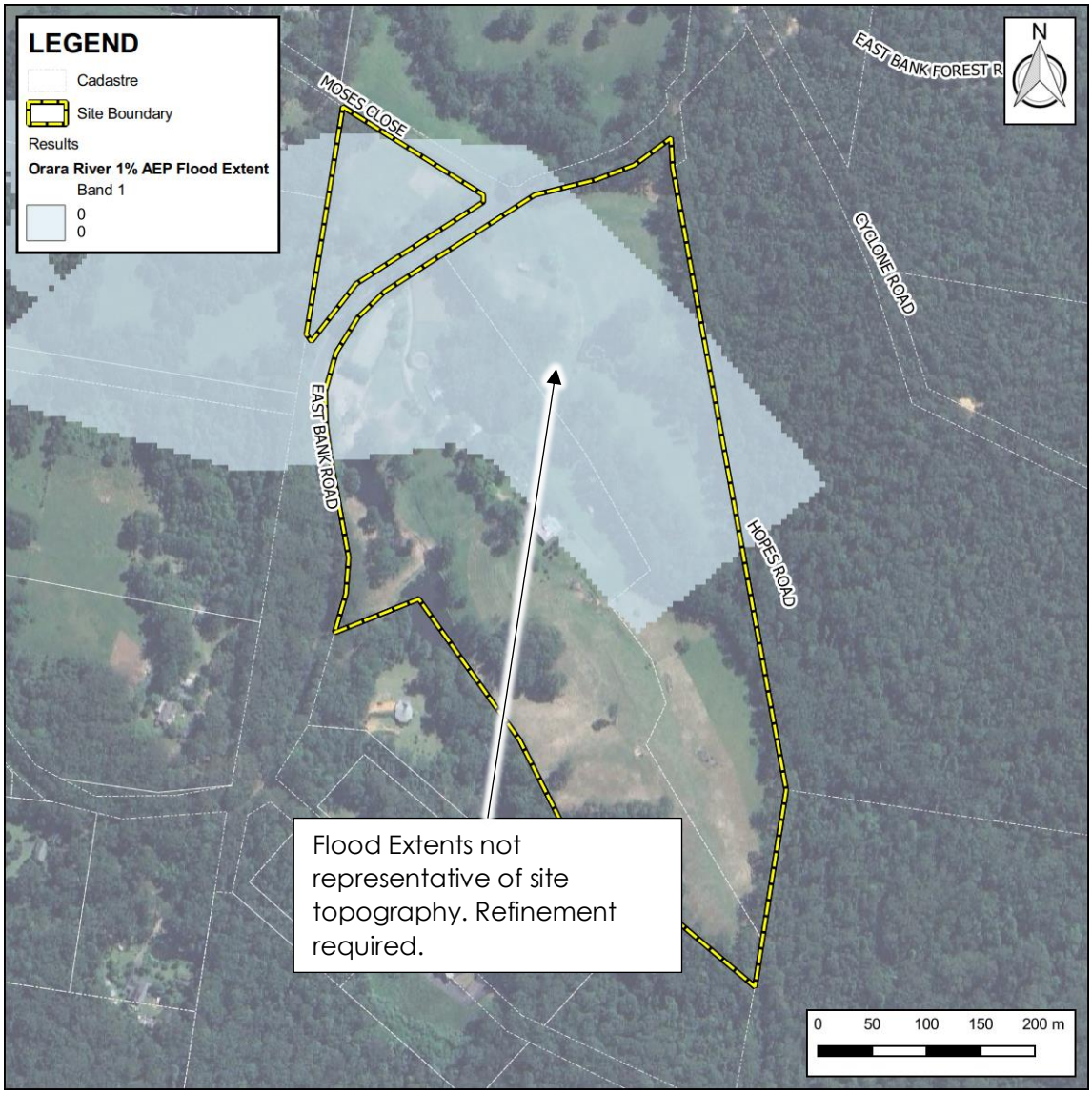



***Figure 3 – Orara River PMF Regional Flood Extent***

# 2 PROPOSED DEVELOPMENT LAYOUT

The proposed development layout prepared by Land Metrics (dated 09/10/2023) is shown in **Figure 4**. The current development layout revision can be summarised as:

- Two existing lots subdivided into fifteen lots and part road dedication.

Refer to planning report accompanying this application for further details regarding the development.

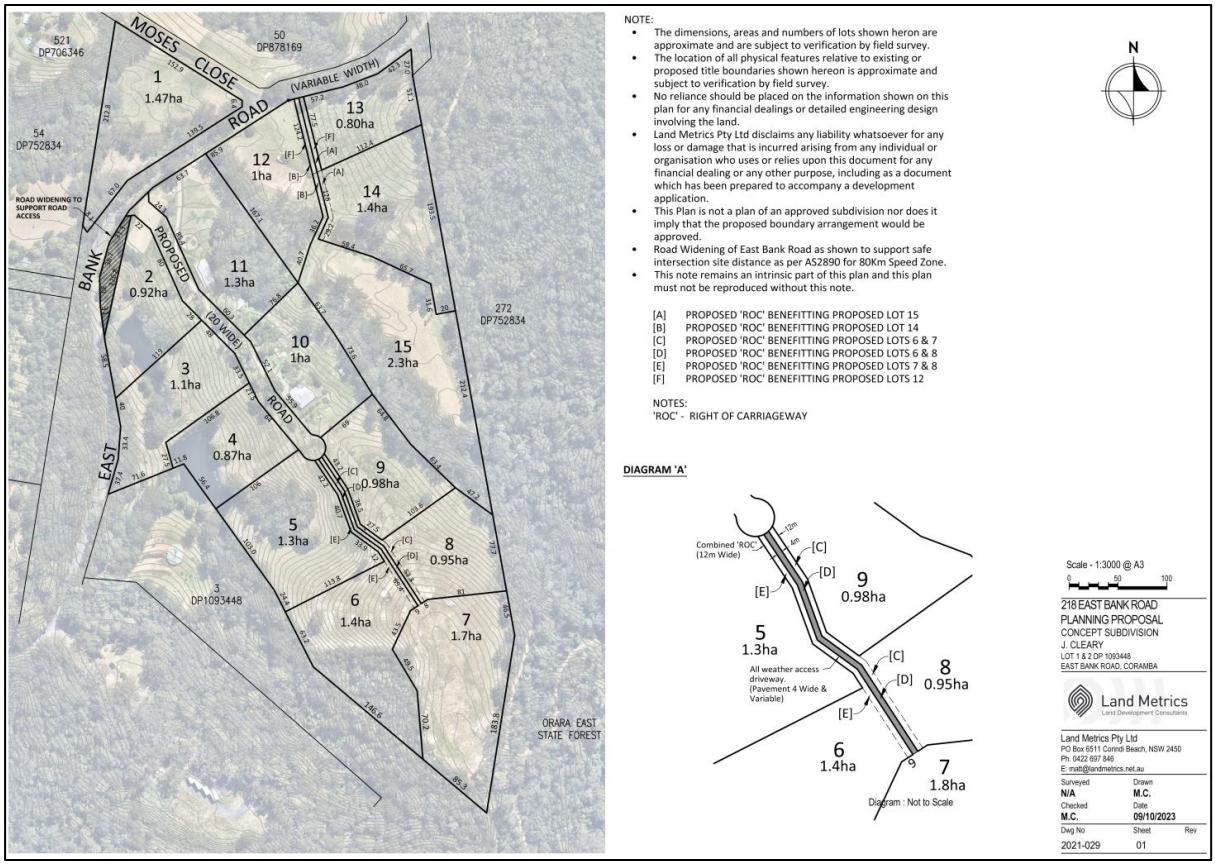



***Figure 4 – Site Layout by Land Metrics (09/10/2023)***

The following sections detail the hydrologic and hydraulic modelling approach and modelling outcomes relating to the site and proposed site layout.

# 3 HYDROLOGY (RORB)

## 3.1 Hydrological model

A RORB hydrological model was developed for the site to model the existing case flood behaviour for a range of flood scenarios. Model outputs were used as inflow hydrographs within the TUFLOW model to assess flood behaviour in relation to the proposed development. An analysis was undertaken utilizing both Australian Rainfall and Runoff (AR&R) 1987 and AR&R 2019 Intensity Frequency Durations (IFD) curves utilising the worst-case scenarios. The following sections outline the adopted model parameters and rainfall data.

## 3.2 Model Parameters

The Orara River Flood Study adopted the RORB Default Equation 2.5 of the RORB Manual for the determination of the Kc values. For this assessment the RORB Default Equation 2.5 was also utilised. The RORB parameters outlined within **Table 1** were used within the model. Default parameter of 0.8 was used for RORB parameter 'm'.

***Table 1 – RORB Input Details***

| RORB Parameter | Value |
|---|---|
| Kc | 2.35 |
| m | 0.8 |

The following section outlines the rainfall losses and IFD selection.

## 3.3 Rainfall data and losses

### 3.3.1 Model Losses

Model losses have been adopted based on losses outlined within the Orara River Flood Study. The following table outlines the adopted rainfall loss parameters for the various scenarios.

***Table 2 – RORB Input Details***

| RORB Parameter | Initial Loss | Continuing Loss |
|---|---|---|
| Up to and including the 1% AEP event | 25 mm | 2.5 mm/hr |
| 1% event up to the PMF event | 0 mm | 1 mm/hr |
| PMF | 0 mm | 1 mm/hr |

### 3.3.2 AR&R 1987 IFDs

The following table shows the adopted 1987 IFD parameters as outlined within the Orara River Flood Study.

***Table 3 – AR&R 1987 IFD Parameters***

| Parameter | Value |
|---|---|
| 2yr 1hr (ARI, duration) | 42.87 |
| 2yr 12hr (ARI, duration) | 9.67 |
| 2yr 72hr (ARI, duration) | 3.39 |
| 50yr 1hr (ARI, duration) | 82.66 |
| 50yr 12hr (ARI, duration) | 19.91 |
| 50yr 72hr (ARI, duration) | 7.97 |
| Skew | 0.08 |
| F2 Value | 4.38 |
| F50 Value | 16.55 |
| Zone | A |

These parameters were adopted in RORB for simulating the peak discharges at the catchment outlet in accordance with AR&R 1987 methodologies.

### 3.3.3 AR&R 2019 IFDs

The average centroid of the contributing catchment latitude and longitude was used as inputs to the Australian Bureau of Meteorology website to extract the IFD Table for the AR&R 2019 IFD's. The IFD table was then used within existing and design scenario RORB models. AR&R 2019 procedures (except for losses) have been used in the hydrologic analysis and the adopted IFD table is provided in **Table 4**.

***Table 4 – 2019 IFD table rainfall depths (mm) (Australian Bureau of Meteorology)***

| Duration | 0.2 EY | 5% AEP | 1% AEP |
|---|---|---|---|
| 10 min | 24.7 | 32.9 | 43.3 |
| 15 min | 31.0 | 41.2 | 54.0 |
| 20 min | 35.8 | 47.6 | 62.7 |
| 25 min | 39.7 | 53.0 | 70.2 |
| 30 min | 43.0 | 57.6 | 76.9 |
| 45 min | 50.7 | 69.0 | 94.0 |
| 1 hour | 56.8 | 78.1 | 108 |
| 1.5 hour | 66.5 | 93.1 | 132 |
| 2 hour | 74.6 | 106 | 152 |

| Duration | 0.2 EY | 5% AEP | 1% AEP |
|---|---|---|---|
| 3 hour | 88.4 | 127 | 185 |
| 4.5 hour | 106 | 154 | 225 |
| 6 hour | 121 | 177 | 258 |
| 9 hour | 148 | 216 | 312 |
| 12 hour | 171 | 249 | 355 |

Rainfall loss parameters were adopted from the Orara River Flood Study as outlined in **Section 3.3.1** of this report.

### 3.3.4 Climate Change

The 2090 climate change RCP 4.5 scenario has been simulated in RORB for the 1% AEP event. The increase in rainfall intensity for the RCP 4.5 scenario is summarised in **Table 4**.

***Table 5 – Climate Change Rainfall Increases***

| Climate Change Representative Concentration Pathway | Increase to Rainfall Intensity |
|---|---|
| RCP 4.5 | 9.5% |

### 3.3.5 Probable Maximum Precipitation

Probable Maximum Precipitation (PMP) estimates were adopted from the Orara River Flood Study and are shown in **Table 6**. Hydrographs from the PMP RORB models were used within TUFLOW to assess the Probable Maximum Flood (PMF).

***Table 6 – 2019 IFD table rainfall depths (mm) (Australian Bureau of Meteorology)***

| Duration (mins) | PMP Rainfall Depth (mm) |
|---|---|
| 60 | 300 |
| 120 | 360 |
| 180 | 440 |
| 240 | 500 |
| 300 | 520 |
| 360 | 570 |
| 720 | 640 |

## 3.4 Imperviousness

Percent impervious layers were generated from an assessment of existing land use, aerial imagery. Impervious plans have been provided in **Appendix C**.

## 3.5 Existing Catchment Details

The existing catchment boundaries were derived from NSW LiDAR Data - Coffs Harbour 2016-07-29 LiDAR Project. Existing case catchment plan is provided in **Appendix C**, **Figure 5** and is generally summarised in **Table 7** below.

***Table 7 – Existing Case RORB Catchment Details***

| Catchment Name | Area (ha) | Impervious (%) | | Catchment Name | Area (ha) | Impervious (%) |
|---|---|---|---|---|---|---|
| Cat_2 | 2.696 | 4.7 | | Cat_21 | 4.942 | 0.0 |
| Cat_3 | 4.730 | 0.0 | | Cat_22 | 1.291 | 0.0 |
| Cat_4 | 4.112 | 0.0 | | Cat_23 | 4.615 | 0.0 |
| Cat_5 | 0.577 | 10.7 | | Cat_24 | 4.043 | 0.0 |
| Cat_6 | 5.532 | 0.0 | | Cat_25 | 0.941 | 0.0 |
| Cat_7 | 2.728 | 4.8 | | Cat_26 | 2.084 | 13.1 |
| Cat_8 | 1.630 | 1.1 | | Cat_27 | 5.820 | 0.0 |
| Cat_9 | 1.837 | 0.0 | | Cat_28 | 2.949 | 0.0 |
| Cat_10 | 3.582 | 1.1 | | Cat_29 | 5.813 | 0.0 |
| Cat_11 | 1.196 | 0.0 | | Cat_30 | 0.431 | 0.0 |
| Cat_12 | 1.861 | 0.0 | | Cat_31 | 2.998 | 0.0 |
| Cat_13 | 1.729 | 0.0 | | Cat_32 | 1.836 | 0.0 |
| Cat_14 | 3.042 | 0.5 | | Cat_33 | 1.599 | 0.0 |
| Cat_15 | 1.694 | 2.2 | | Cat_34 | 3.619 | 0.0 |
| Cat_16 | 6.458 | 0.0 | | Cat_35 | 1.664 | 0.0 |
| Cat_17 | 2.140 | 0.0 | | Cat_36 | 8.056 | 0.0 |
| Cat_18 | 6.071 | 0.0 | | Cat_37 | 1.187 | 0.0 |
| Cat_19 | 0.768 | 13.5 | | Cat_38 | 3.552 | 12.4 |
| Cat_20 | 3.291 | 6.5 | | Cat_39 | 1.025 | 0.0 |

The study area covered a total catchment area of 114.1 hectares. Further details are provided in **Appendix C** which contains figures of the catchment delineation.

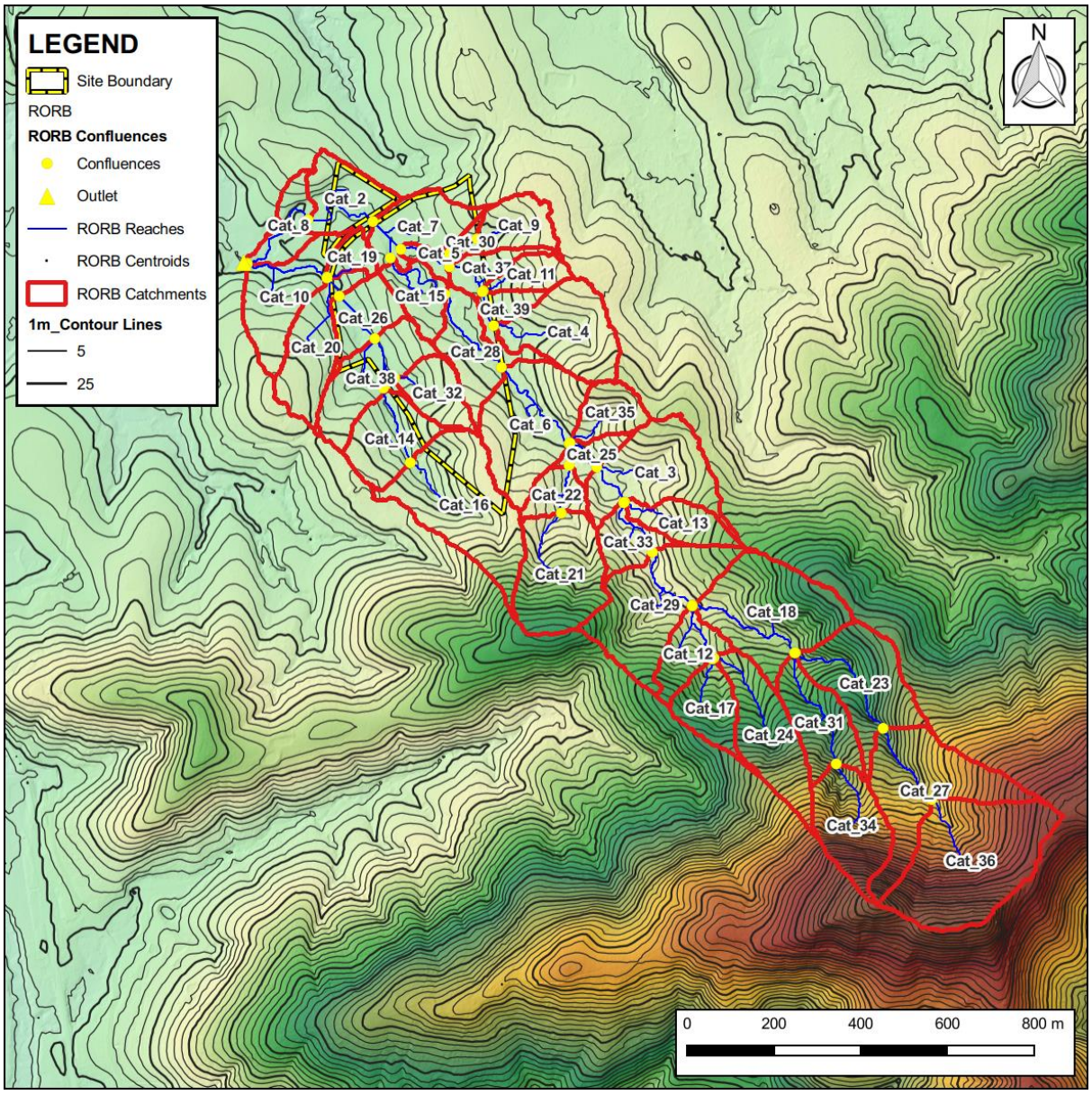



***Figure 5 – Catchment Plan***

## 3.6 RORB Results

The catchment outlet was utilized to determine peak discharges for the modelled catchments for the AR&R 1987 and AR&R 2019 methodologies. Model results were compared for the 1% AEP storm durations to determine the "worst case" design storms for the site. Maximum discharges were taken from the AR&R 1987 model while the median maximum discharges were taken from the AR&R 2019 model.

**Table 8** represents the peak-median discharges which were observed at the RORB outlet location as shown in **Figure 5**.

***Table 8 – RORB Results at RORB Outlet***

| | 1% AEP (AR&R 1987) | 1% AEP (AR&R 2019) | Adopted Scenario for TUFLOW |
|---|---|---|---|
| **Critical Duration** | 0360min | 0180min | AR&R 2019 |
| **Temporal Pattern** | N/A | TP05 | |
| **Discharge ($m^3/s$)** | 14.40 | 16.65 | |

Based on the above analysis, the RORB hydrographs from AR&R 2019 methodologies models were used within TUFLOW as it represented a worst-case scenario for the site.

## 3.7 RFFE Assessment

The Regional Flood Frequency Estimation (RFFE) Model is a tool to estimate the frequency and magnitude of floods in a specific region. An RFFE assessment was undertaken on the catchment study area and output details have been provided within **Appendix B**. Input details are provided in **Table 9** and output details are provided **Table 10**.

***Table 9 – RFFE Input Details***

| | |
|---|---|
| **Latitude Outlet** | -30.212 |
| **Latitude Outlet** | 153.024 |
| **Latitude Centroid** | -30.218 |
| **Latitude Centroid** | 153.033 |
| **Area ($km^2$)** | 1.142 |

***Table 10 – RFFE Discharges vs RORB Model***

| | 50% AEP | 20% AEP | 10% AEP | 5% AEP | 2% AEP | 1% AEP |
|---|---|---|---|---|---|---|
| **Discharge ($m^3/s$)** | 2.31 | 5.25 | 8.15 | 11.8 | 17.9 | 23.8 |
| **Lower Confidence Limit (5%) ($m^3/s$)** | 1.04 | 2.45 | 3.60 | 4.81 | 6.50 | 7.90 |
| **Upper Confidence Limit (95%) ($m^3/s$)** | 5.12 | 11.3 | 18.6 | 29.0 | 49.1 | 71.2 |
| **RORB with AR&R 2019 Methodologies** | - | - | 9.27 | 11.52 | 14.23 | 16.65 |

Based on the analysis and modelling methodologies discussed above, the AR&R 2019 procedures are a fair representation of flood risk for the site and have therefore been utilised within TUFLOW for the purpose of this Flood Risk Assessment.

# 4 HYDRAULIC MODEL SETUP

## 4.1 General

A two-dimensional (2D) TUFLOW model was developed for the site to model the local creeks which intersect the site, as well the existing culvert crossings for roads connecting the site.

Five flood event scenarios were assessed for the existing scenario. Details on the adopted flood event scenarios are outlined in **Table 11.**

***Table 11 – TUFLOW model scenarios***

| Flood Event | Durations (mins) |
|---|---|
| 0.2 EY | 10, 15, 20, 25, 30, 45, 60, 90, 120, 180, 270, 360, 540, 720 |
| 5% AEP | 10, 15, 20, 25, 30, 45, 60, 90, 120, 180, 270, 360, 540, 720 |
| 1% AEP | 10, 15, 20, 25, 30, 45, 60, 90, 120, 180, 270, 360, 540, 720 |
| 1% AEP + CC | 10, 15, 20, 25, 30, 45, 60, 90, 120, 180, 270, 360, 540, 720 |
| PMF | 10, 15, 20, 25, 30, 45, 60, 90, 120, 180, 270, 360, 540, 720 |

***Table 12 – Critical Temporal Patterns***

| Storm Duration | 0.2 EY | 5% AEP | 1% AEP |
|---|---|---|---|
| 10min | TP02 | TP08 | TP10 |
| 15min | TP02 | TP09 | TP08 |
| 20min | TP07 | TP05 | TP10 |
| 25min | TP05 | TP02 | TP09 |
| 30min | TP04 | TP08 | TP08 |
| 45min | TP10 | TP02 | TP09 |
| 60min | TP04 | TP09 | TP02 |
| 90min | TP03 | TP03 | TP01 |
| 120min | TP05 | TP03 | TP01 |
| 180min | TP02 | TP06 | TP05 |
| 270min | TP03 | TP02 | TP07 |
| 360min | TP03 | TP06 | TP02 |
| 540min | TP05 | TP05 | TP08 |
| 720min | TP05 | TP07 | TP06 |

## 4.2 Existing Case Model

The existing TUFLOW model was developed by DRE and is site specific. The TUFLOW solution scheme utilised the TUFLOW HPC GPU version 2023.03.AE.iSP.

### 4.2.1 Materials

The TUFLOW model consisted of eight general materials types which are shown in **Table 13** should be read in conjunction with **Appendix D.03**. A global Mannings 'n' value of 0.035 (maintained grass) was used within the areas not through ESRI shape layers.

The manning 'n' values adopted for each material type within the TUFLOW models are provided in **Table 13.**

***Table 13 – Mannings 'n' Values Adopted in TUFLOW Model***

| Mannings 'n' Value | Description |
|---|---|
| 0.022 | Roads |
| 0.030 | Gravel |
| 0.033 | Ponds and Water |
| 0.035 | Maintained Grass |
| 0.080 | Clumped Trees |
| 0.100 | Dense Vegetation |
| 0.300 | Buildings |

### 4.2.2 Topography

The existing case TUFLOW model topography was layered with the following elevation data:

- NSW LiDAR Data - Coffs Harbour 2016-07-29 LiDAR Project.

### 4.2.3 Major Hydraulic Structures

Existing culvert structures of East Bank Road were modelled within TUFLOW to assess the local road immunity for the development during a flood event to better understand time of isolation for the site and proposed development. Details of the major culvert structures are included in **Table 14** and their locations are generally shown on **Appendix D.02**.

***Table 14 – Existing Major Culvert Crossing Details***

| TUFLOW Culvert ID | Description | Length (m) | Upstream IL (mAHD) | Downstream IL (mAHD) |
|---|---|---|---|---|
| Culv_South | 2/900 RCP | 12.5 | 98.76 | 98.64 |
| Culv_North | 1/3050 x 1805 RCBC | 8.6 | 103.93 | 103.92 |

## 4.3 Downstream Tailwater Conditions

Downstream tailwater conditions were adopted from the maximum gridded outputs water surface levels from the Orara River Flood Study for each event as a static water surface level and are summarised below in **Table 15**.

***Table 15 – Tailwater Conditions***

| Event | Tailwater Level (mAHD) |
|---|---|
| 0.2 EY | 93.35 |
| 5% AEP | 93.44 |
| 1% AEP | 93.55 |
| 1% AEP RPC4.5 | 93.57* |
| PMF | 95.99 |

**Adopted from the 500yr ARI Level*

# 5 RESULTS

## 5.1 Water Surface Elevations

The 1% AEP scenario mapping is shown in **Figure 6** in relation to the site. Due to the steep topography of the site the water surface elevation across the site ranges from 100.8 mAHD to 106.5 mAHD as generally shown in **Figure 6**.

There are large areas of land within each proposed lot that are clear of the 1% AEP flood extents. Adequate space is available within each proposed lot to provide 500mm freeboard to pad levels for future dwellings. It should be noted that during detailed design, a culvert crossing will need to be included within the eastern access handle to proposed lot 15 to provide flood free access to this property during the 1% AEP flood event. The location of this future culvert crossing is generally shown on **Figure 6**.

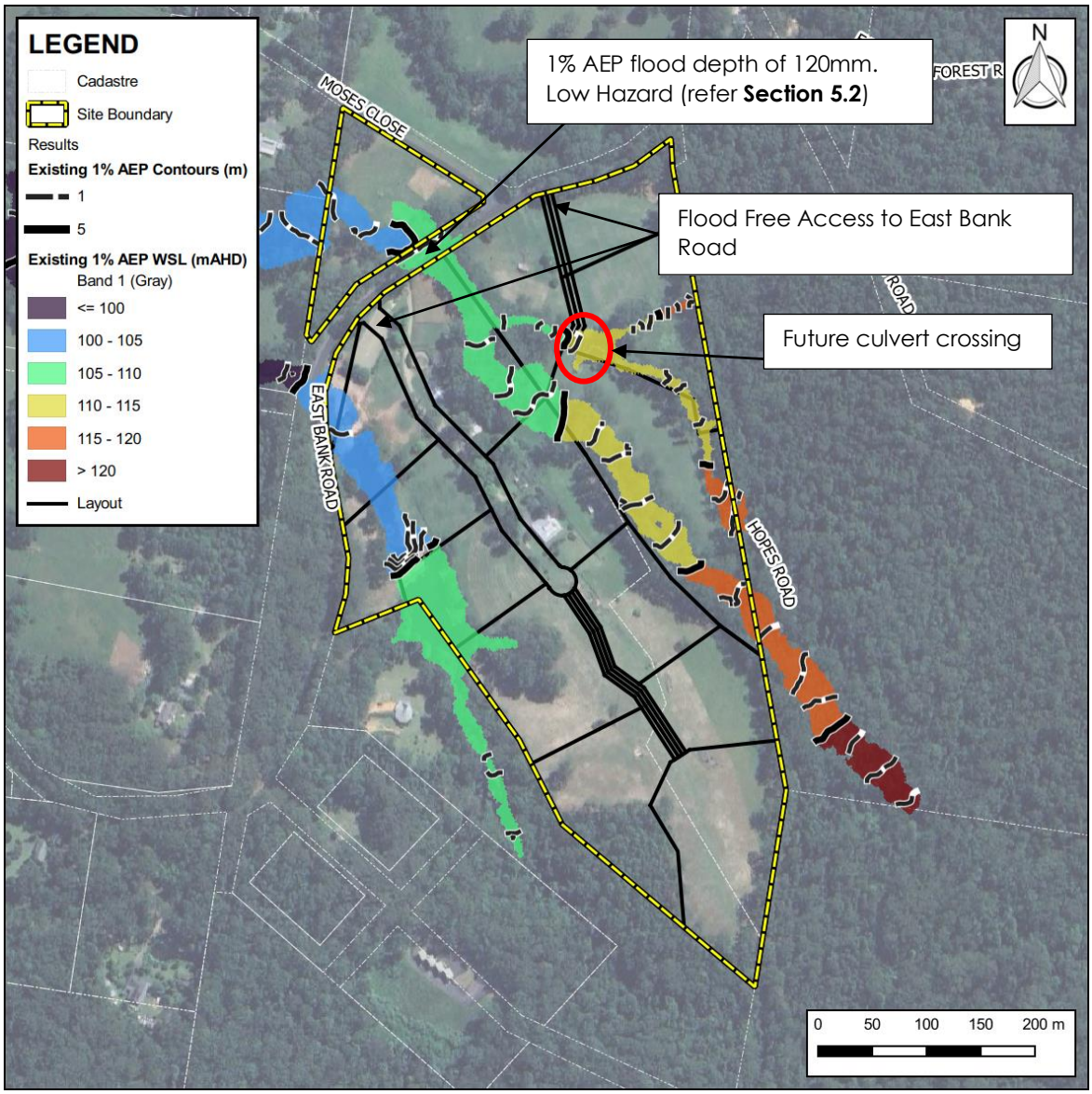



*Figure 6 – 1% AEP Water Surface Levels*

Water surface level mapping has been provided for all other modelled events and can be seen in **Appendix E**.

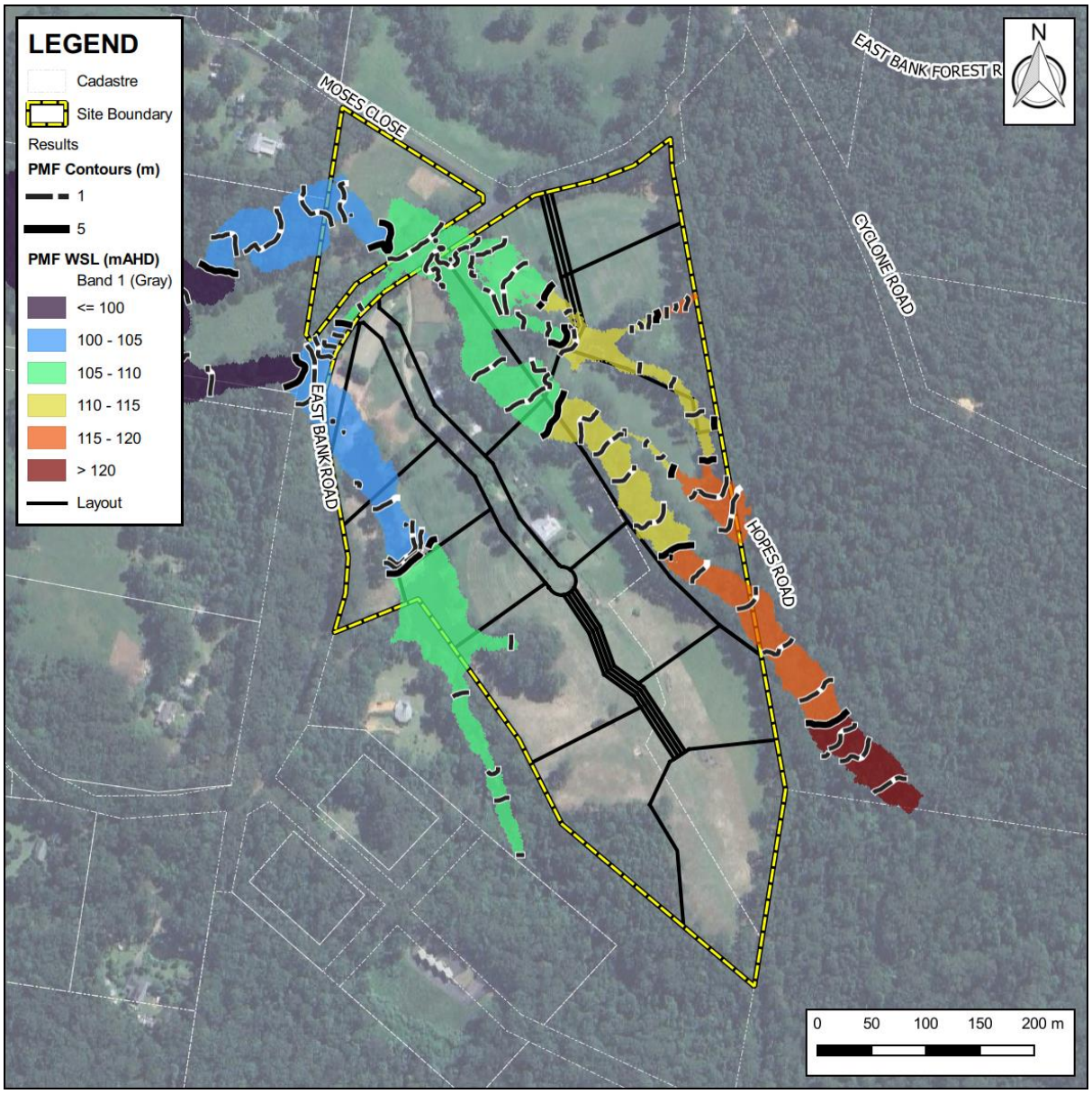



***Figure 7 – PMF Water Surface Levels***

## 5.2 Hazard mapping

Hazard mapping for the existing scenarios are provided in **Appendix E**. The hazard mapping has been based on scenario results from the 0.2 EY, 5% AEP, 1% AEP, 1% AEP plus climate change and PMF flood events. The 1% AEP and PMF hazard mapping has been provided in **Figure 9** and **Figure 10** respectively. The mapping was based upon the existing case RORB and TUFLOW models. **Figure 8** represents the hazard classifications for varying velocity depth product criteria.

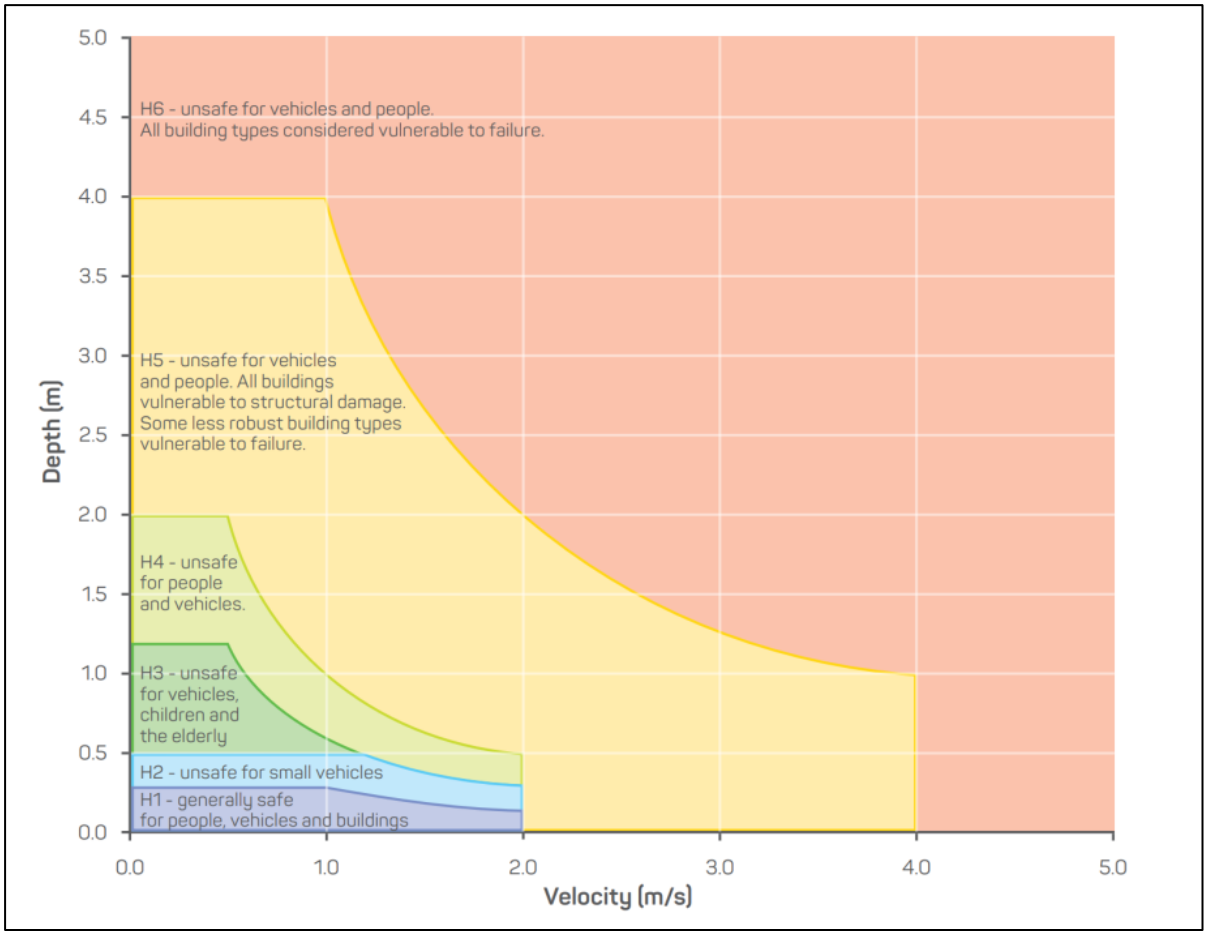



***Figure 8 – Flood Hazard Vulnerability Curves***

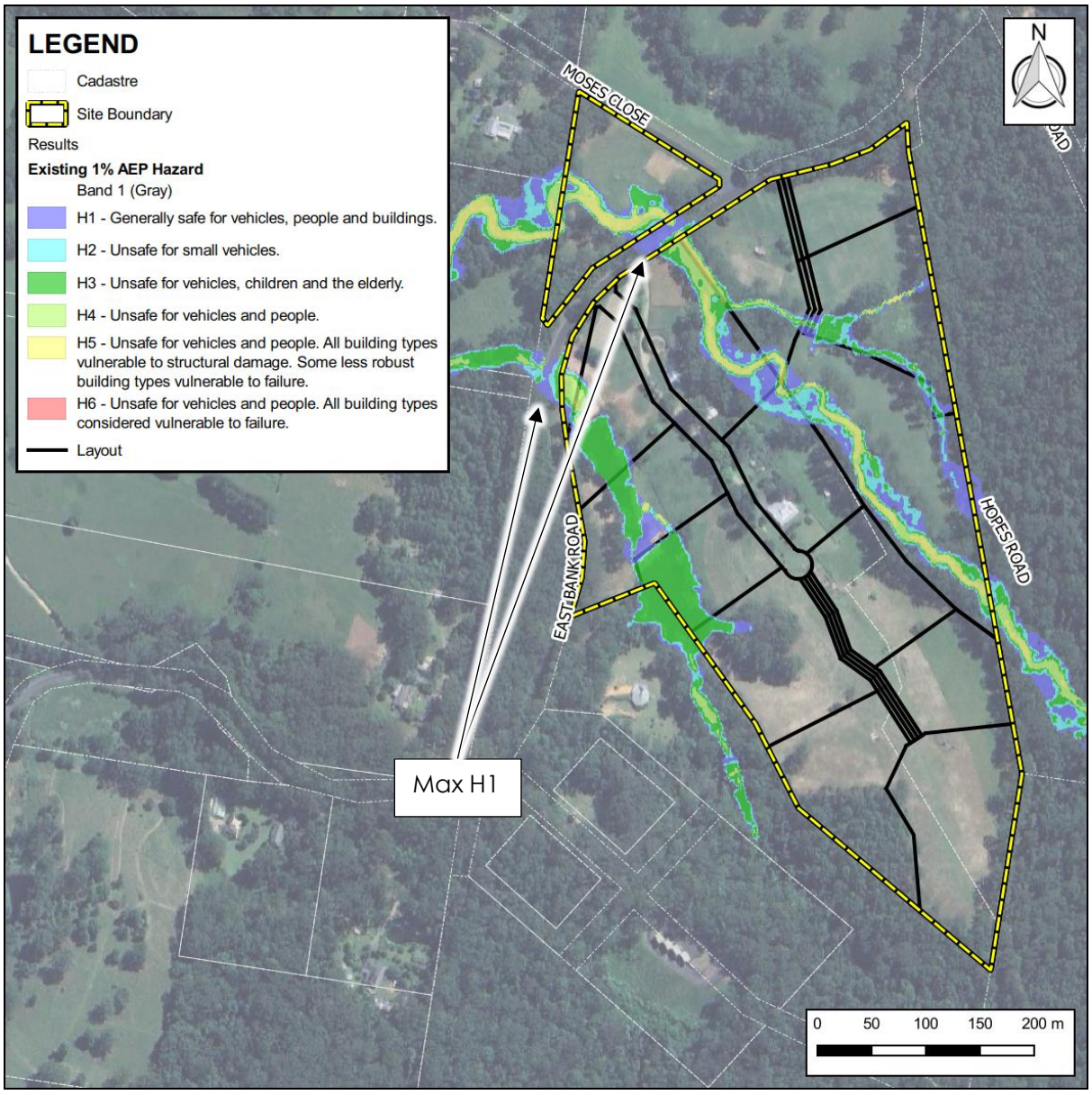



***Figure 9 – Existing 1% AEP Hazard Mapping***

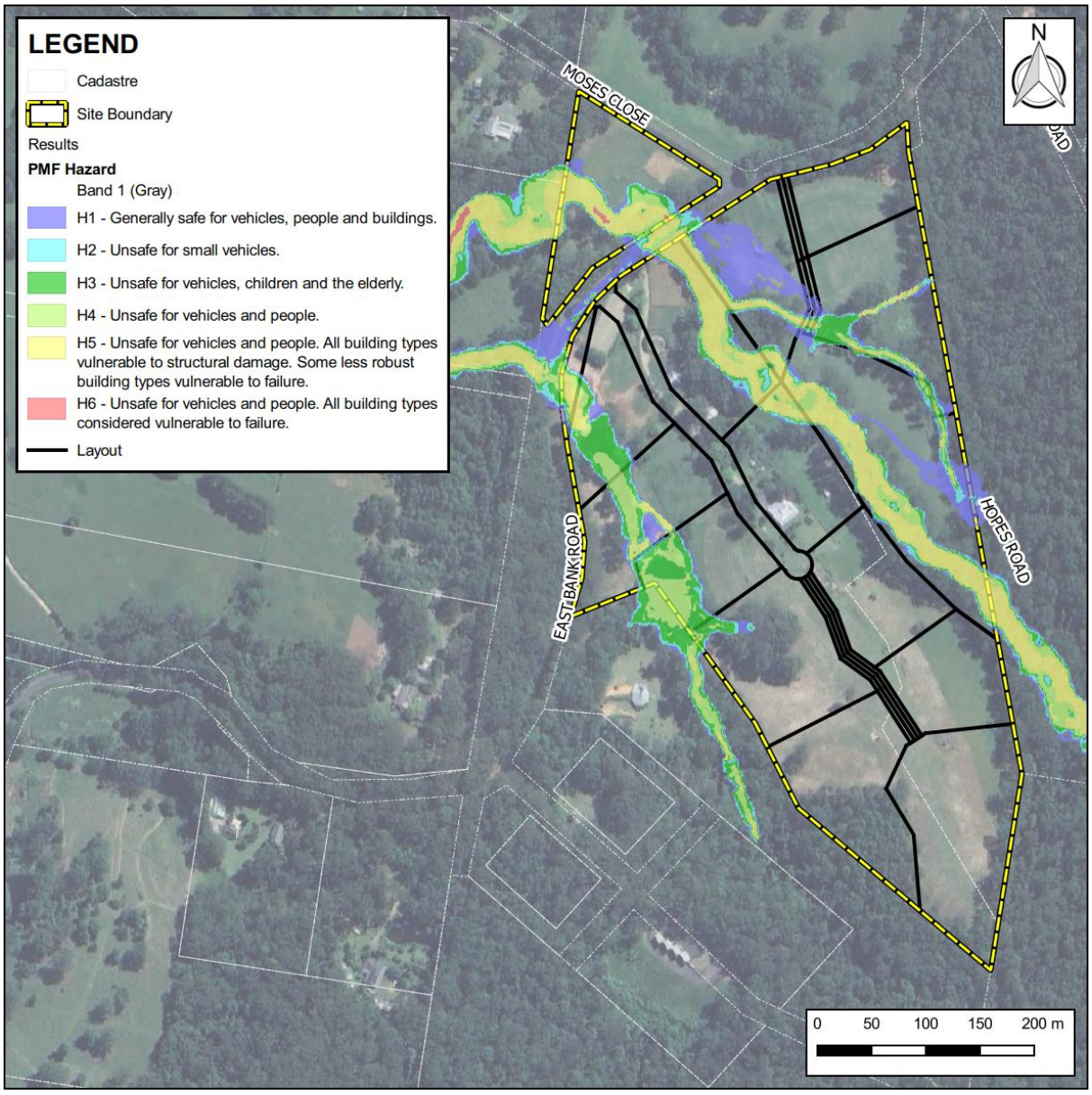



***Figure 10 – Existing PMF Hazard Mapping***

## 5.3 Flood Free Access to East Bank Road

The following section discusses the access from the site to East Bank Road and the nearest township Coramba. The site has flood free access to East Bank Road for events up to and including the 1% AEP event as discussed within **Section 5.1**. East Bank Road has a maximum hazard classification during the 1% AEP event of H1 which is described as "Generally safe for vehicles, people and buildings". The site can therefore be safely accessed via East Bank Road during local flood events up to the 1% AEP.

## 5.4 Time of Isolation

TUFLOW result outputs have been generated for time in hours exceeding a H1 hazard classification. The 1% AEP and PMF events are mapped in **Figure 11** and **Figure 12** respectively with all events mapped in **Appendix E**. The TUFLOW modelling indicates there is no time of closures for East Bank Road during a 1% AEP and during a PMF event the time of closure is less than 3 hours.

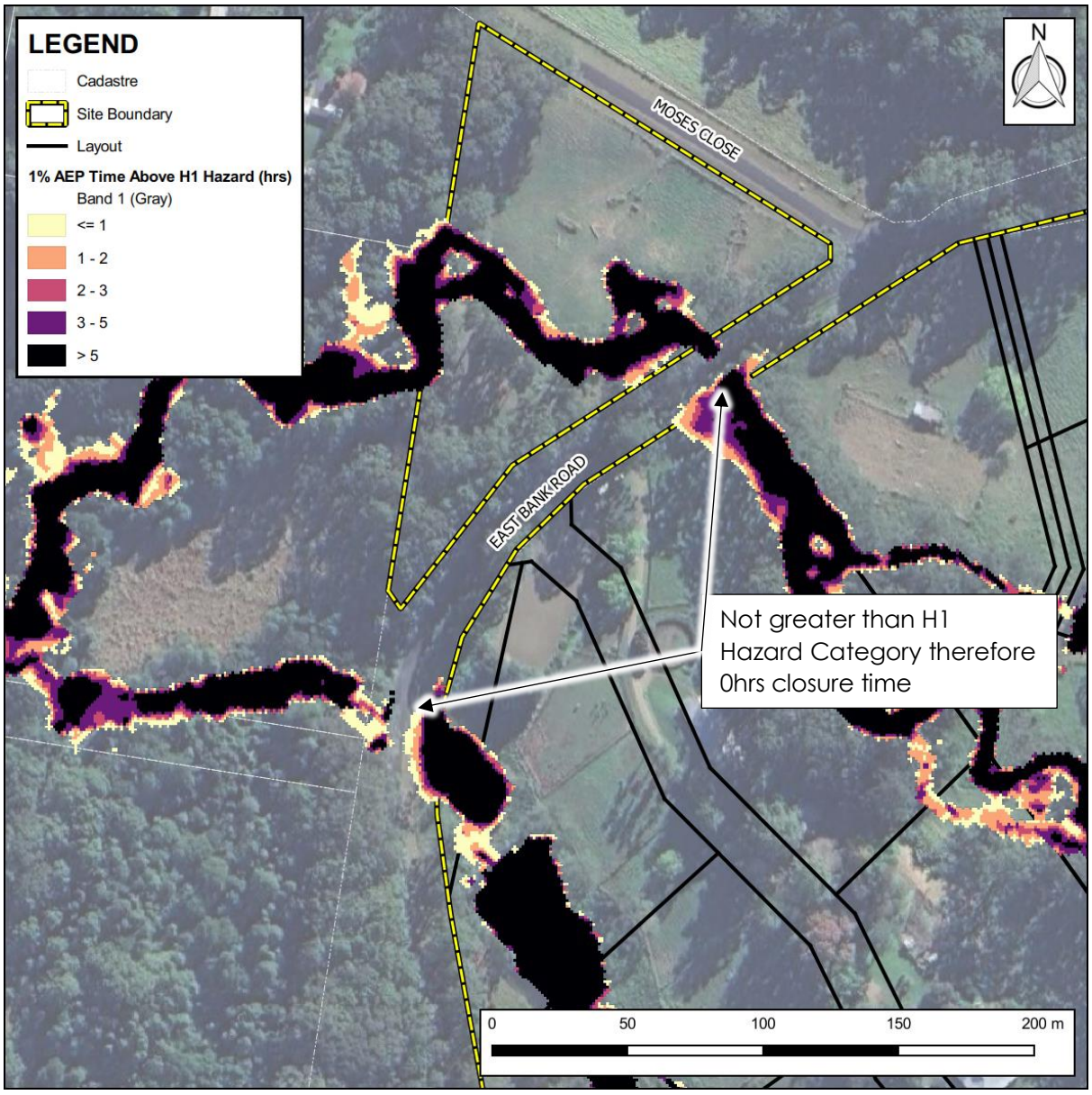



***Figure 11 – 1% AEP Time of Isolation (Greater than H1 Hazard) East Bank Road***

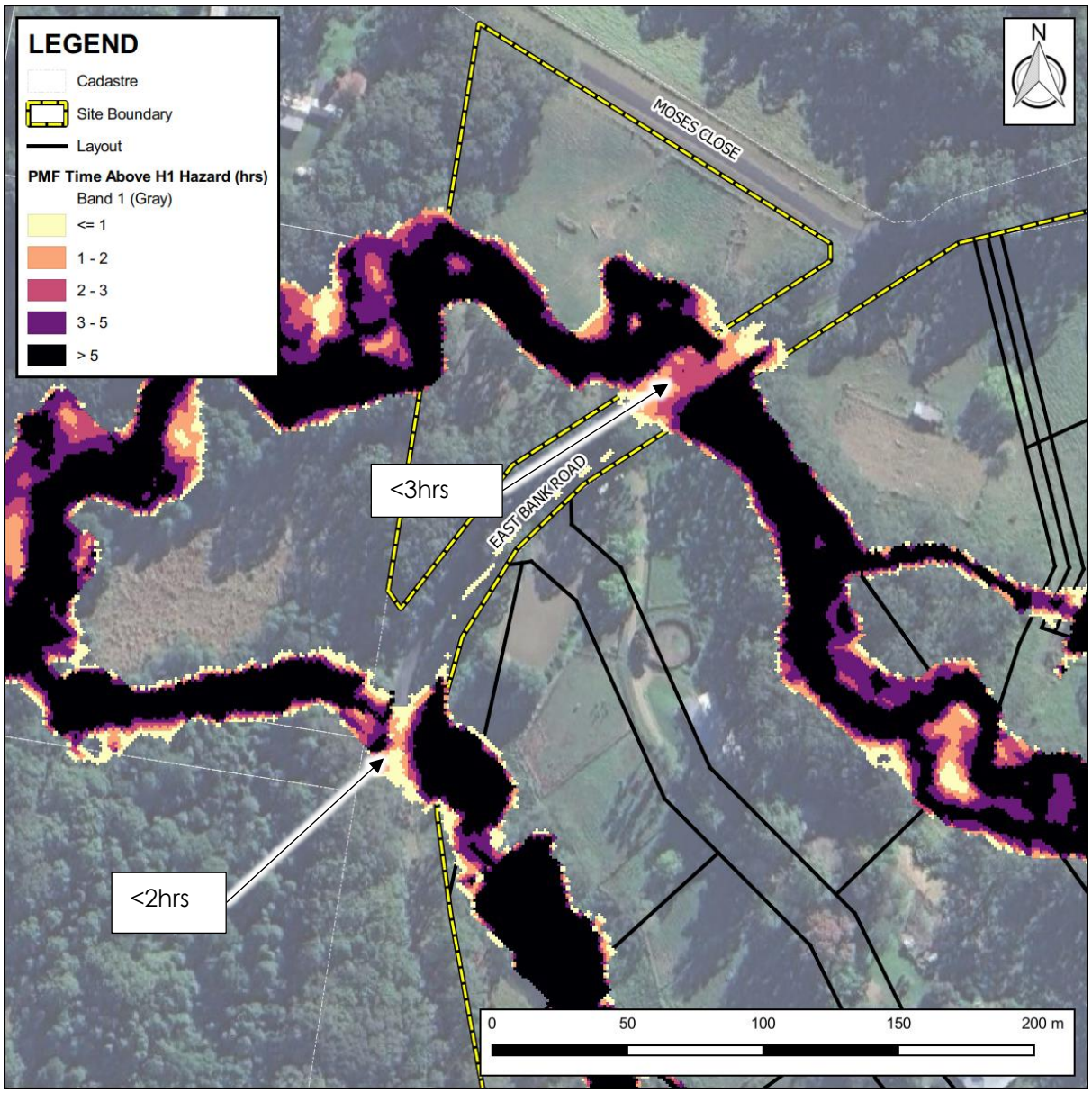



***Figure 12 – PMF Time of Isolation (Greater than H1 Hazard) East Bank Road***

## 5.5 Shelter In Place

According to the Draft Shelter In Place Guideline a Shelter-in-place (SIP) is the movement of occupants to a building or the occupants remaining in a location that provides vertical refuge on the site or near the site above the PMF level before their property becomes flood-affected.

***Table 16 – Existing Major Culvert Crossing Details***

| Proposed Lot | Flood Free Land Area (m²) |
|---|---|
| Lot 1 | 10,772 |
| Lot 2 | 6,453 |
| Lot 3 | 9,116 |
| Lot 4 | 5,538 |
| Lot 5 | 13,698 |
| Lot 6 | 14,032 |
| Lot 7 | 18,273 |
| Lot 8 | 9,370 |
| Lot 9 | 10,280 |
| Lot 10 | 9,412 |
| Lot 11 | 8,488 |
| Lot 12 | 5,410 |
| Lot 13 | 8,056 |
| Lot 14 | 11,581 |
| Lot 15 | 13,359 |

As it has been demonstrated each of the proposed lots have a considerable amount of flood free land from the Probable Maximum Flood (PMF). Flood free land for each proposed lot has been tabulated in **Table 16**. As each of the proposed lots have been demonstrated to contain flood free land above the PMF, there would be no need to evacuate residents from these properties during a flood event as each lot will have a SIP available on site.

# 6 SUMMARY

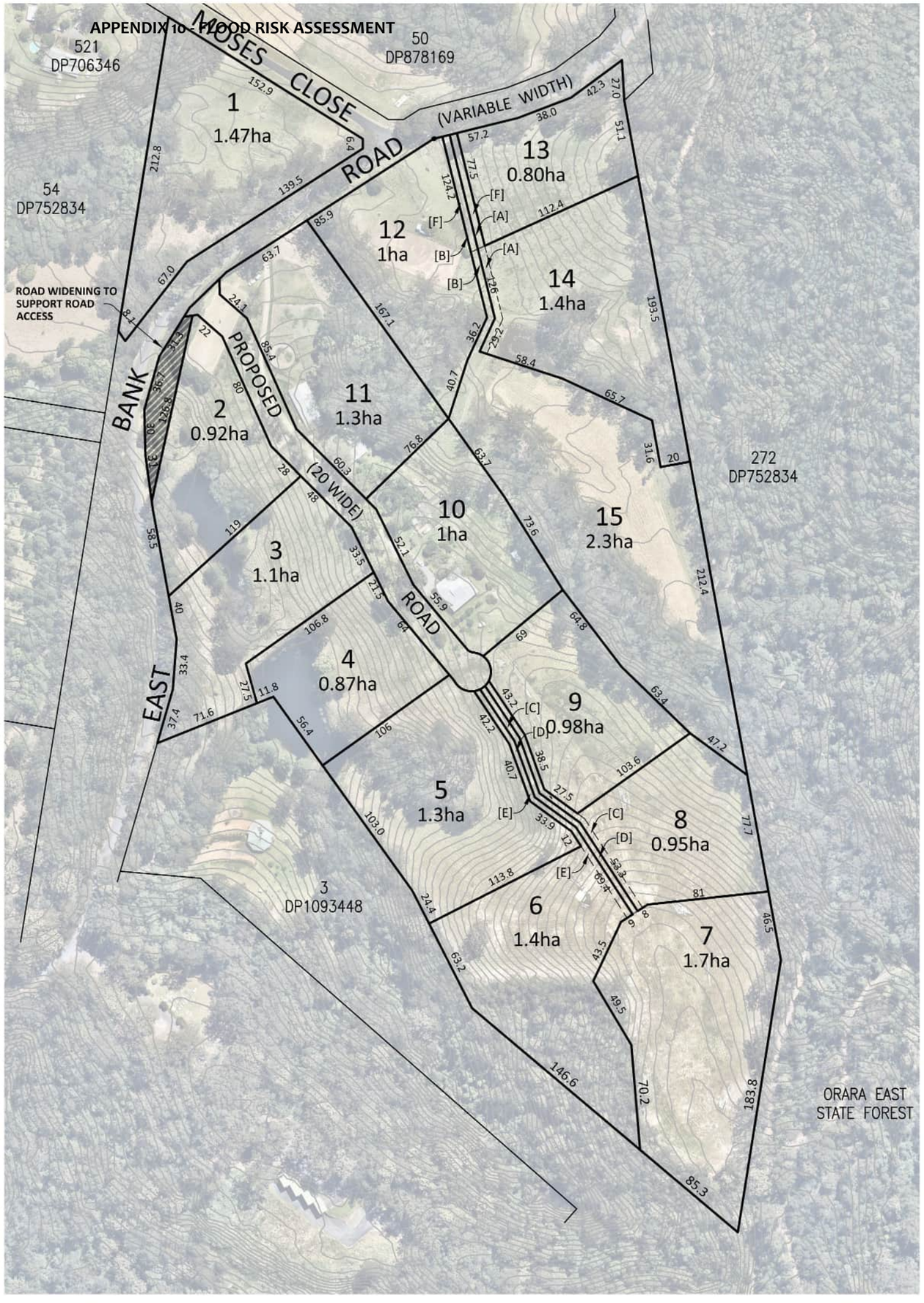
This Flood Risk Assessment (FRA) has been developed to provide an assessment of development of the site, in the context of how it relates to the current engineering environment surrounding it.

The following observations are made:

- Flood modelling outcomes identified within this report show that the proposed development has a developable footprint outside the 1% AEP flood event.
- Each proposed parcel has developable land outside the PMF flood extents which can be used as a Shelter In Place for residents.
- The development has flood free access to East Bank Road.
- The development will not unduly burden SES, Emergency Departments or Council during flood events up to the PMF.
- A culvert crossing will be required within the development to provide 1% AEP immunity to service Lot 15
- East Bank Road has a time of closure of less than 3hours during a PMF for the local flood event and the site is not directly affected by the backwater of the Orara River Regional flood.

Based on the findings outlined in this FRA, the proposed development has been assessed as suitable for the level of flood risk relative to the surrounding environment. We do not foresee any reasonable flood risks that would preclude the development being approved by Department of Planning, Housing and Infrastructure NSW or Council.

# APPENDIX A PROPOSED DEVELOPMENT PLAN




NOTE:

- The dimensions, areas and numbers of lots shown heron are approximate and are subject to verification by field survey.
- The location of all physical features relative to existing or proposed title boundaries shown hereon is approximate and subject to verification by field survey.
- No reliance should be placed on the information shown on this plan for any financial dealings or detailed engineering design involving the land.
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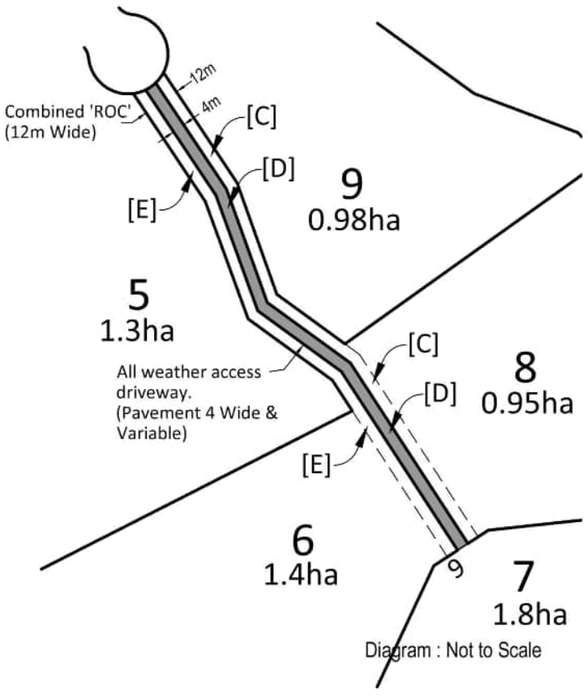
- This Plan is not a plan of an approved subdivision nor does it imply that the proposed boundary arrangement would be approved.
- Road Widening of East Bank Road as shown to support safe intersection site distance as per AS2890 for 80Km Speed Zone.
- This note remains an intrinsic part of this plan and this plan must not be reproduced without this note.

[A] PROPOSED 'ROC' BENEFITTING PROPOSED LOT 15
[B] PROPOSED 'ROC' BENEFITTING PROPOSED LOT 14
[C] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 6 & 7
[D] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 6 & 8
[E] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 7 & 8
[F] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 12

NOTES:
'ROC' - RIGHT OF CARRIAGEWAY

**DIAGRAM 'A'**




Scale - 1:3000 @ A3
0 50 100

218 EAST BANK ROAD
PLANNING PROPOSAL
CONCEPT SUBDIVISION
J. CLEARY
LOT 1 & 2 DP 1093448
EAST BANK ROAD, CORAMBA

Land Metrics
Land Development Consultants

Land Metrics Pty Ltd
PO Box 6511 Corindi Beach, NSW 2450
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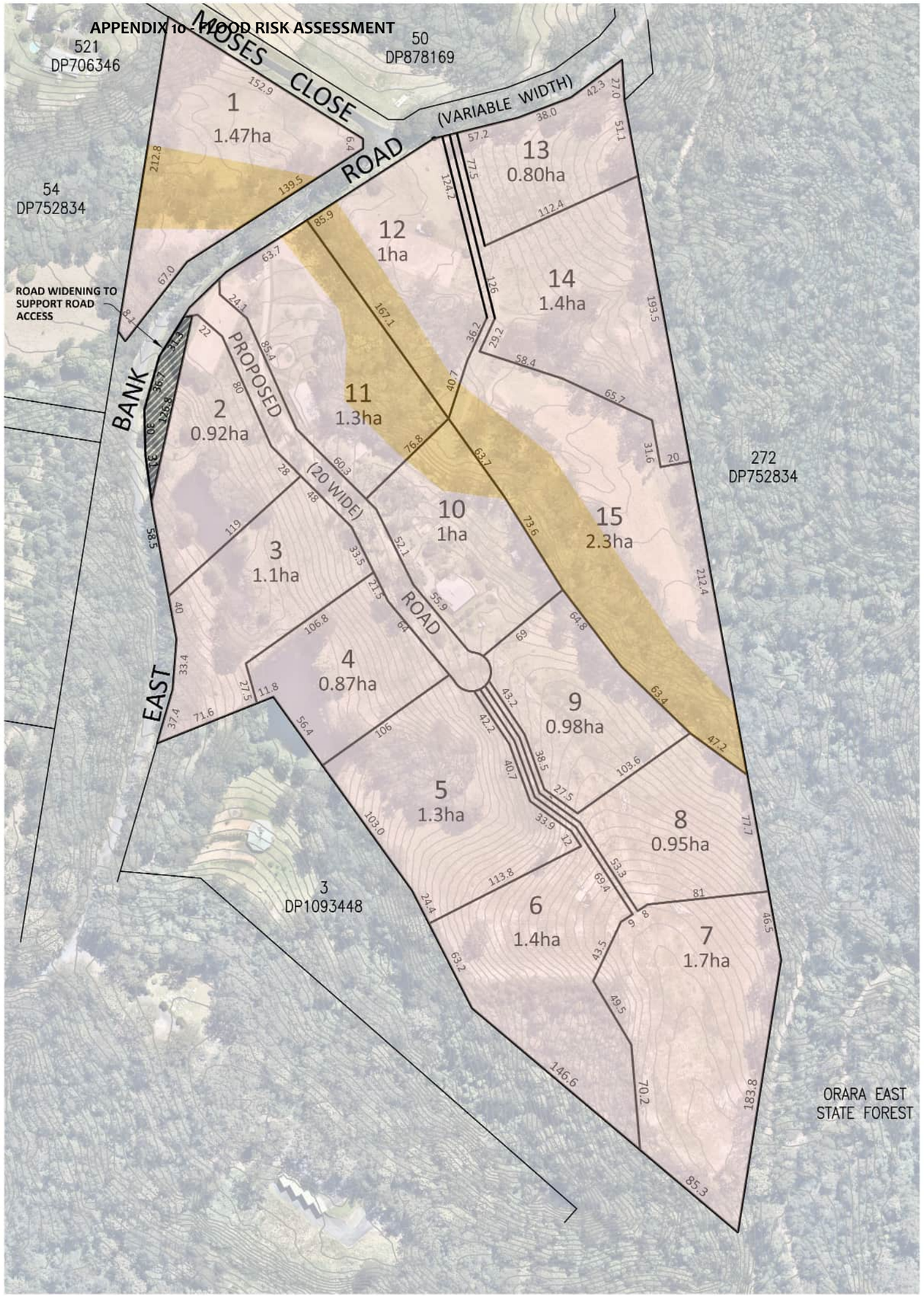
| N/A | M.C. | |
| Checked | Date | |
| M.C. | 09/10/2023 | |
| Dwg No | Sheet | Rev |
| 2021-029 | 01 | |




NOTE:

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- This note remains an intrinsic part of this plan and this plan must not be reproduced without this note.

N

PROPOSED LAND USE ZONES

- R5 LARGE LOT RESIDENTIAL
- C2 ENVIRONMENTAL CONSERVATION

Scale - 1:3000 @ A3

0 50 100

218 EAST BANK ROAD
PLANNING PROPOSAL
PROPOSED LAND USE ZONE(S)
J. CLEARY
LOT 1 & 2 DP 1093448
EAST BANK ROAD, CORAMBA

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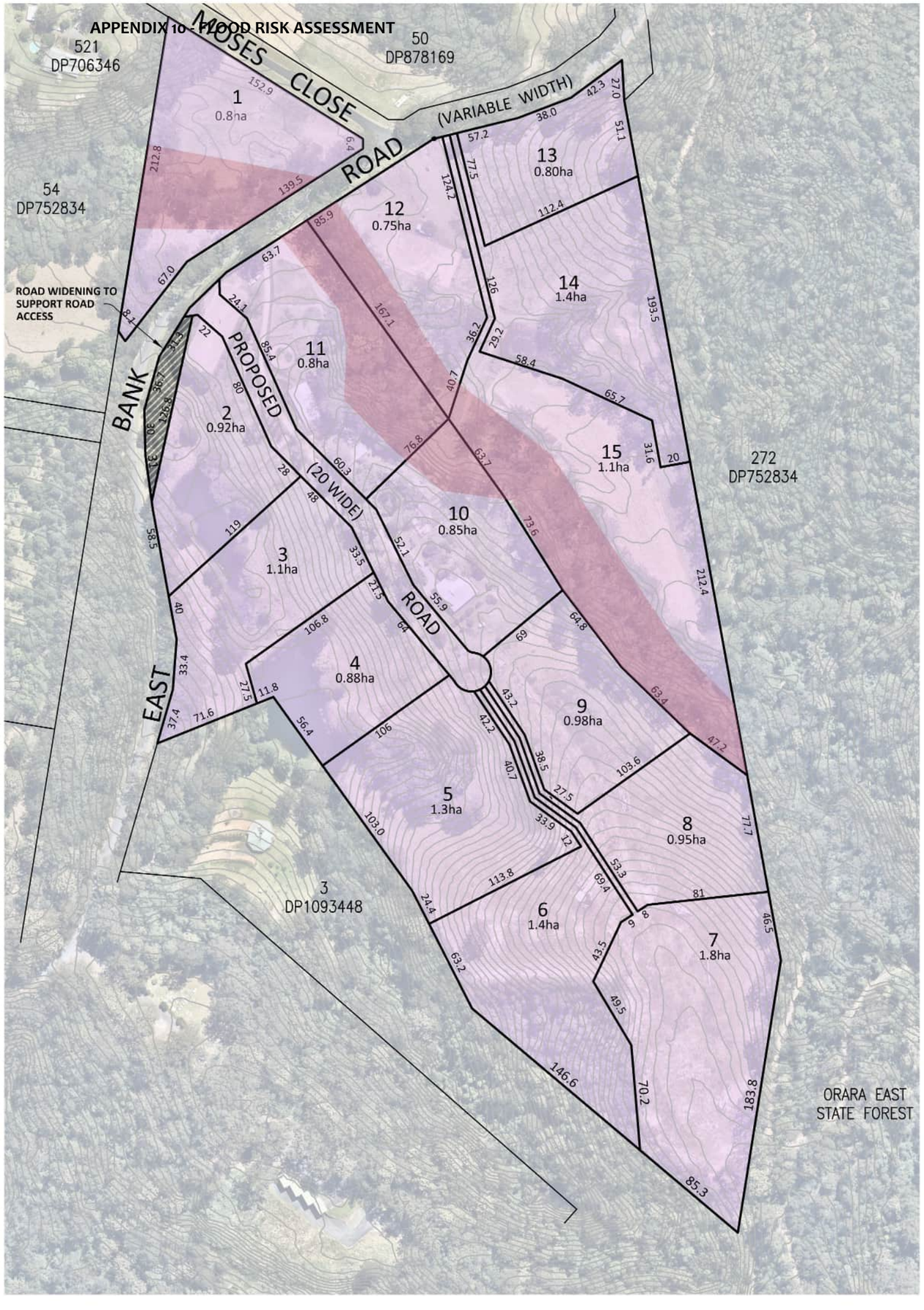
| N/A | M.C | |
| Checked | Date | |
| M.C. | 09/10/2023 | |
| Dwg No | Sheet | Rev |
| 2021-029 | 02 | |




NOTE:

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- Areas shown on this plan are applicable to R5 Zone limits only.

N

DRAFT MINIMUM LOT SIZES

REPRESENTS PROPOSED R5 ZONED LAND

REPRESENTS PROPOSED C2 ENVIRONMENTAL PROTECTION

Scale - 1:3000 @ A3

0 50 100

218 EAST BANK ROAD
PLANNING PROPOSAL
PROPOSED MINIMUM LOT SIZE PLAN
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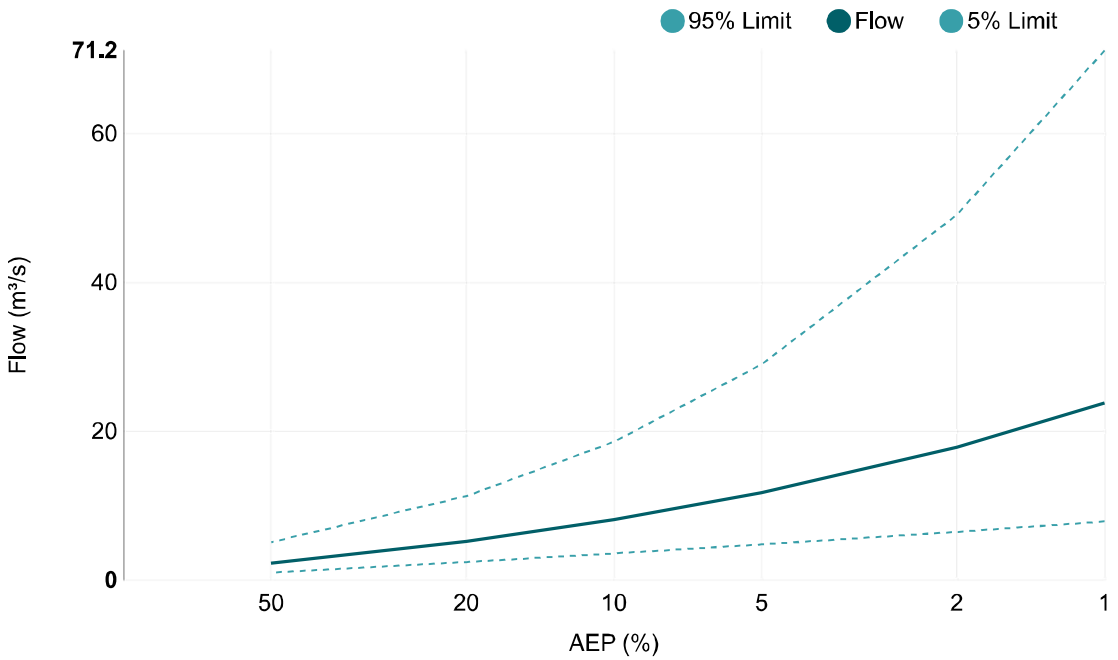
Land Metrics
Land Development Consultants

Land Metrics Pty Ltd
PO Box 6511 Corindi Beach, NSW 2450
Ph. 0422 697 846
E: matt@landmetrics.net.au

| Surveyed | Drawn | |
|---|---|---|
| N/A | M.C. | |
| Checked | Date | |
| M.C. | 09/10/2023 | |
| Dwg No | Sheet | Rev |
| 2021-029 | 04 | |

# APPENDIX B RFFE OUTPUTS

# Results | Regional Flood Frequency Estimation Model




| AEP (%) | Discharge ($m^3/s$) | Lower Confidence Limit (5%) ($m^3/s$) | Upper Confidence Limit (95%) ($m^3/s$) |
|---|---|---|---|
| 50 | 2.31 | 1.04 | 5.12 |
| 20 | 5.25 | 2.45 | 11.3 |
| 10 | 8.15 | 3.60 | 18.6 |
| 5 | 11.8 | 4.81 | 29.0 |
| 2 | 17.9 | 6.50 | 49.1 |
| 1 | 23.8 | 7.90 | 71.2 |

## Statistics

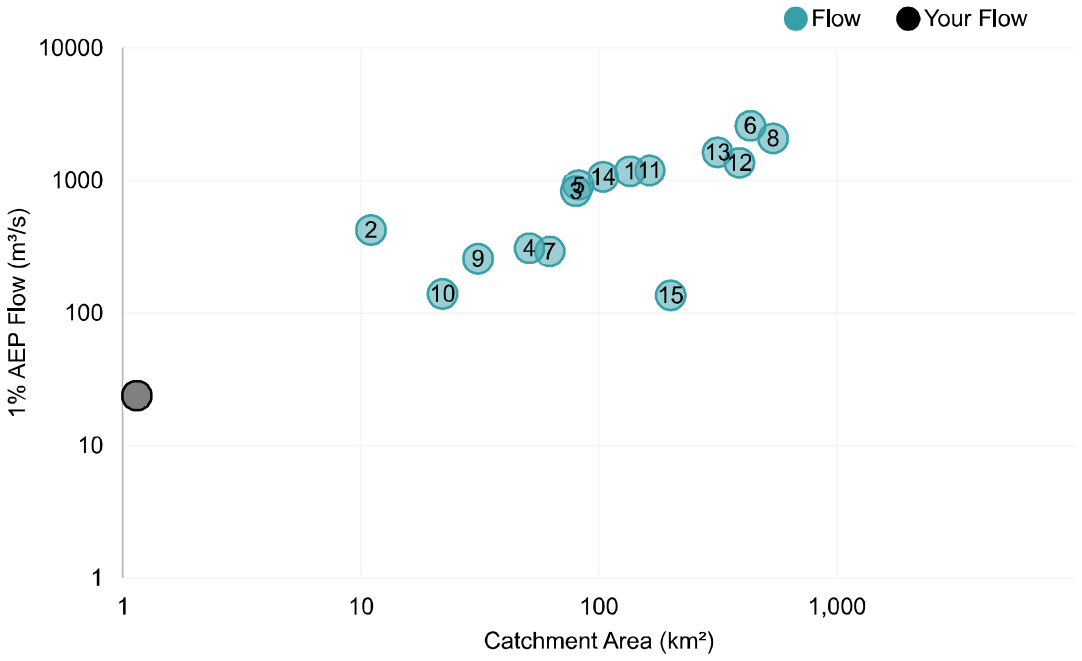
| Variable | Value | Standard Dev |
|---|---|---|
| Mean | 0.674 | 0.442 |
| Standard Dev | 0.984 | 0.314 |
| Skew | 0.110 | 0.029 |

Note: These statistics come from the nearest gauged catchment. Details.

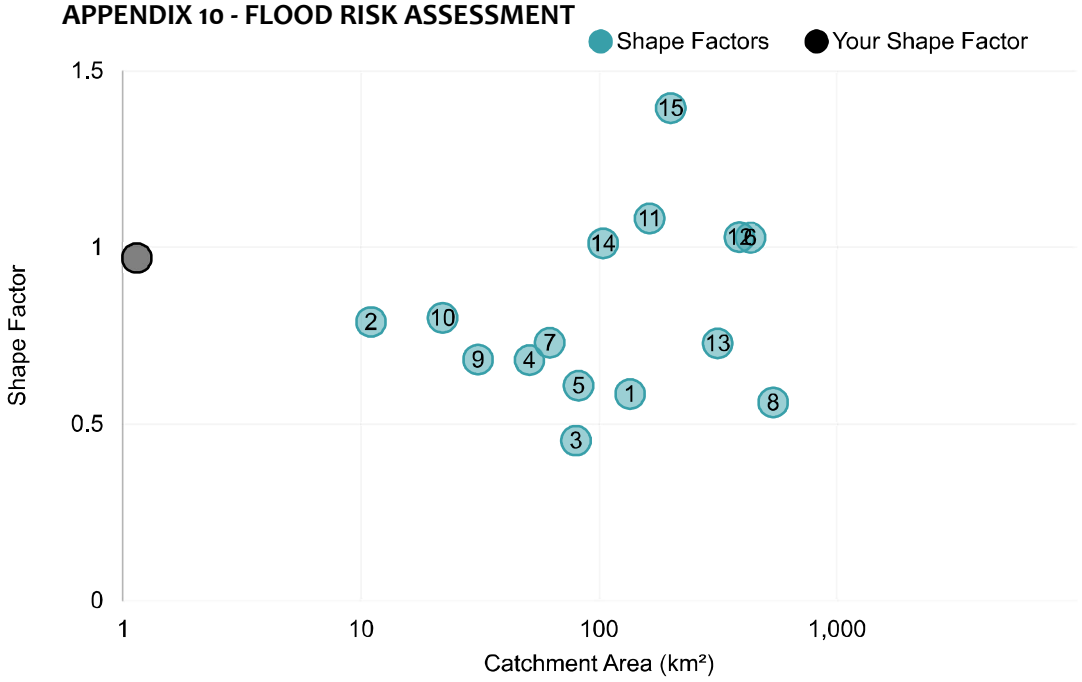
| Correlation | | |
|---|---|---|
| 1.000 | | |
| -0.330 | 1.000 | |
| 0.170 | -0.280 | 1.000 |

Note: These statistics are common to each region. Details.

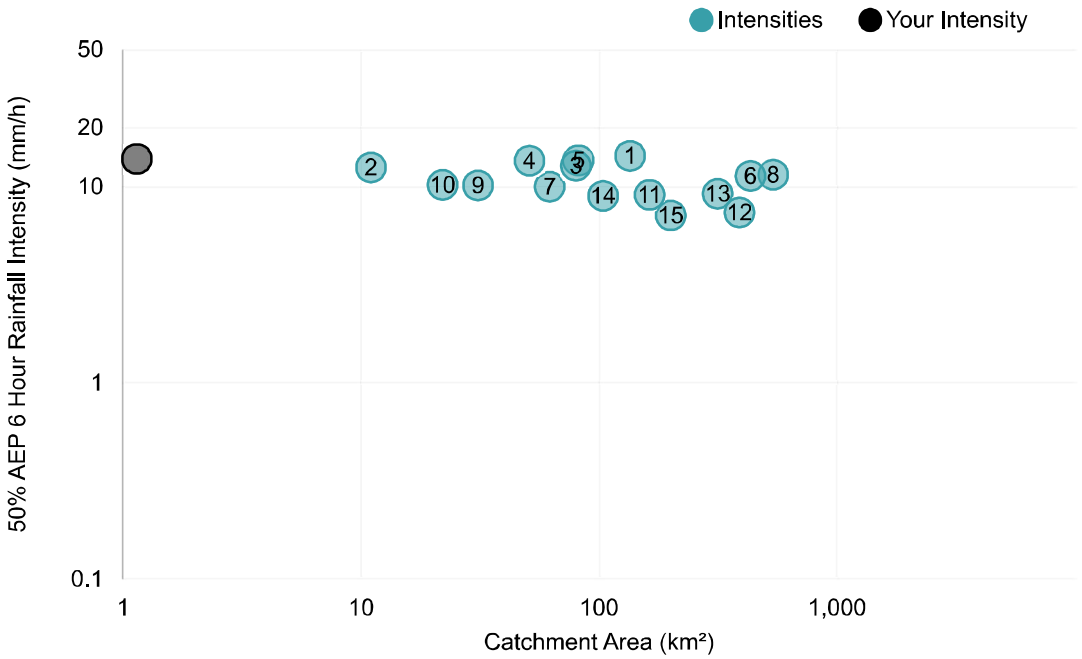
# 1% AEP Flow vs Catchment Area



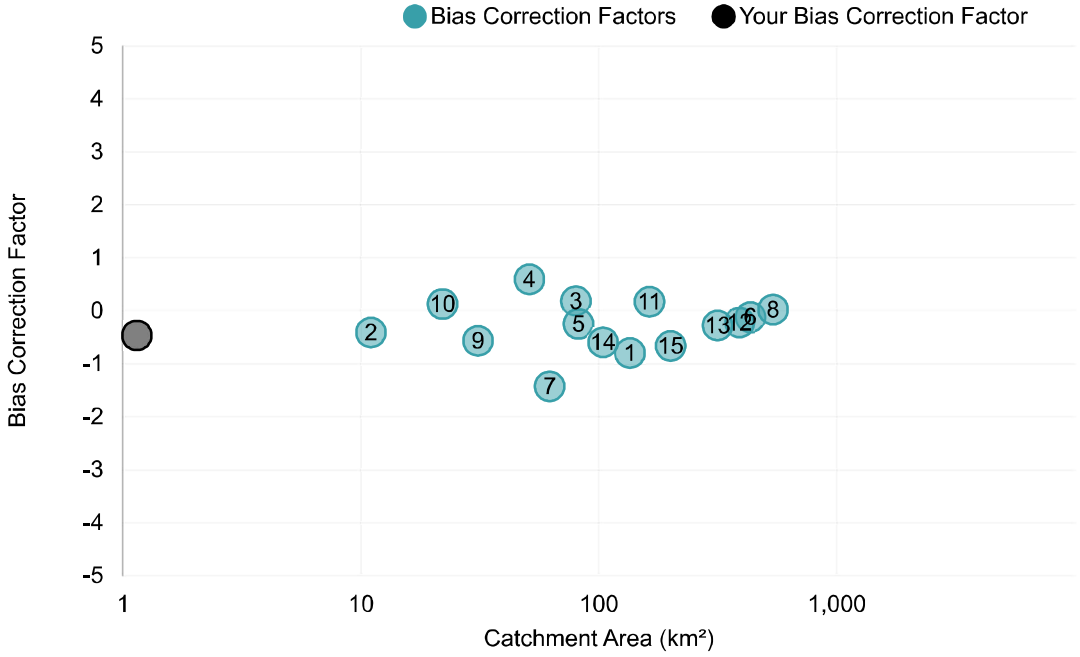

# Shape Factor vs Catchment Area




# Intensity vs Catchment Area




# Bias Correction Factor vs Catchment Area




# Download

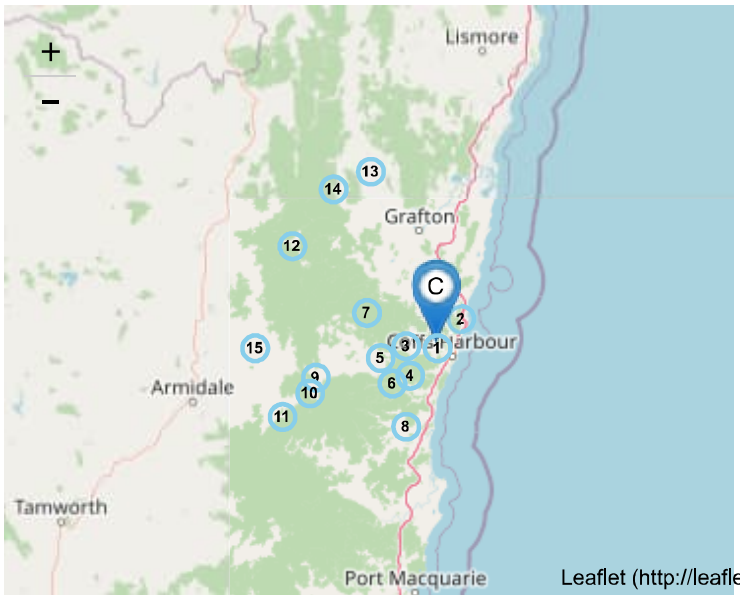
TXT Nearby JSON

**Input Data**

| | |
|---|---|
| Date/Time | 2024-07-21 19:55 |
| Catchment Name | 10101 Outlet |
| Latitude (Outlet) | -30.2121247065 |
| Longitude (Outlet) | 153.023981724 |
| Latitude (Centroid) | -30.2175113725 |
| Longitude (Centroid) | 153.032810605 |
| Catchment Area ($km^2$) | 1.14150399951 |
| Distance to Nearest Gauged Catchment (km) | 5.35 |
| 50% AEP 6 Hour Rainfall Intensity (mm/h) | 13.844648 |
| 2% AEP 6 Hour Rainfall Intensity (mm/h) | 36.872821 |
| Rainfall Intensity Source (User/Auto) | Auto |
| Region | East Coast |
| Region Version | RFFE Model 2016 v1 |

## Input Data

| | |
|---|---|
| Region Source (User/Auto) | Auto |
| Shape Factor | 0.97 |
| Interpolation Method | Natural Neighbour |
| Bias Correction Value | -0.467 |



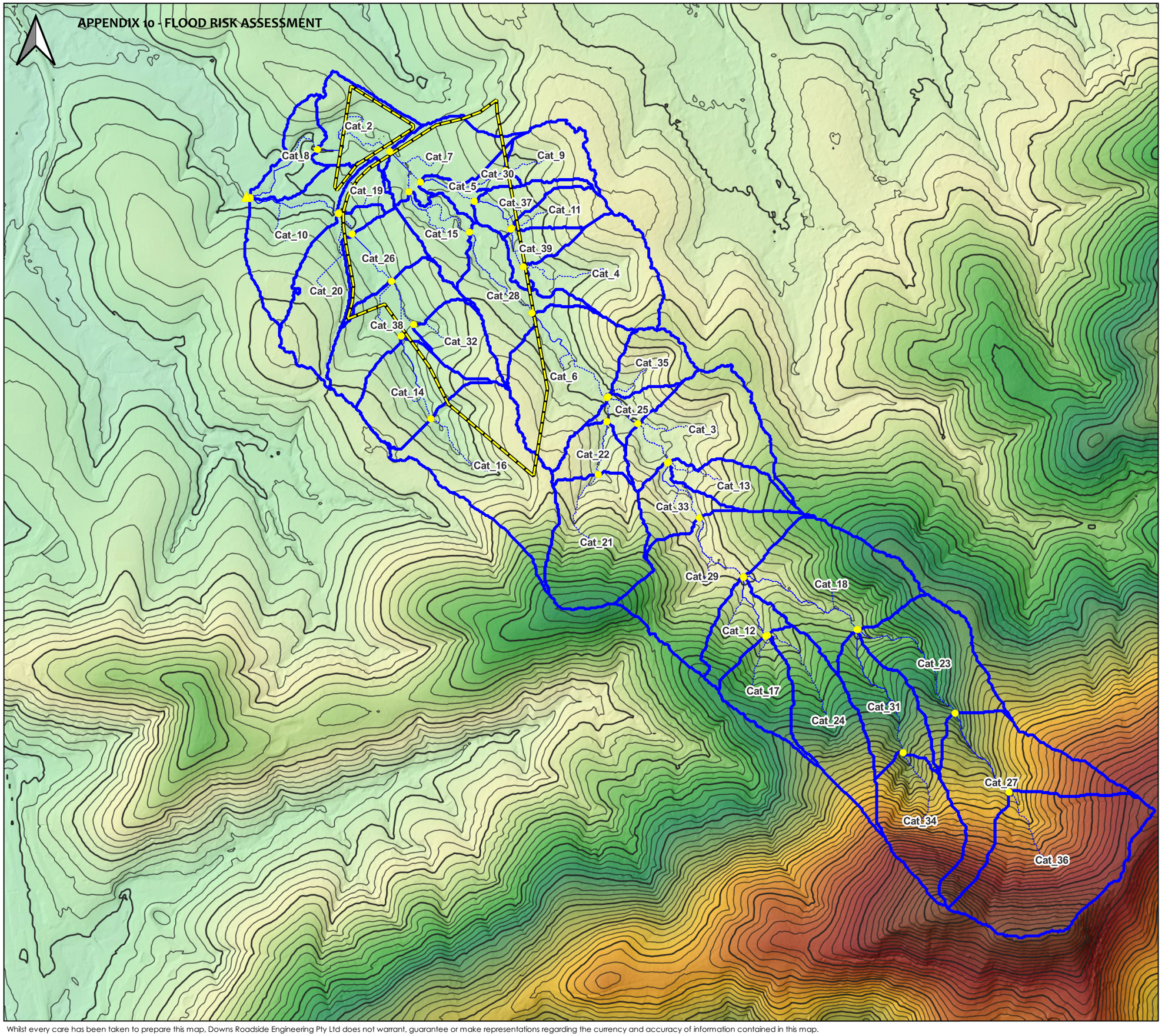

Method by Dr Ataur Rahman and Dr Khaled Haddad from Western Sydney University for the Australian Rainfall and Runoff Project. Full description of the project can be found at the project page (http://arr.ga.gov.au/revision-projects/project-list/projects/project-5) on the ARR website. Send any questions regarding the method or project here (mailto:admin@arr-software.org).

ENGINEERS AUSTRALIA (http://www.engineersaustralia.org.au)

WESTERN SYDNEY UNIVERSITY (http://www.uws.edu.au)

# APPENDIX C RORB CATCHMENT PLANS

APPENDIX 10 - FLOOD RISK ASSESSMENT




## Legend

- Site Boundary
- RORB Reaches
- Confluences
- Outlet
- RORB Catchments

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

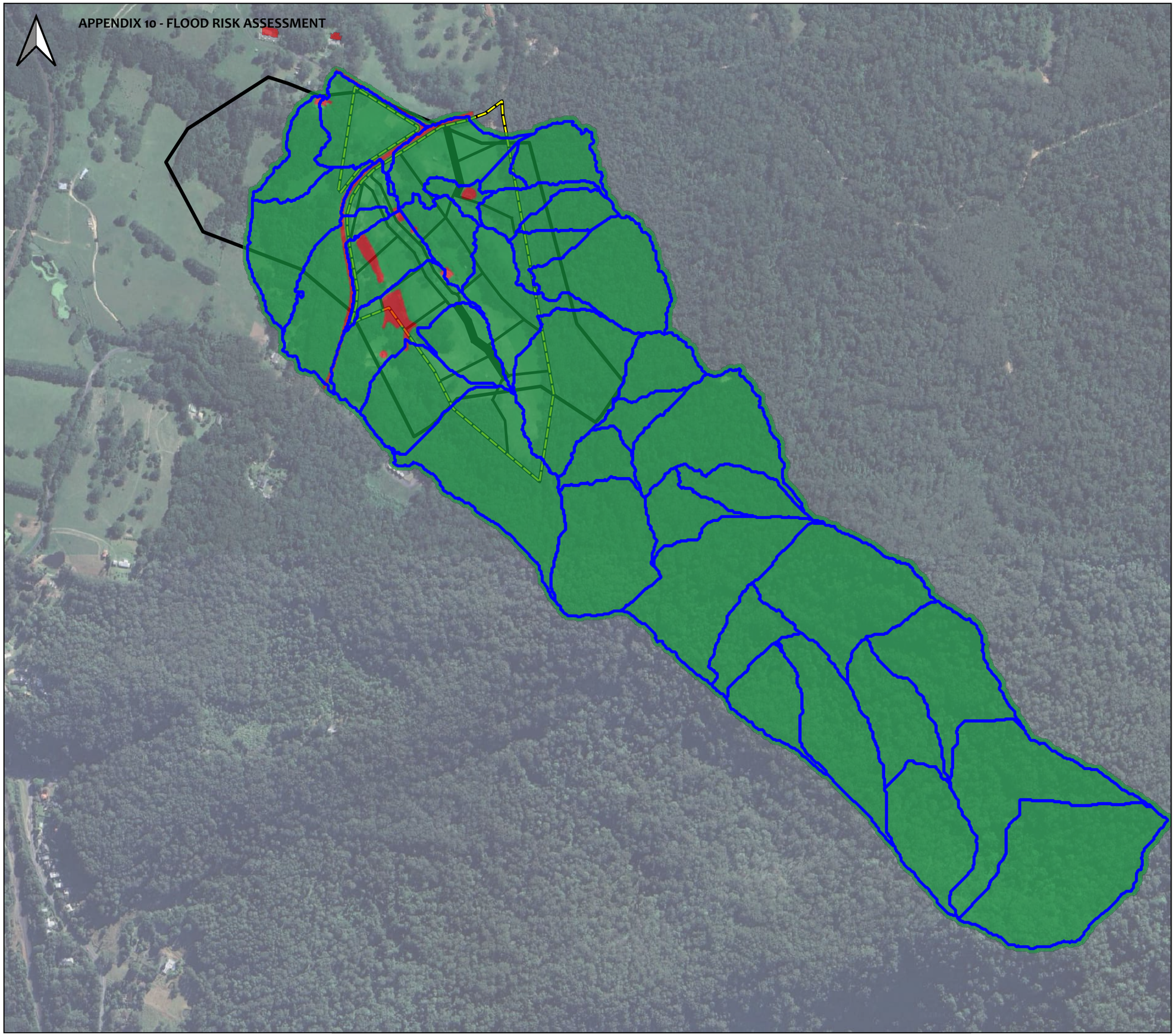
Title:
RORB Catchment Plan

Scale (at A3)
1:7,500
0 255075100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A
Appendix C.01
Date: 13/08/2024

APPENDIX 10 - FLOOD RISK ASSESSMENT



## Legend

- Site Boundary
- Model Boundry
- RORB Catchments
- Layout

Percent Impervious
Band 1 (Gray)
100
0

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Impervious Plan

Scale (at A3)
1:7,500
0 255075100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

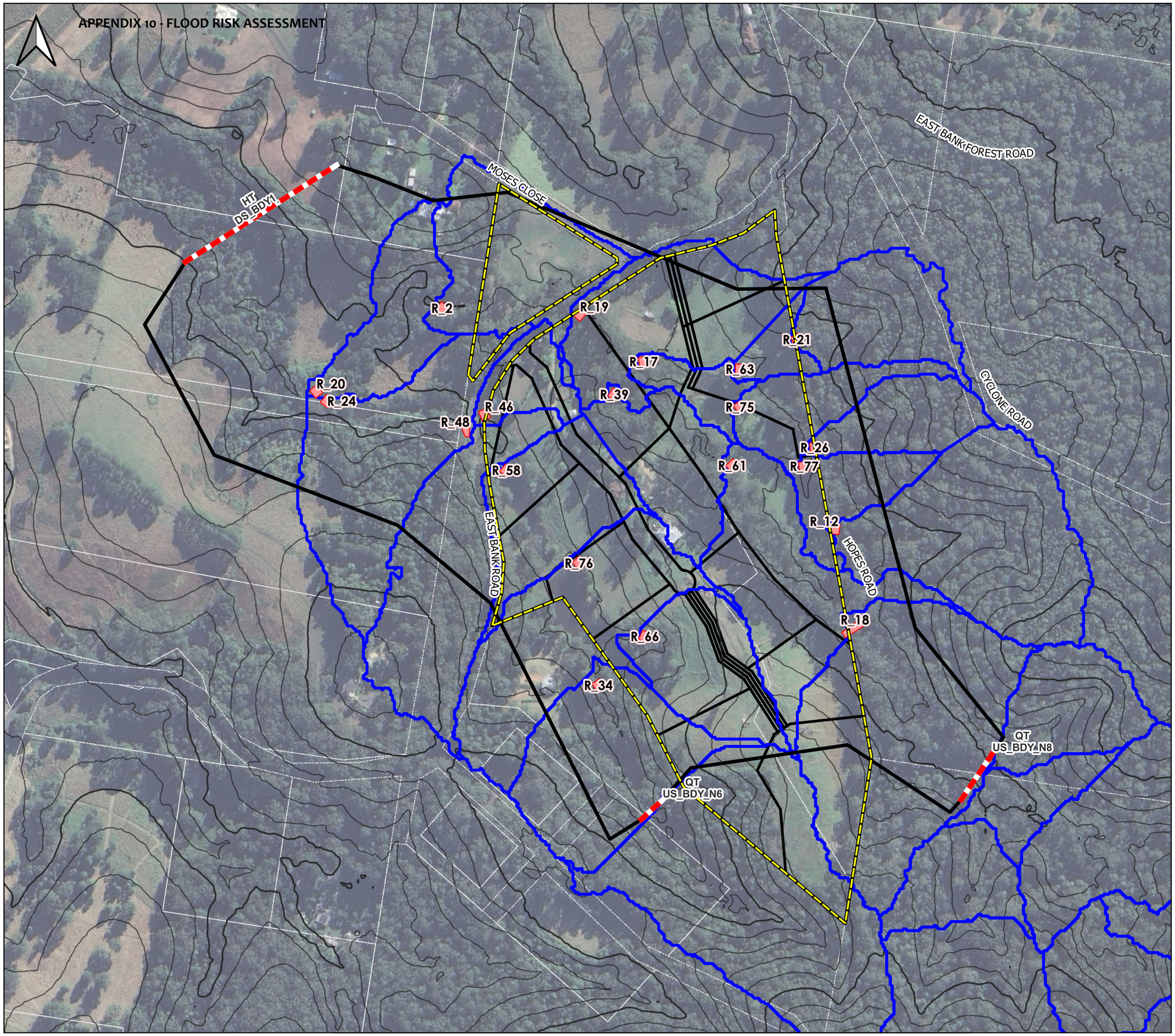
DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix C.02**

Date: 13/08/2024

# APPENDIX D TUFLOW SETUP




## Legend

- Cadastre
- Site Boundary
- Model Boundry
- RORB Catchments
- Boundary Conditions
- Inflow Locations
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
TUFLOW Model and Inflow Locations

Scale (at A3)
1:4,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

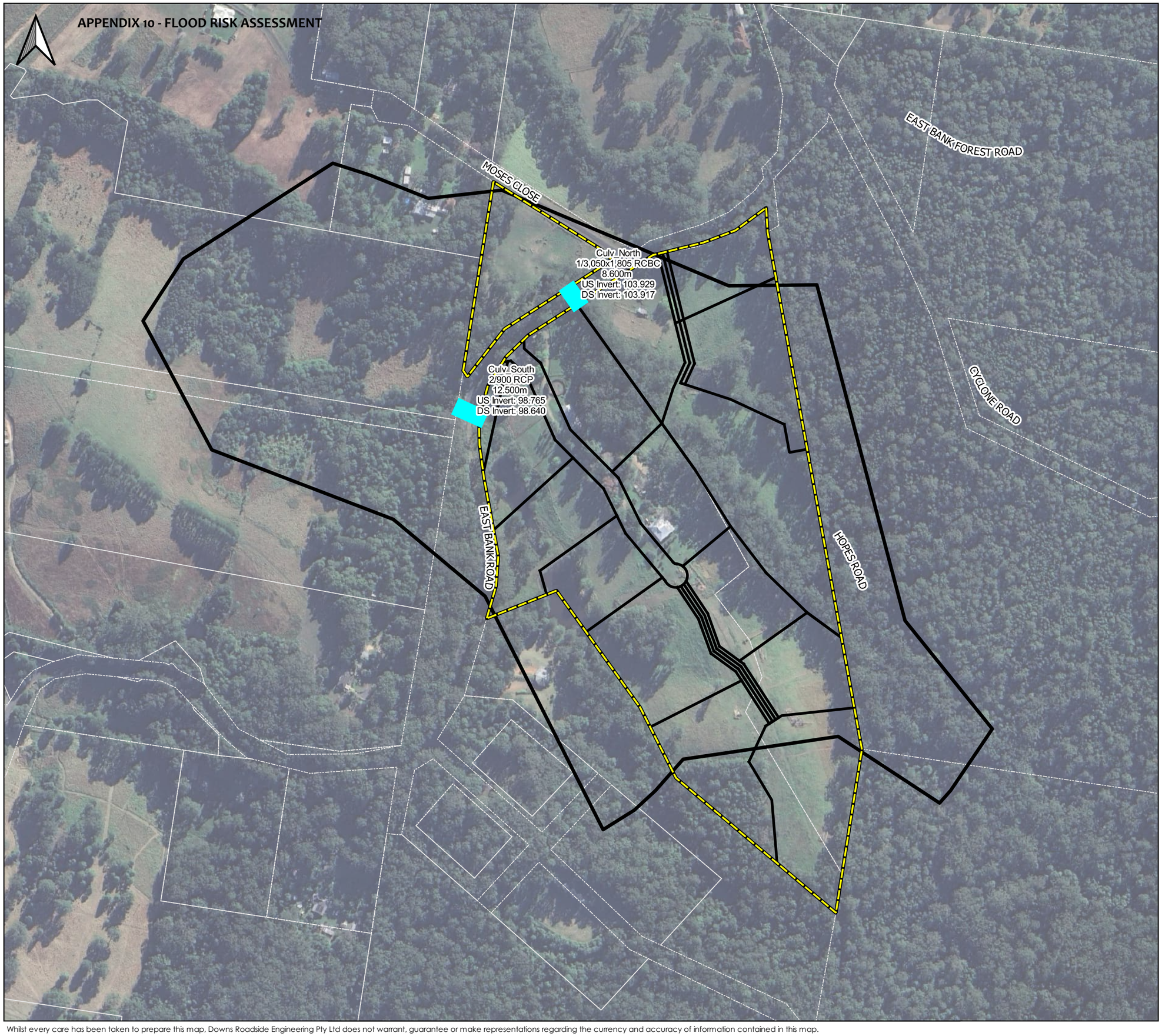
DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix D.01**

Date: 13/08/2024

APPENDIX 10 - FLOOD RISK ASSESSMENT




## Legend

- Cadastre
- Site Boundary
- Model Boundry
- Culverts
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:

TUFLOW Culverts

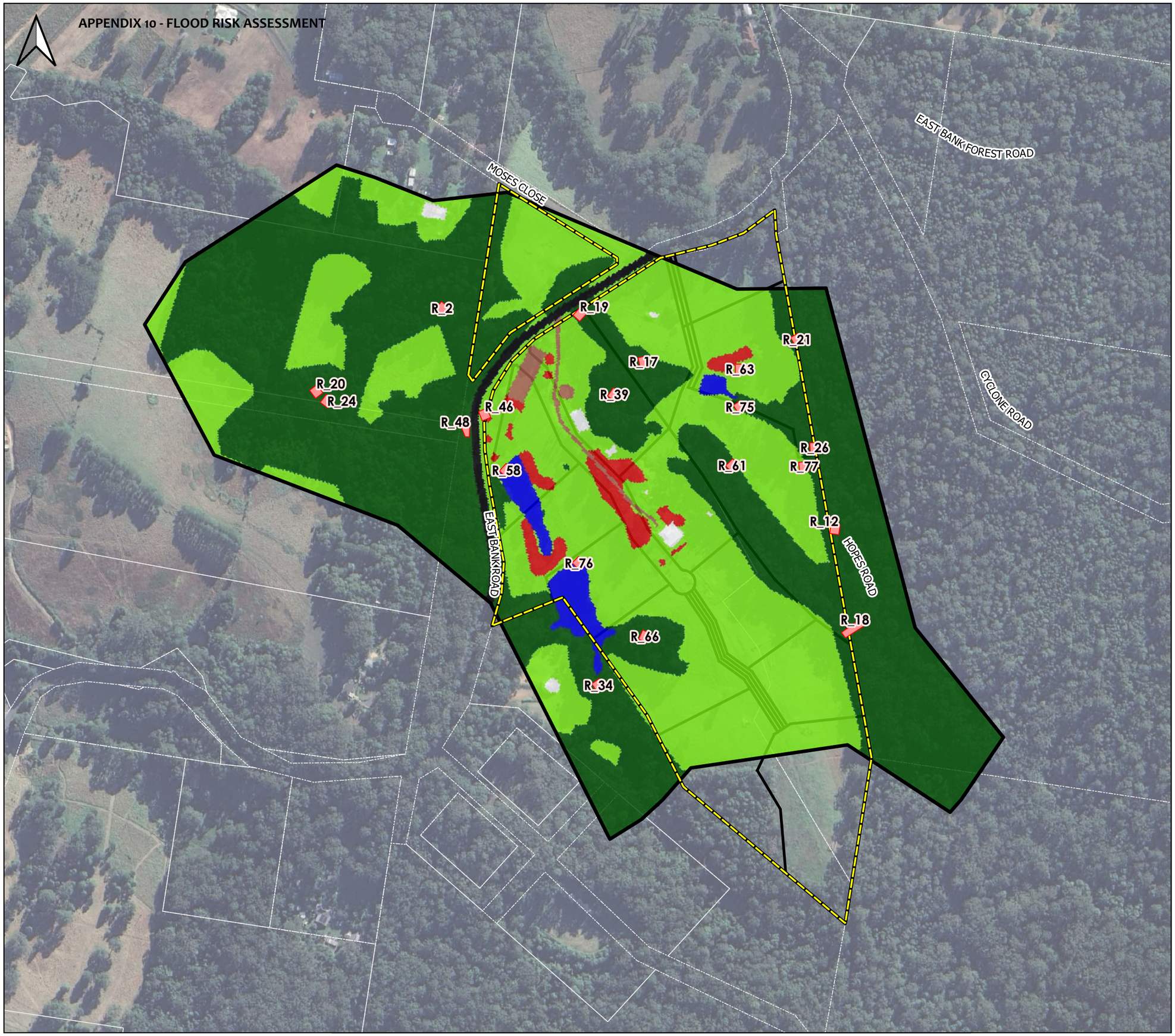
Scale (at A3)
1:4,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix D.02**

Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary
- Model Boundry
- Inflow Locations

Materials

- Band 1 (Gray)
- 0.030 - Gravel
- 0.033 - Ponds and Water
- 0.035 - Maintained Grass
- 0.080 - Clumped Trees
- 0.100 - Dense Vegetation
- 0.300 - Buildings
- 0.022 - Roads
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
TUFLOW Materials

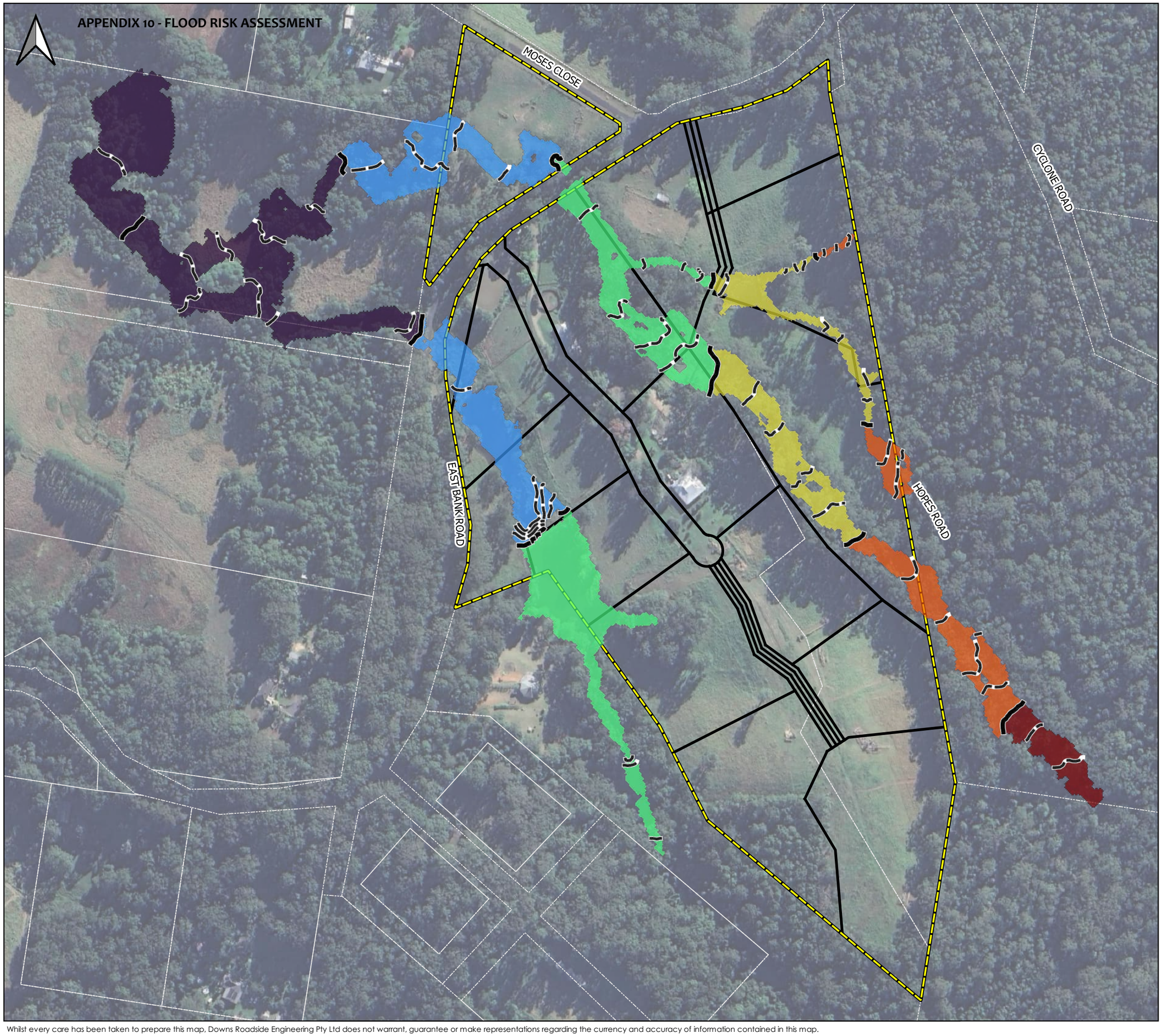
Scale (at A3)
1:4,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A
Appendix D.03
Date: 13/08/2024

# APPENDIX E TUFLOW MAPPING

APPENDIX 10 - FLOOD RISK ASSESSMENT




## Legend

- Cadastre
- Site Boundary

Existing 0.2 EY Contours (m)

- 1
- 5

Existing 0.2 EY WSL (mAHD)
Band 1 (Gray)

- <= 100
- 100 - 105
- 105 - 110
- 110 - 115
- 115 - 120
- > 120

CHCC Transport

Road Labels

- Layout

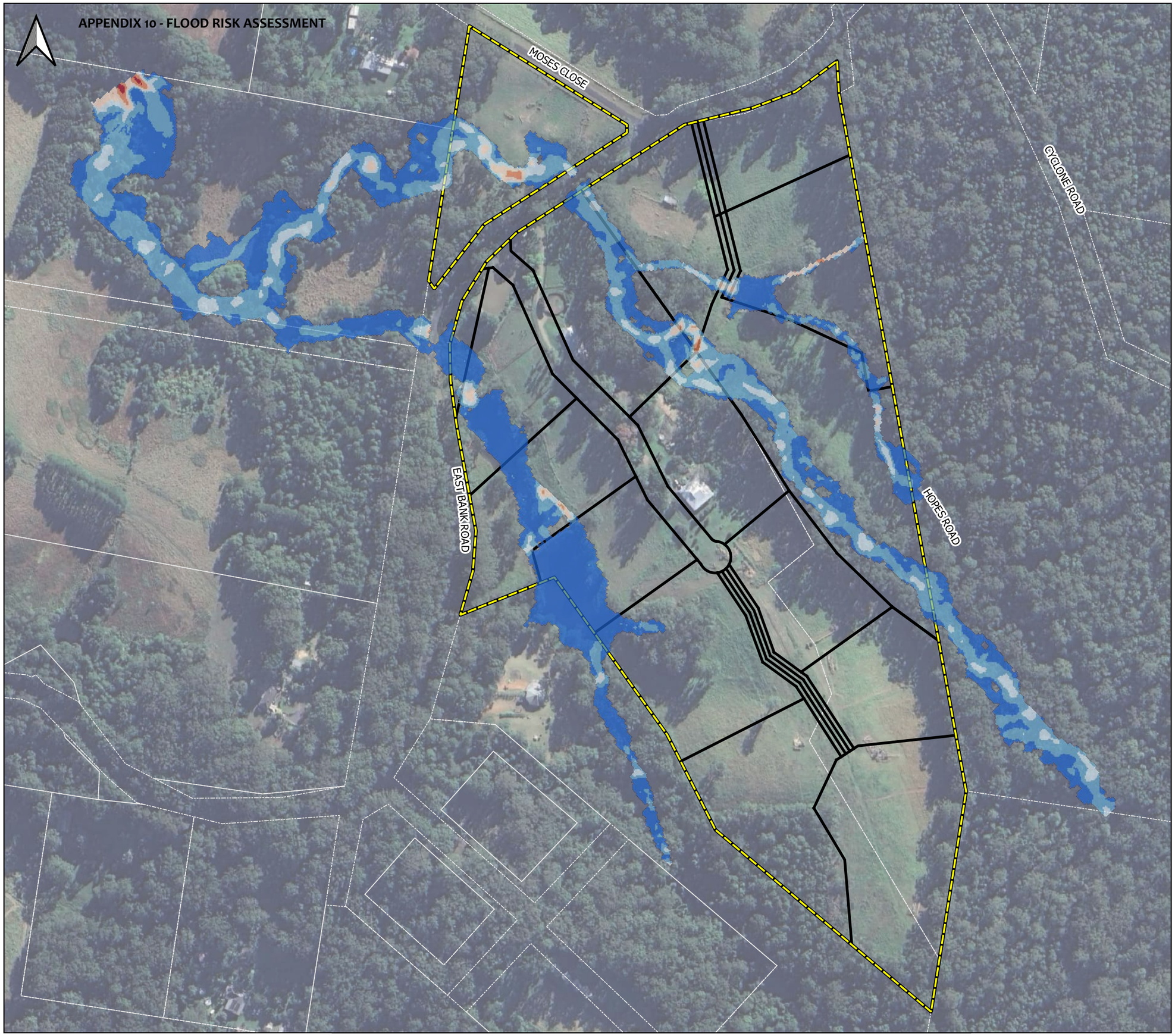
Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Existing 0.2EY Water Surface Level

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |
| Appendix E.01 | |
| Date: | 13/08/2024 |




## Legend

- Cadastre
- Site Boundary

Existing 0.2 EY Velocity (m/s)

Band 1 (Gray)

- <= 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- > 2.5

CHCC Transport

- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Existing 0.2EY Velocity

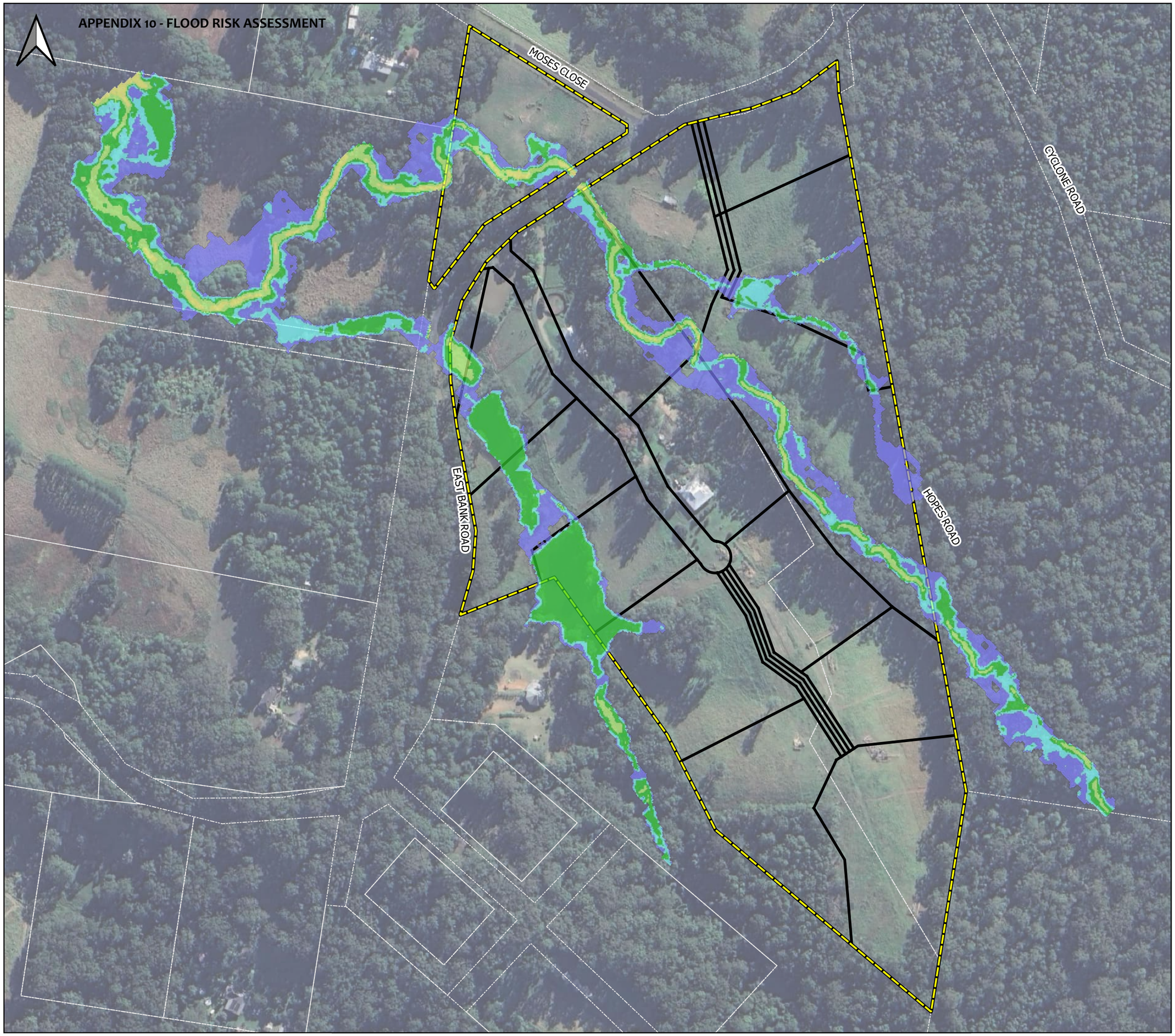
Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A

**Appendix E.02**

Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

Existing 0.2 Hazard

- Band 1 (Gray)
- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

CHCC Transport

- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:

Existing 0.2EY Hazard

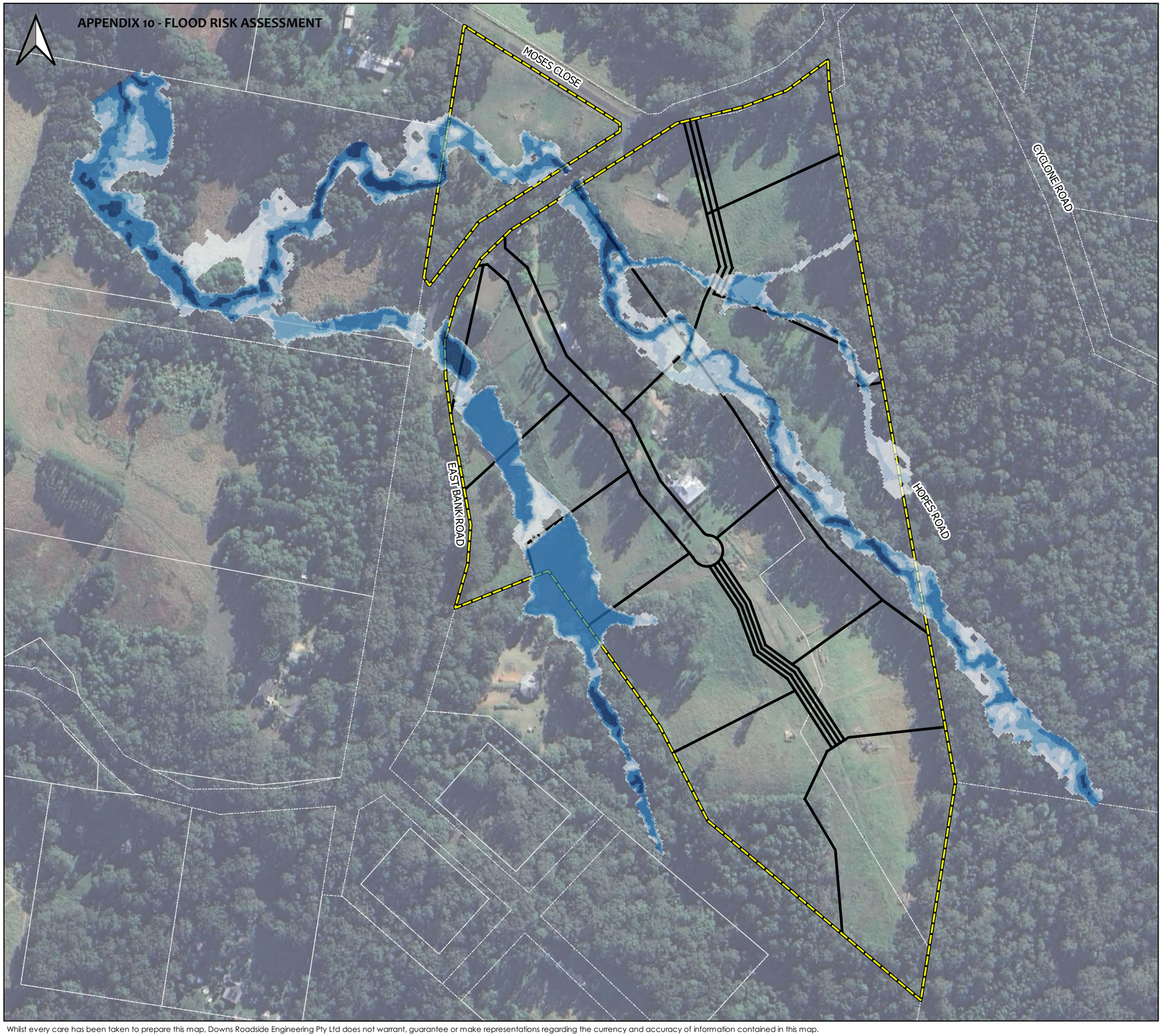
Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix E.03**

Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

Existing 0.2 EY Depth (m)

Band 1 (Gray)

- <= 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

CHCC Transport

- Road Labels
- Layout

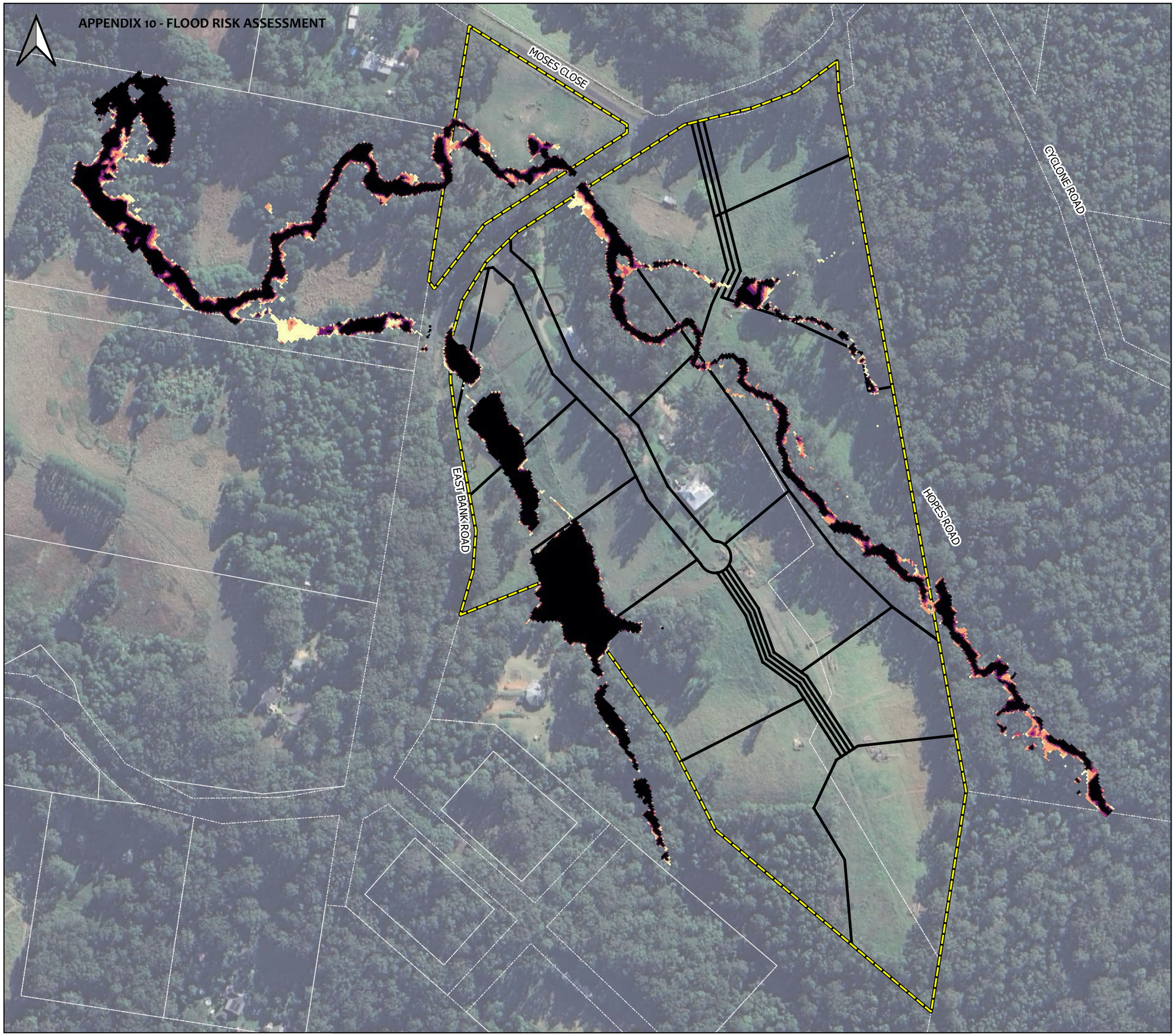
Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Existing 0.2EY Depth

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A
Appendix E.04
Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

CHCC Transport

- Road Labels
- Layout

0.2 EY Time Above H1 Hazard (hrs)

Band 1 (Gray)

- <= 1
- 1 - 2
- 2 - 3
- 3 - 5
- > 5

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

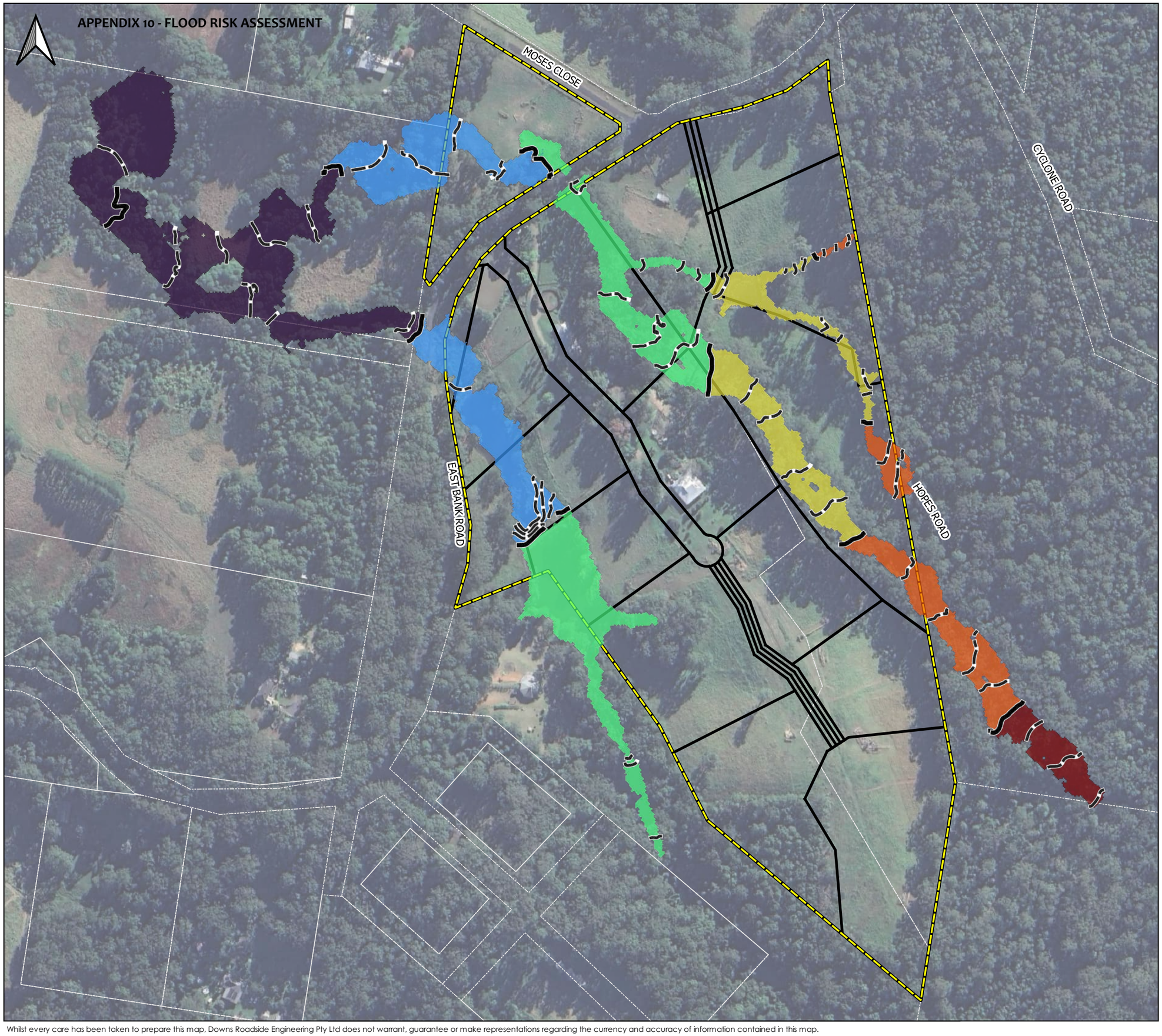
Title:
Existing 0.2EY Time Above H1 Hazard

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A
Appendix E.05
Date: 13/08/2024

APPENDIX 10 - FLOOD RISK ASSESSMENT




## Legend

- Cadastre
- Site Boundary

Existing 5% AEP Contours (m)

- 1
- 5

Existing 5% AEP WSL (mAHD)
Band 1 (Gray)

- <= 100
- 100 - 105
- 105 - 110
- 110 - 115
- 115 - 120
- > 120

CHCC Transport

Road Labels

- Layout

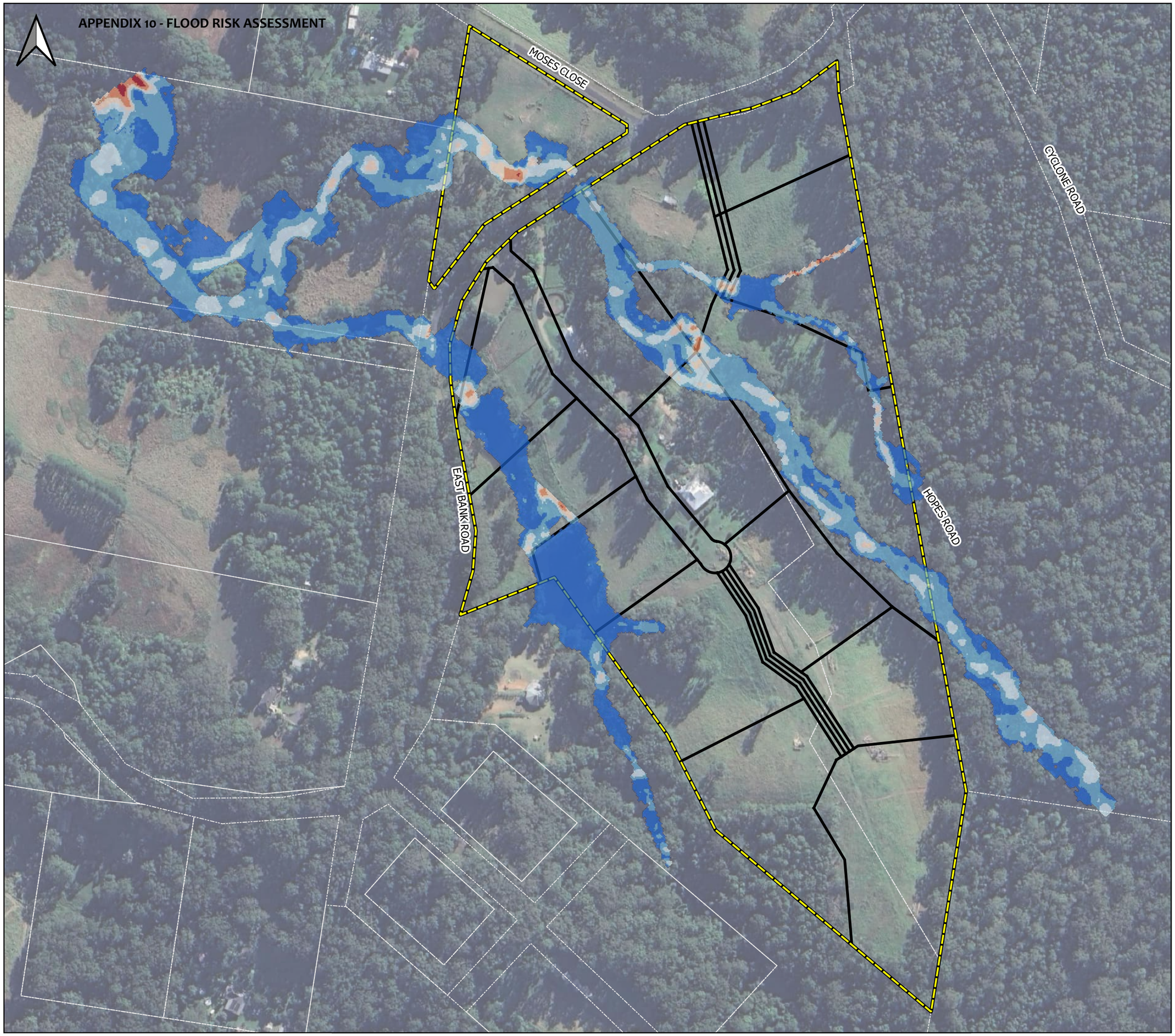
Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Existing 5% AEP Water Surface Level

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A
Appendix E.06
Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

Existing 5% AEP Velocity (m/s)

Band 1 (Gray)

- <= 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- > 2.5

CHCC Transport

- Road Labels
- Layout

Project Name:

218 East Bank Road
Coramba
Flood Impact Assessment

Title:

Existing 5% AEP Velocity

Scale (at A3)
1:3,000

0 25 50 75 100

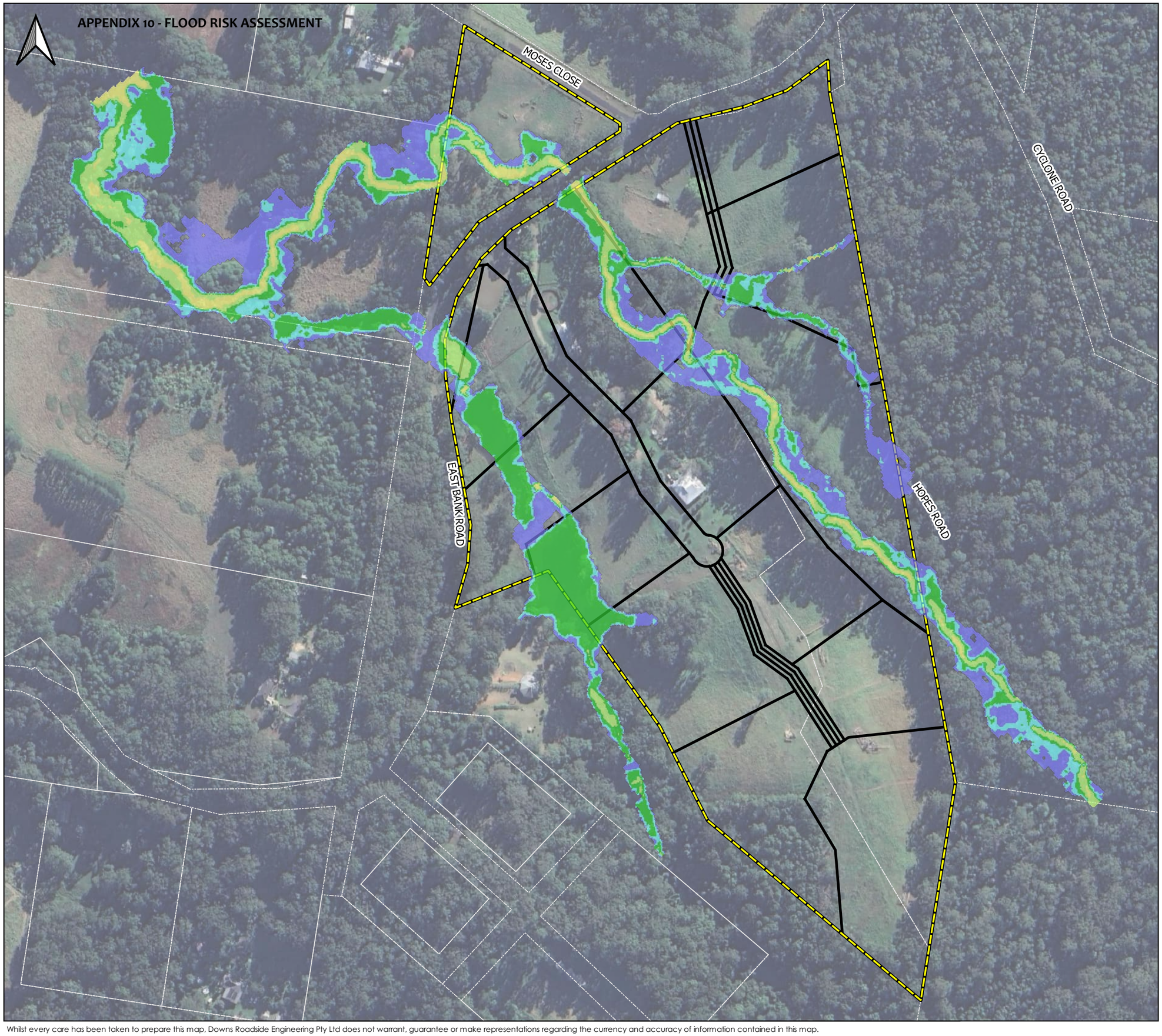
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix E.07**

Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

Existing 5% AEP Hazard

- Band 1 (Gray)
- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

CHCC Transport

- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

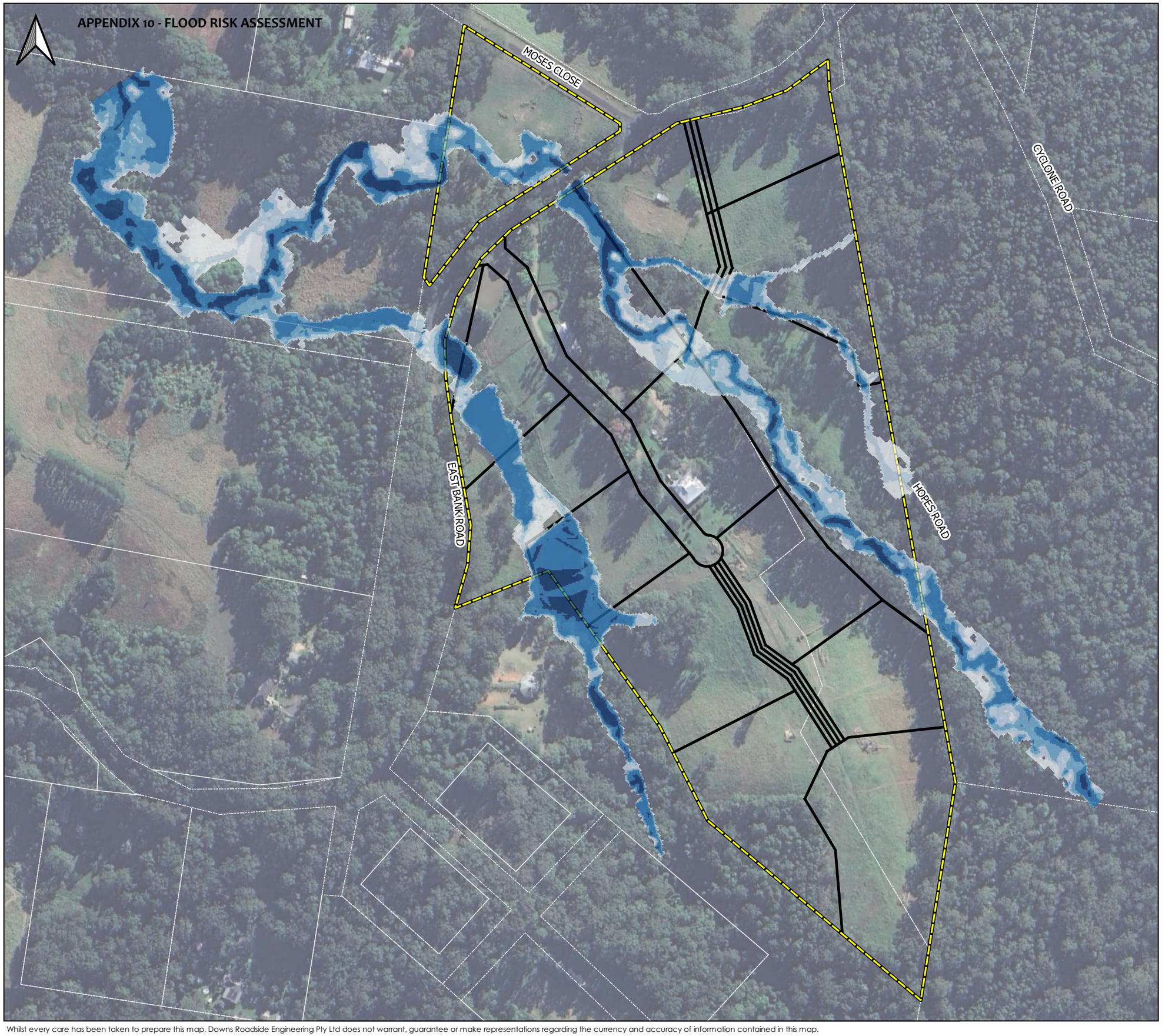
Title:
Existing 5% AEP Hazard

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A
Appendix E.08
Date: 13/08/2024

APPENDIX 10 - FLOOD RISK ASSESSMENT




## Legend

- Cadastre
- Site Boundary

Existing 5% AEP Depth (m)

Band 1 (Gray)

- <= 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

CHCC Transport

- Road Labels
- Layout

Project Name:

218 East Bank Road
Coramba
Flood Impact Assessment

Title:

Existing 5% AEP Depth

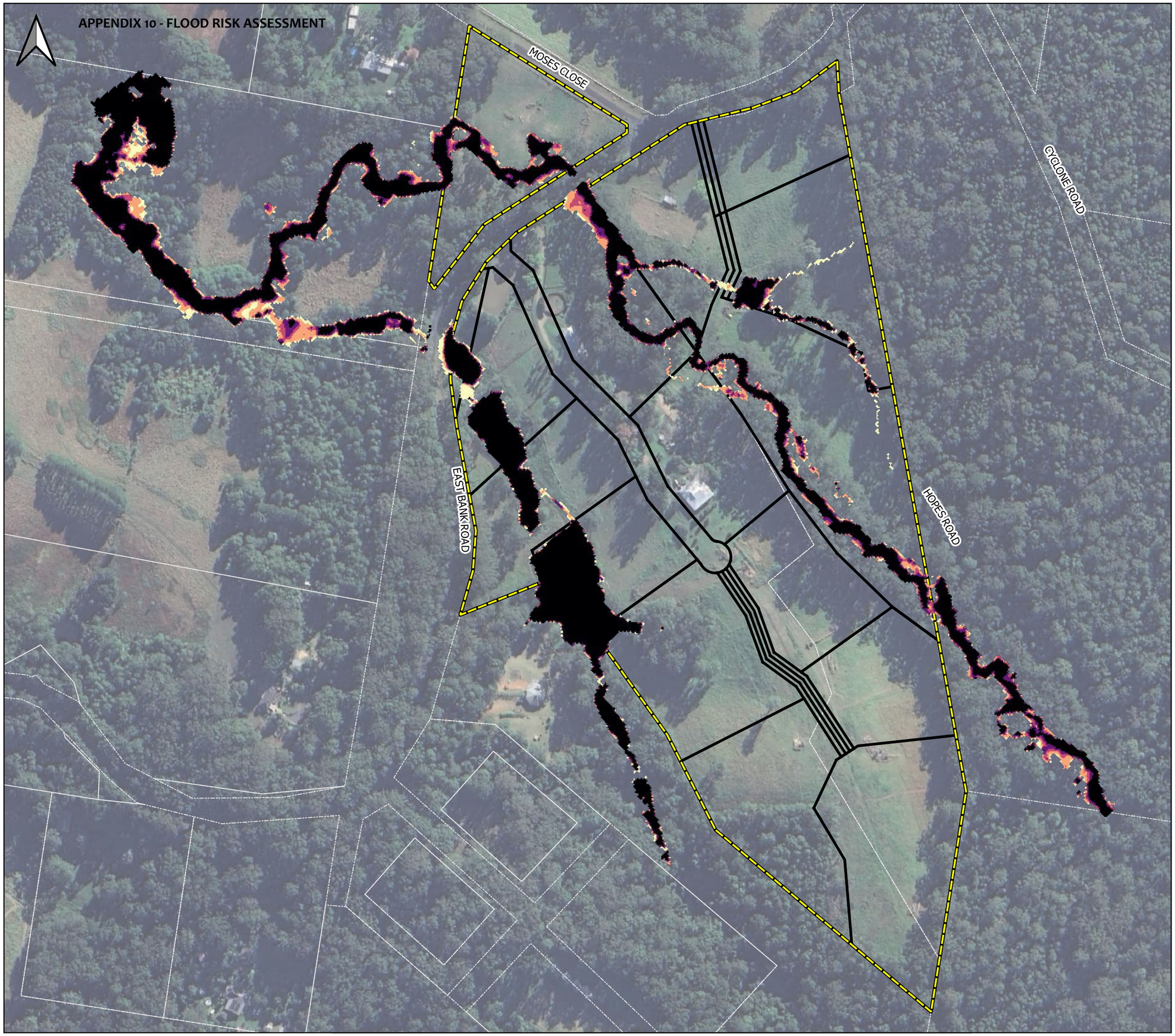
Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix E.09**

Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

CHCC Transport

- Road Labels
- Layout

5% AEP Time Above H1 Hazard (hrs)
Band 1 (Gray)

- <= 1
- 1 - 2
- 2 - 3
- 3 - 5
- > 5

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

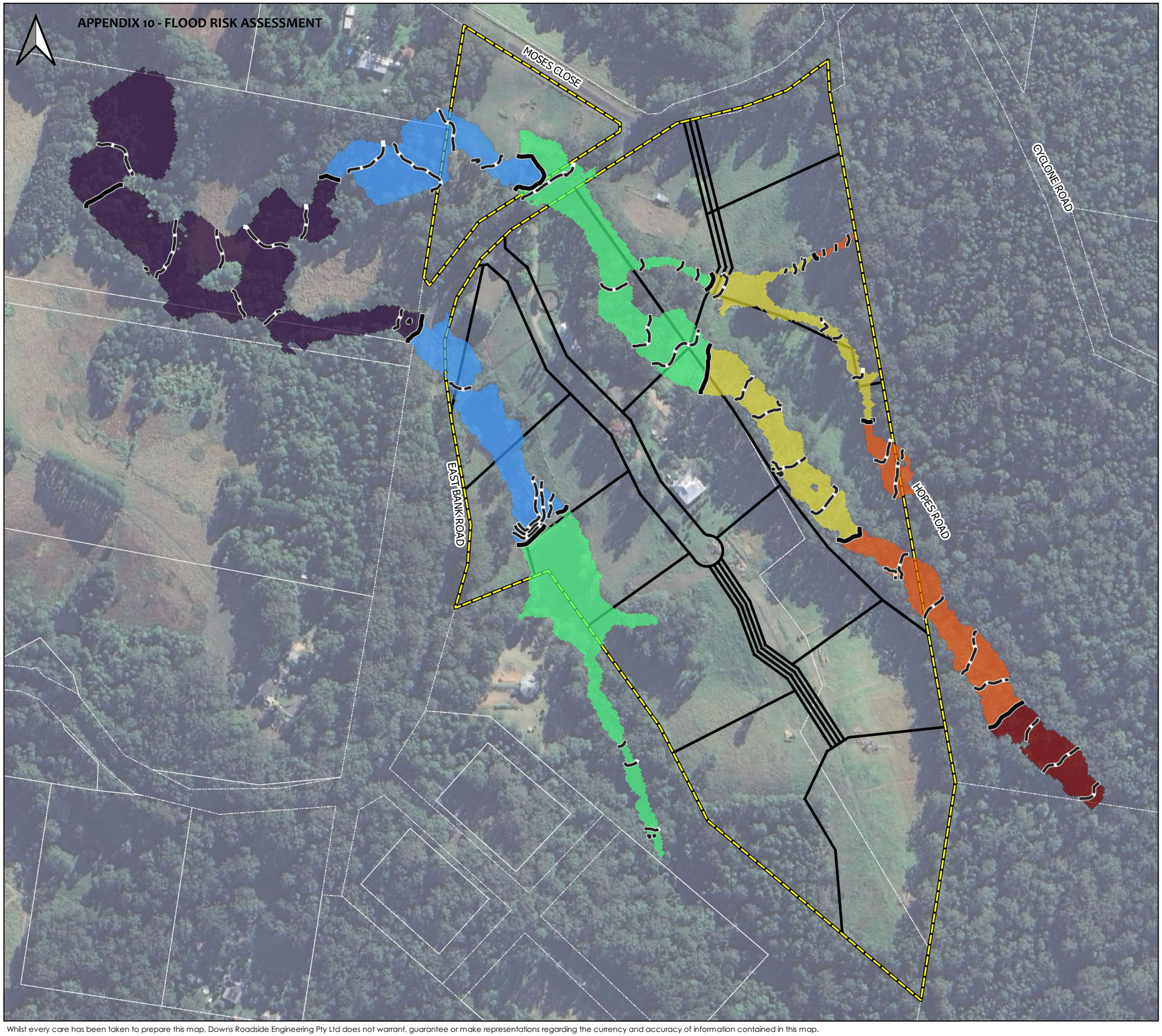
Title:
Existing 5% AEP Time Above H1 Hazard

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A
Appendix E.10
Date: 13/08/2024

APPENDIX 10 - FLOOD RISK ASSESSMENT




## Legend

- Cadastre
- Site Boundary

Existing 1% AEP Contours (m)

- 1
- 5

Existing 1% AEP WSL (mAHD)

Band 1 (Gray)

- <= 100
- 100 - 105
- 105 - 110
- 110 - 115
- 115 - 120
- > 120

CHCC Transport

- Road Labels
- Layout

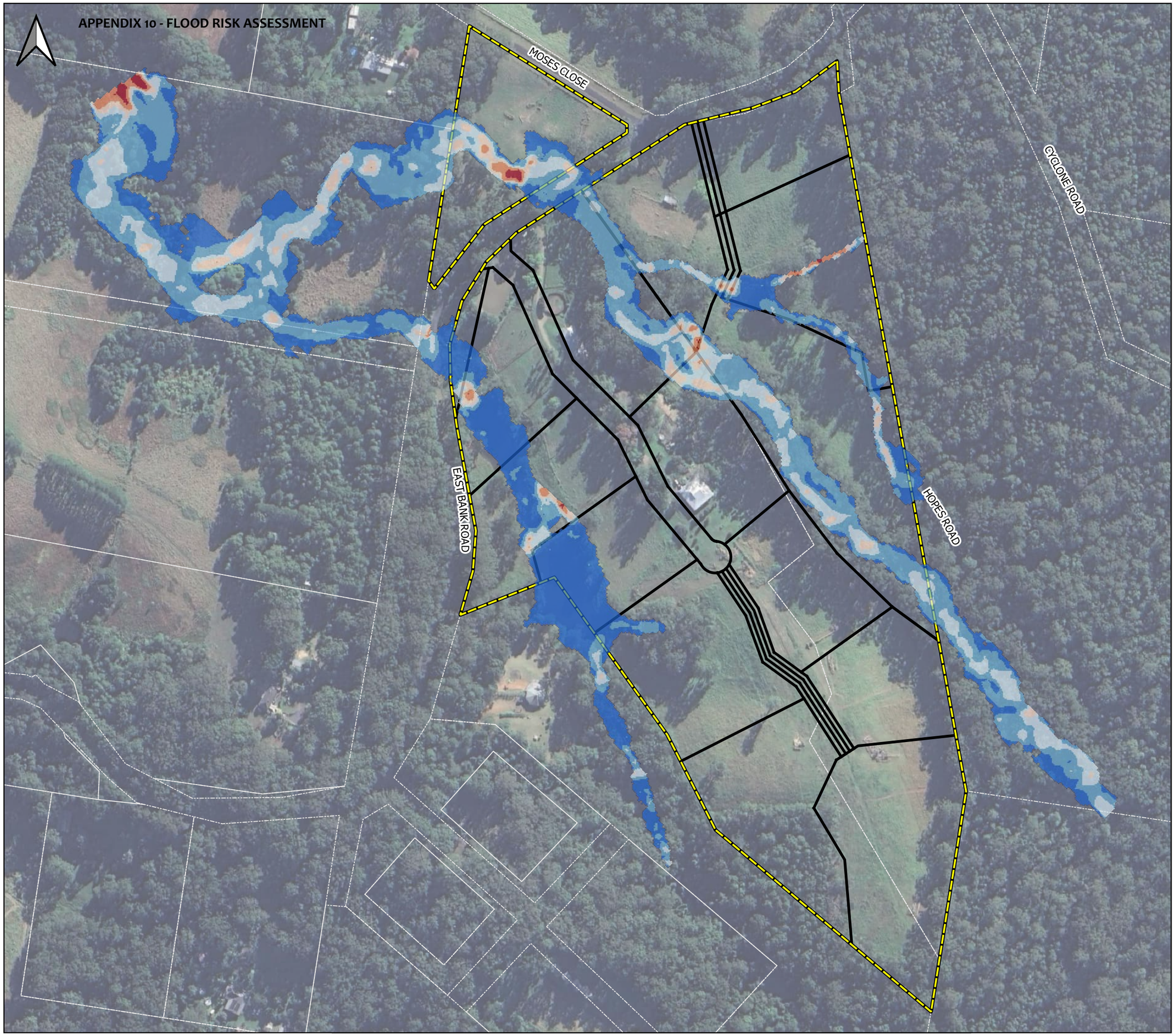
Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Existing 1% AEP WSL

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A
Appendix E.11
Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

Existing 1% AEP Velocity (m/s)
Band 1 (Gray)

- <= 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- > 2.5

CHCC Transport

- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

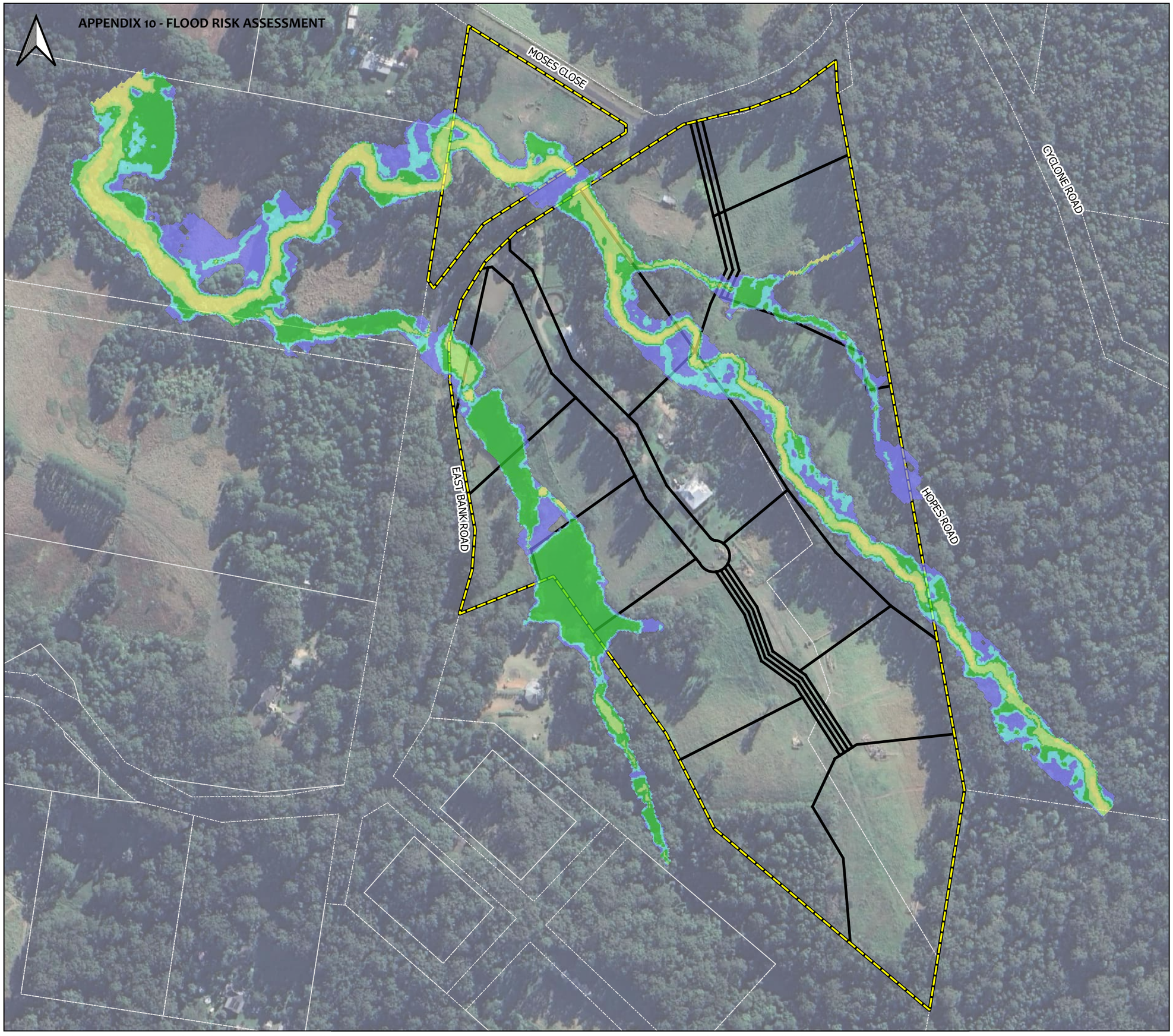
Title:
Existing 1% AEP Velocity

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A
Appendix E.12
Date: 13/08/2024

APPENDIX 10 - FLOOD RISK ASSESSMENT




## Legend

- Cadastre
- Site Boundary

Existing 1% AEP Hazard

Band 1 (Gray)

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

CHCC Transport

- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Existing 1% AEP Hazard

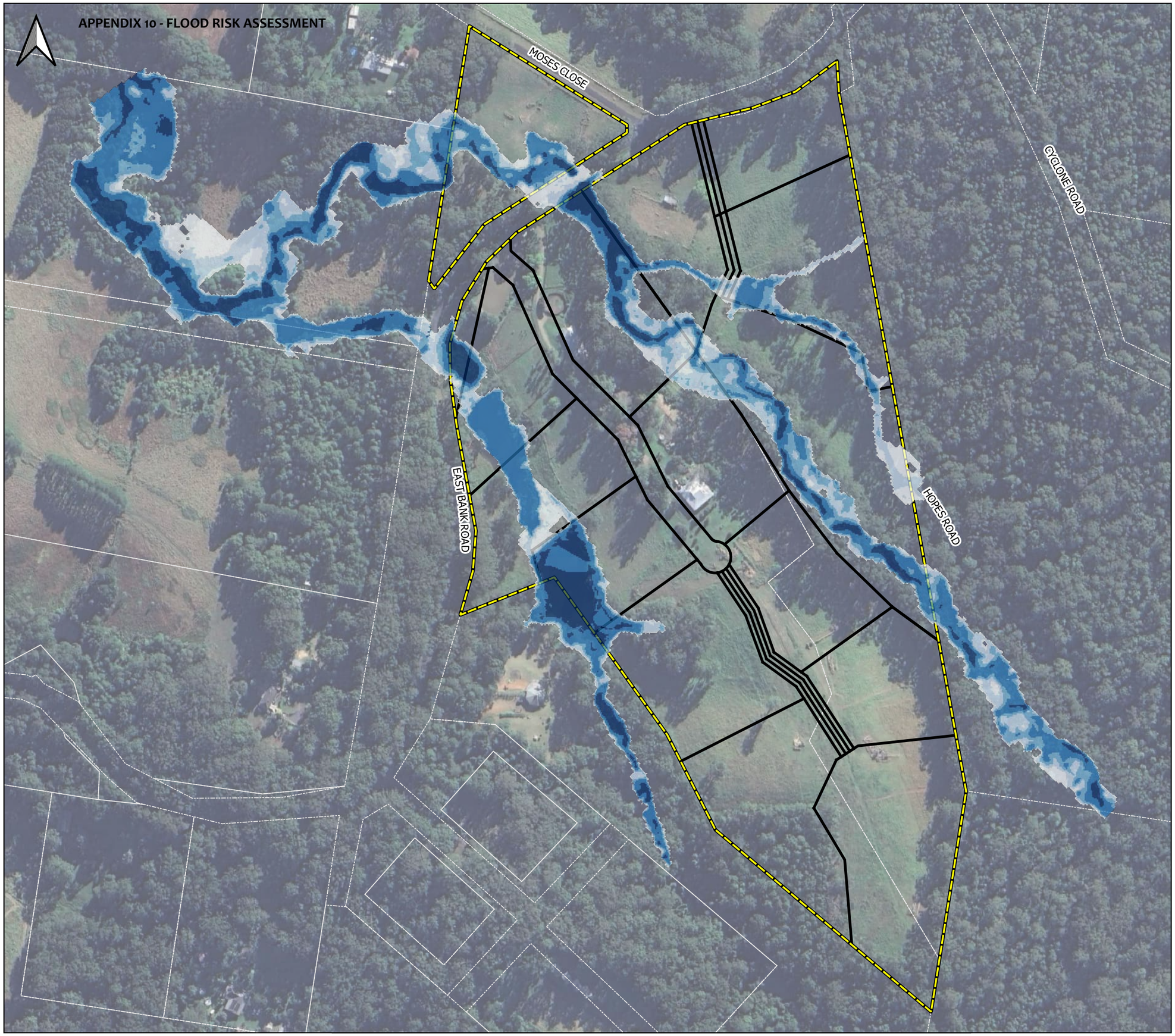
Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix E.13**

Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

Existing 1% AEP Depth (m)
Band 1 (Gray)
- <= 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

CHCC Transport
- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Existing 1% AEP Depth

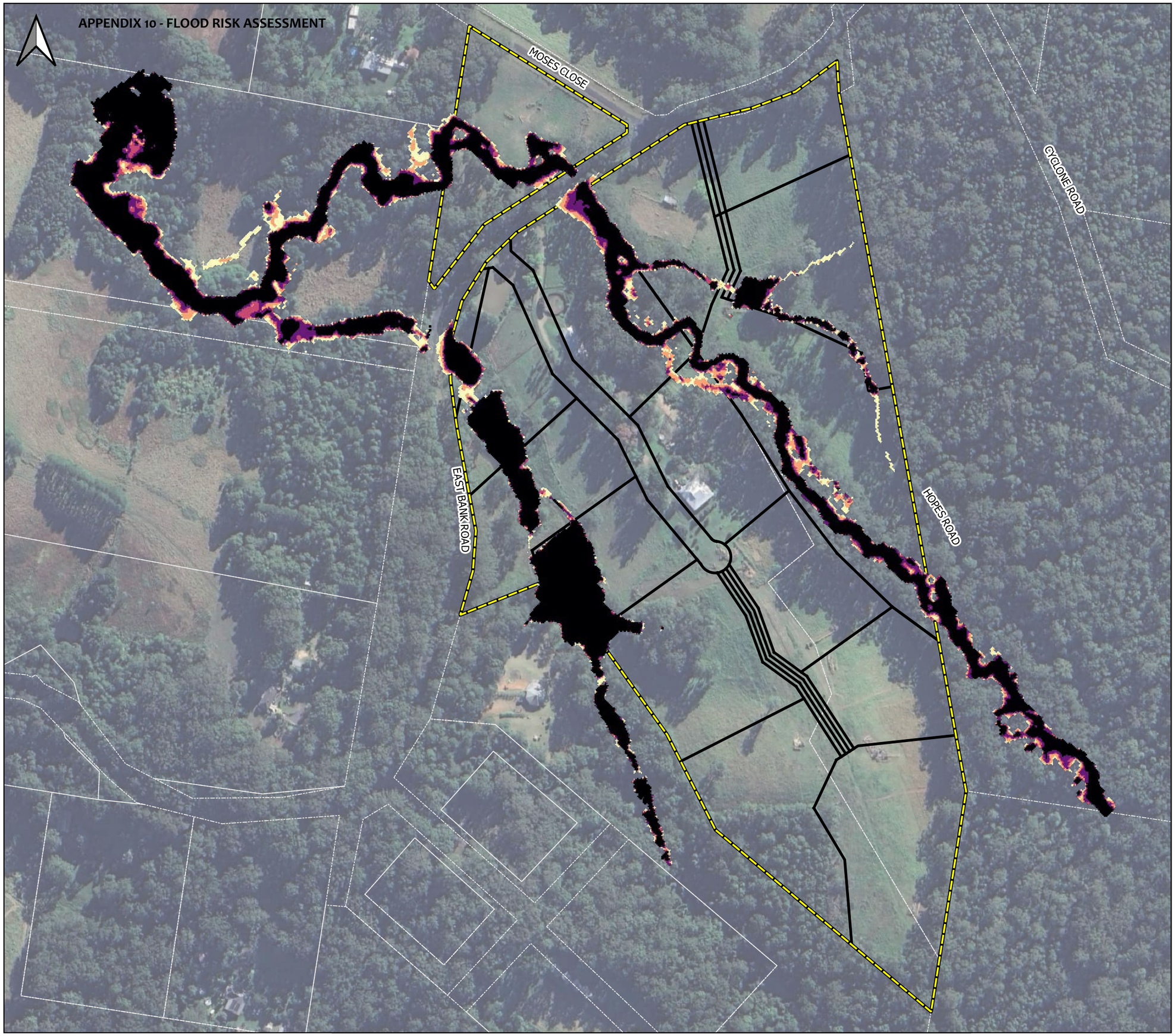
Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix E.14**

Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

CHCC Transport

- Road Labels
- Layout

1% AEP Time Above H1 Hazard (hrs)

Band 1 (Gray)

- <= 1
- 1 - 2
- 2 - 3
- 3 - 5
- > 5

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Existing 1% AEP Time Above H1 Hazard

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

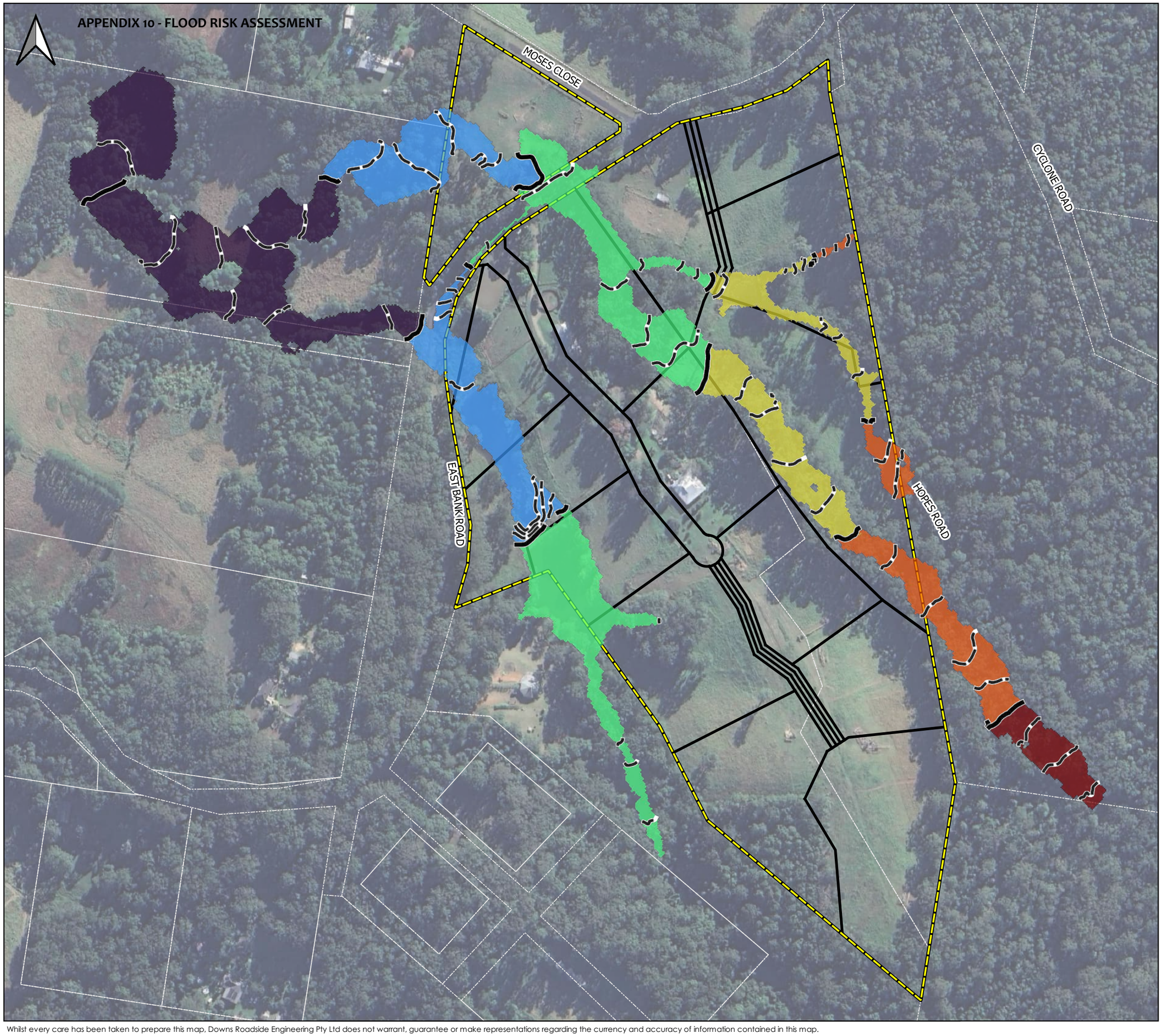
DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A

**Appendix E.15**

Date: 13/08/2024

APPENDIX 10 - FLOOD RISK ASSESSMENT




## Legend

- Cadastre
- Site Boundary

Existing 1% + Climate Change AEP Contours (m)

- 1
- 5

Existing 1% + Climate ChangeAEP WSL (mAHD)

Band 1 (Gray)

- <= 100
- 100 - 105
- 105 - 110
- 110 - 115
- 115 - 120
- > 120

CHCC Transport

Road Labels

- Layout

Project Name:

218 East Bank Road
Coramba
Flood Impact Assessment

Title:

Existing 1% AEP + Climate Change WSL

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

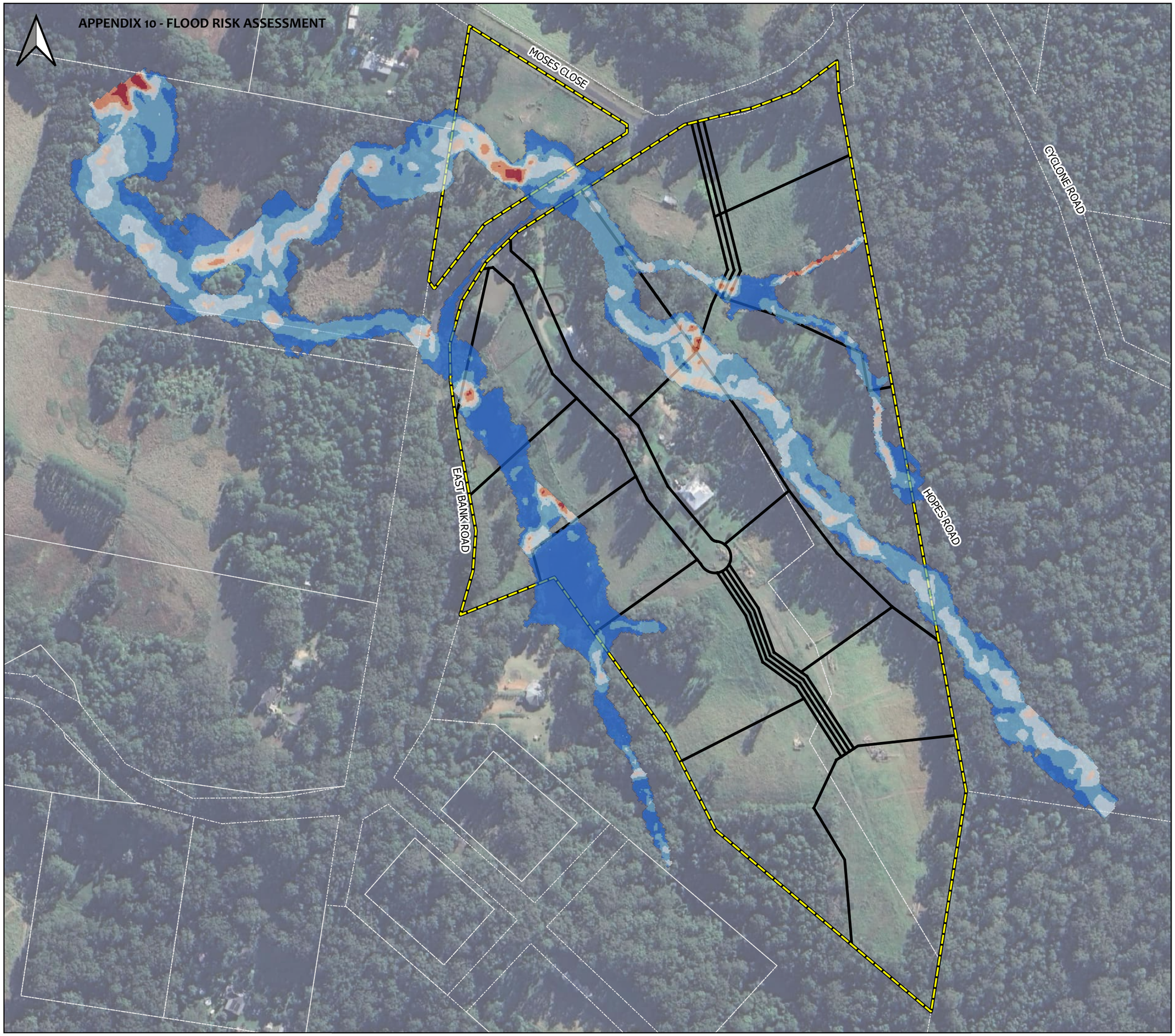
DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix E.16**

Date: 13/08/2024

APPENDIX 10 - FLOOD RISK ASSESSMENT




## Legend

- Cadastre
- Site Boundary

Existing 1% + Climate Change AEP Velocity (m/s)

Band 1 (Gray)

- <= 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- > 2.5

CHCC Transport

- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Existing 1% AEP+ Climate Change Velocity

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

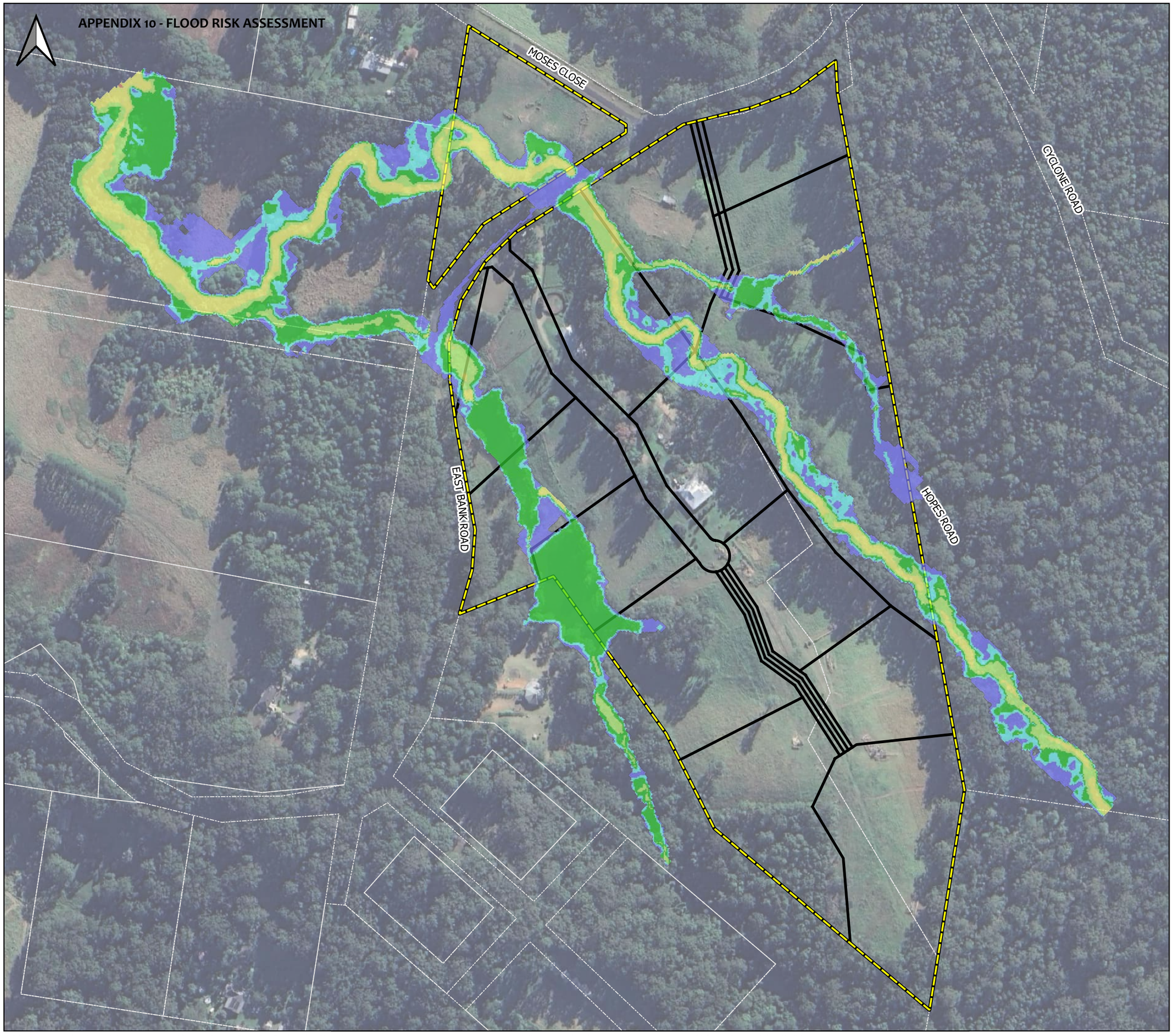
DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A

**Appendix E.17**

Date: 13/08/2024

APPENDIX 10 - FLOOD RISK ASSESSMENT




## Legend

- Cadastre
- Site Boundary

Existing 1% + Climate Change AEP Hazard

- Band 1 (Gray)
- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

CHCC Transport

- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Existing 1% AEP + Climate Change Hazard

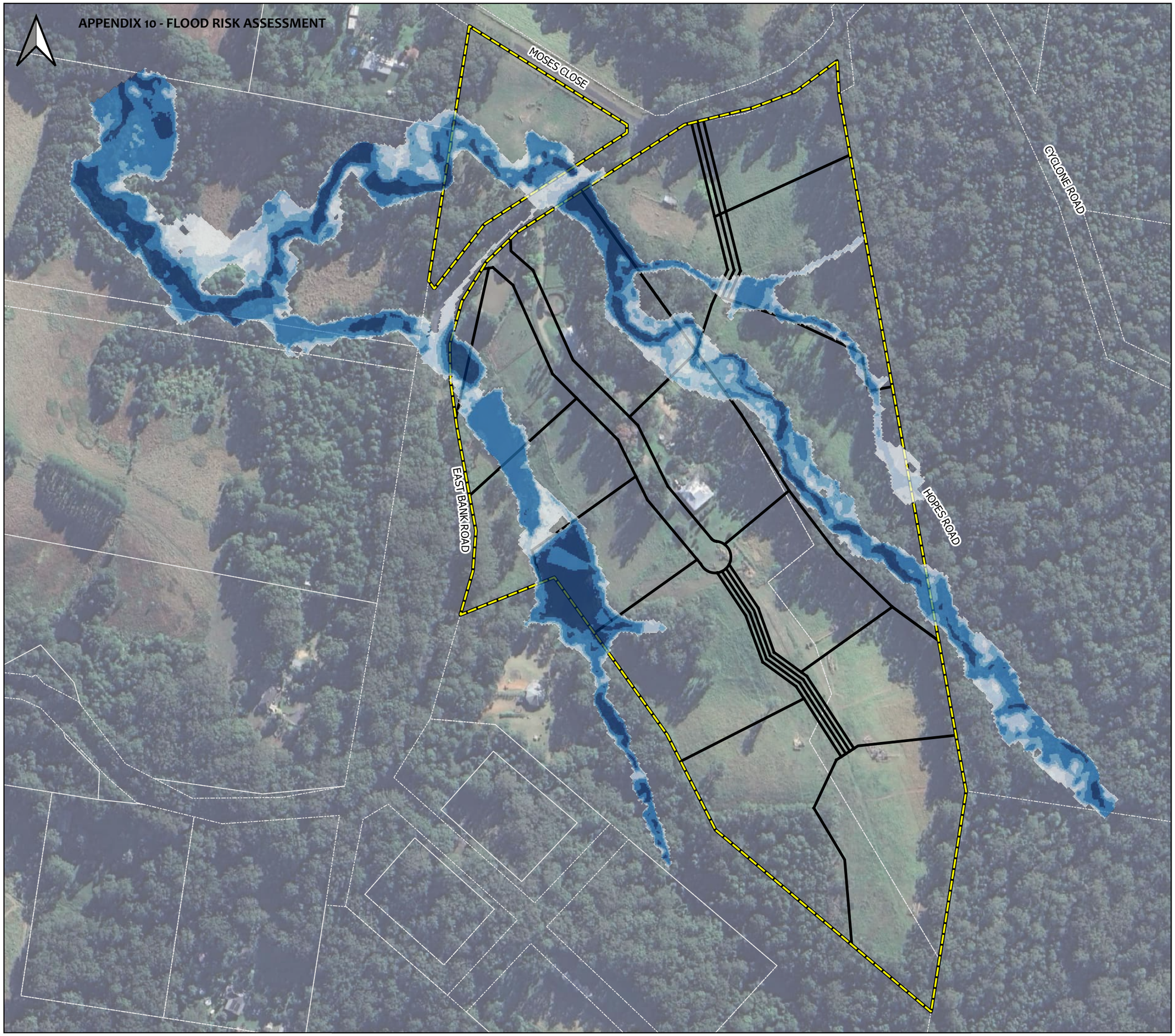
Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix E.18**

Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

Existing 1% + Climate Change AEP Depth (m)

Band 1 (Gray)

- <= 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

CHCC Transport

- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Existing 1% AEP + Climate Change Depth

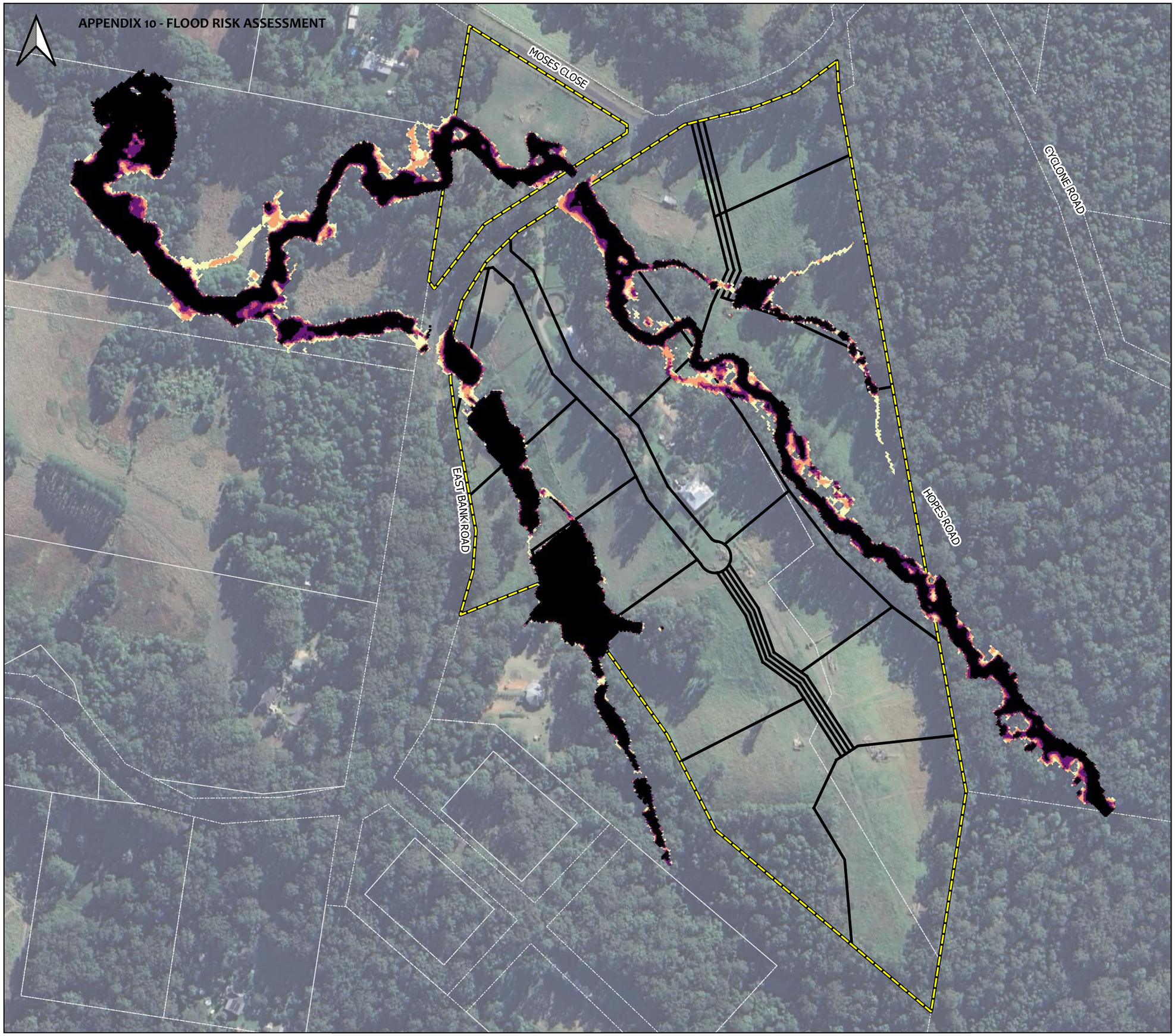
Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix E.19**

Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

CHCC Transport

- Road Labels
- Layout

1% AEP + Climate Change Time Above H1 Hazard (hrs)
Band 1 (Gray)

- <= 1
- 1 - 2
- 2 - 3
- 3 - 5
- > 5

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Existing 1% AEP + Climate Change Time Above H1 Hazard

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

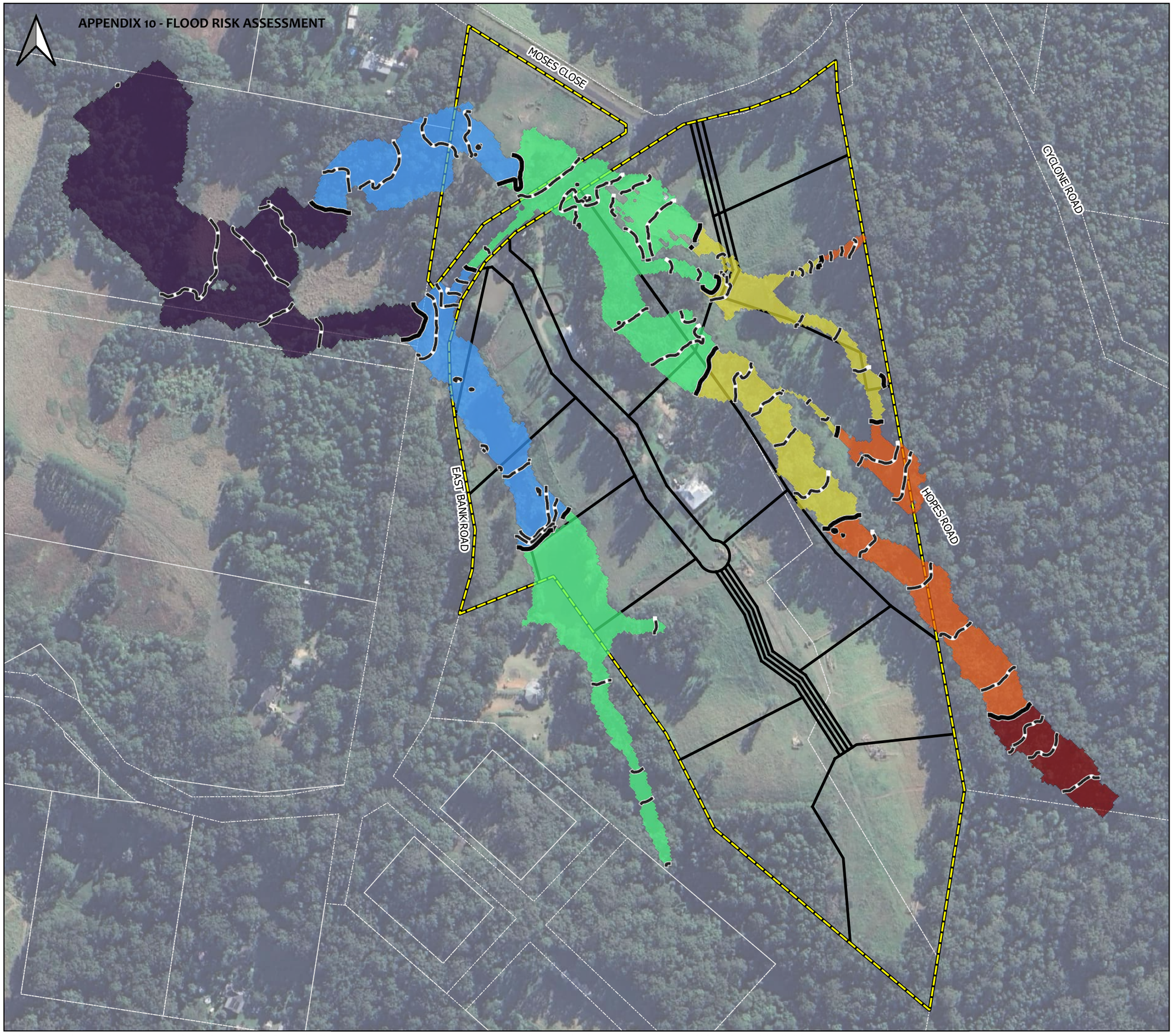
DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix E.20**

Date: 13/08/2024

APPENDIX 10 - FLOOD RISK ASSESSMENT




## Legend

- Cadastre
- Site Boundary

PMF Contours (m)

- 1
- 5

PMF WSL (mAHD)

Band 1 (Gray)

- <= 100
- 100 - 105
- 105 - 110
- 110 - 115
- 115 - 120
- > 120

CHCC Transport

- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:

Probable Maximum Flood WSL

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

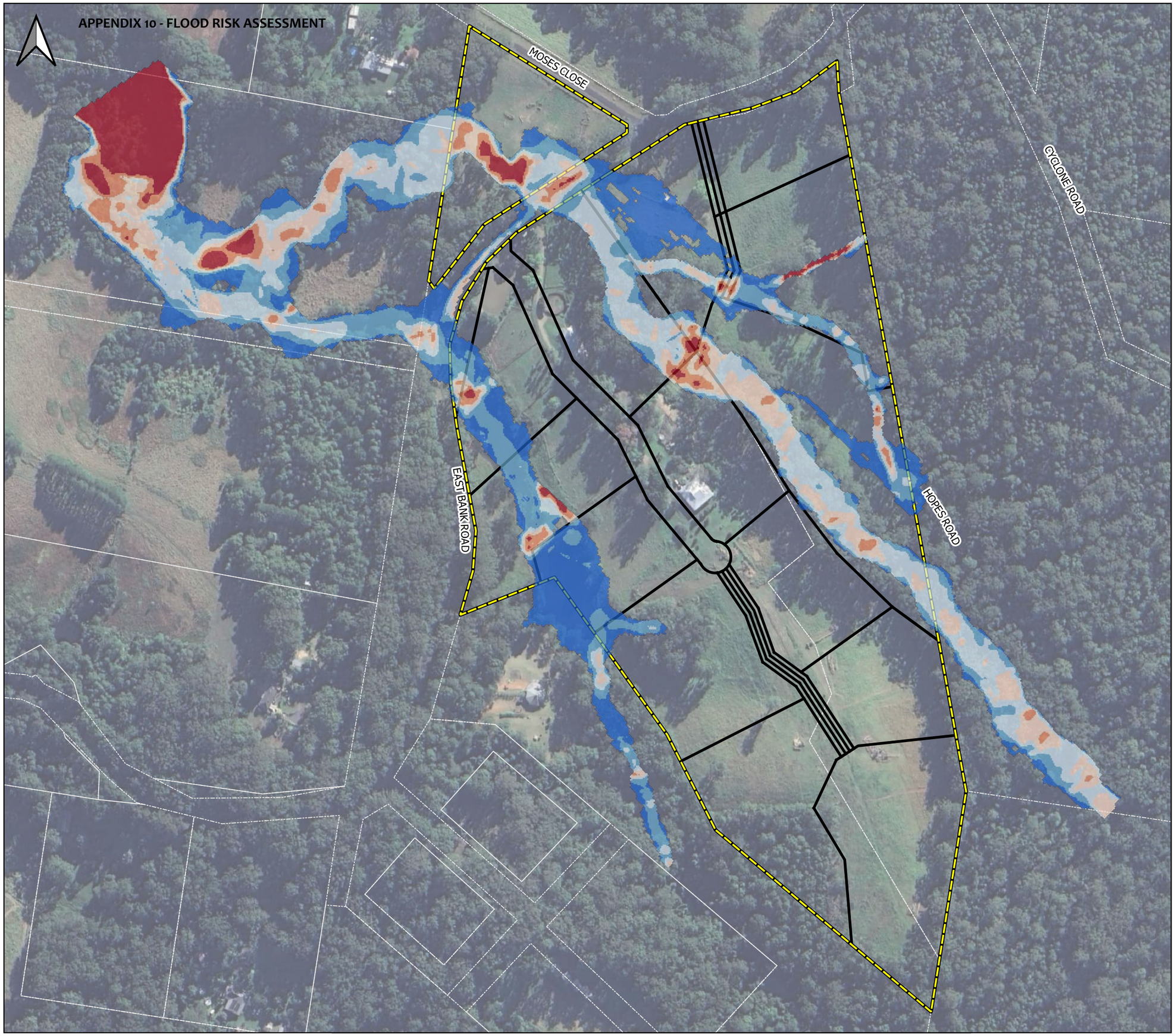
DOWNS ROADSIDE ENGINEERING

| Project Number: | Rev: |
|---|---|
| 10101 | A |

**Appendix E.21**

Date: 13/08/2024

APPENDIX 10 - FLOOD RISK ASSESSMENT




## Legend

- Cadastre
- Site Boundary

PMF Velocity (m/s)

Band 1 (Gray)

- <= 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- > 2.5

CHCC Transport

- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Probable Maximum Flood Velocity

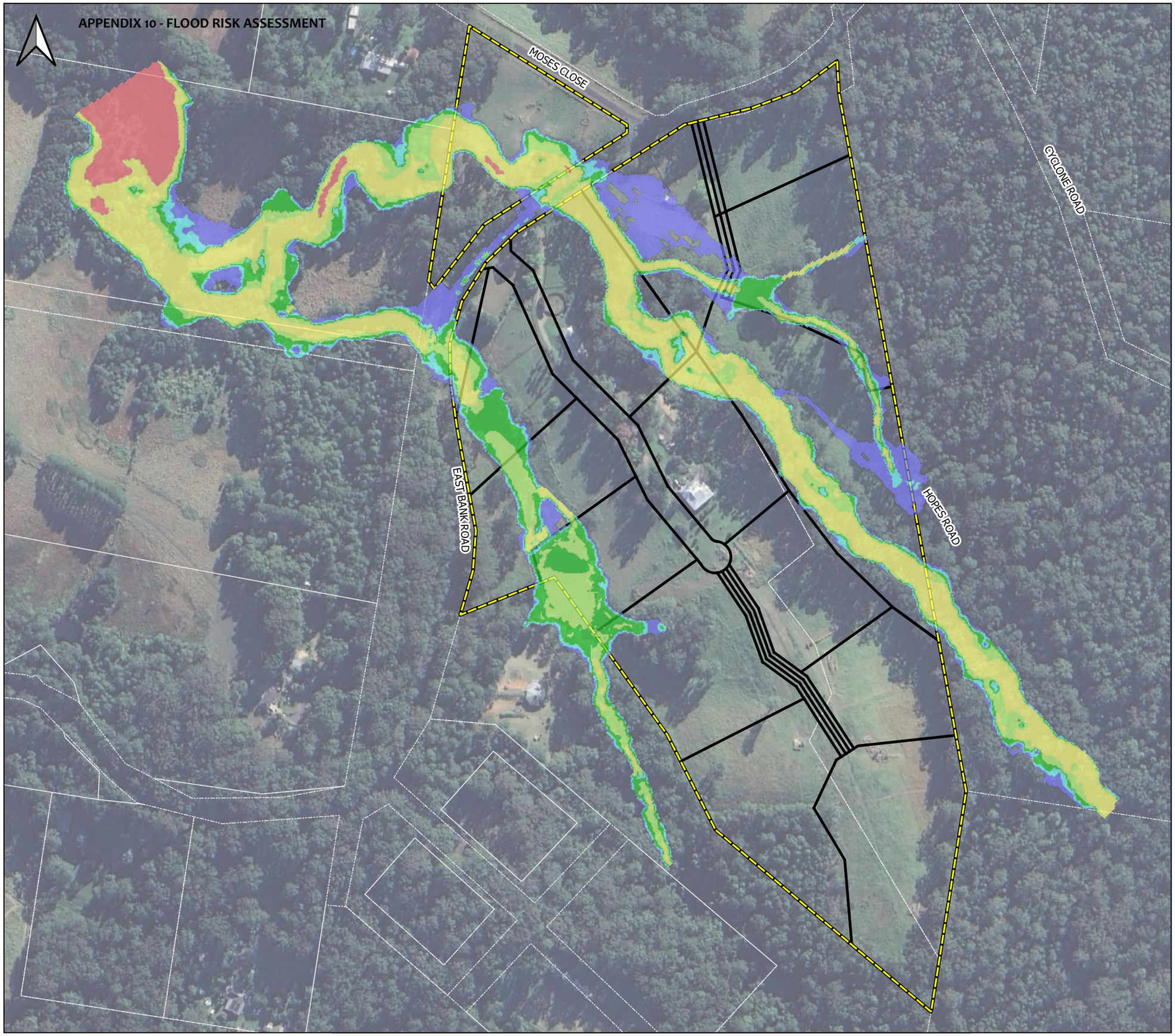
Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A

**Appendix E.22**

Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

PMF Hazard

- Band 1 (Gray)
- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

CHCC Transport

- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:

Probable Maximum Flood Hazard

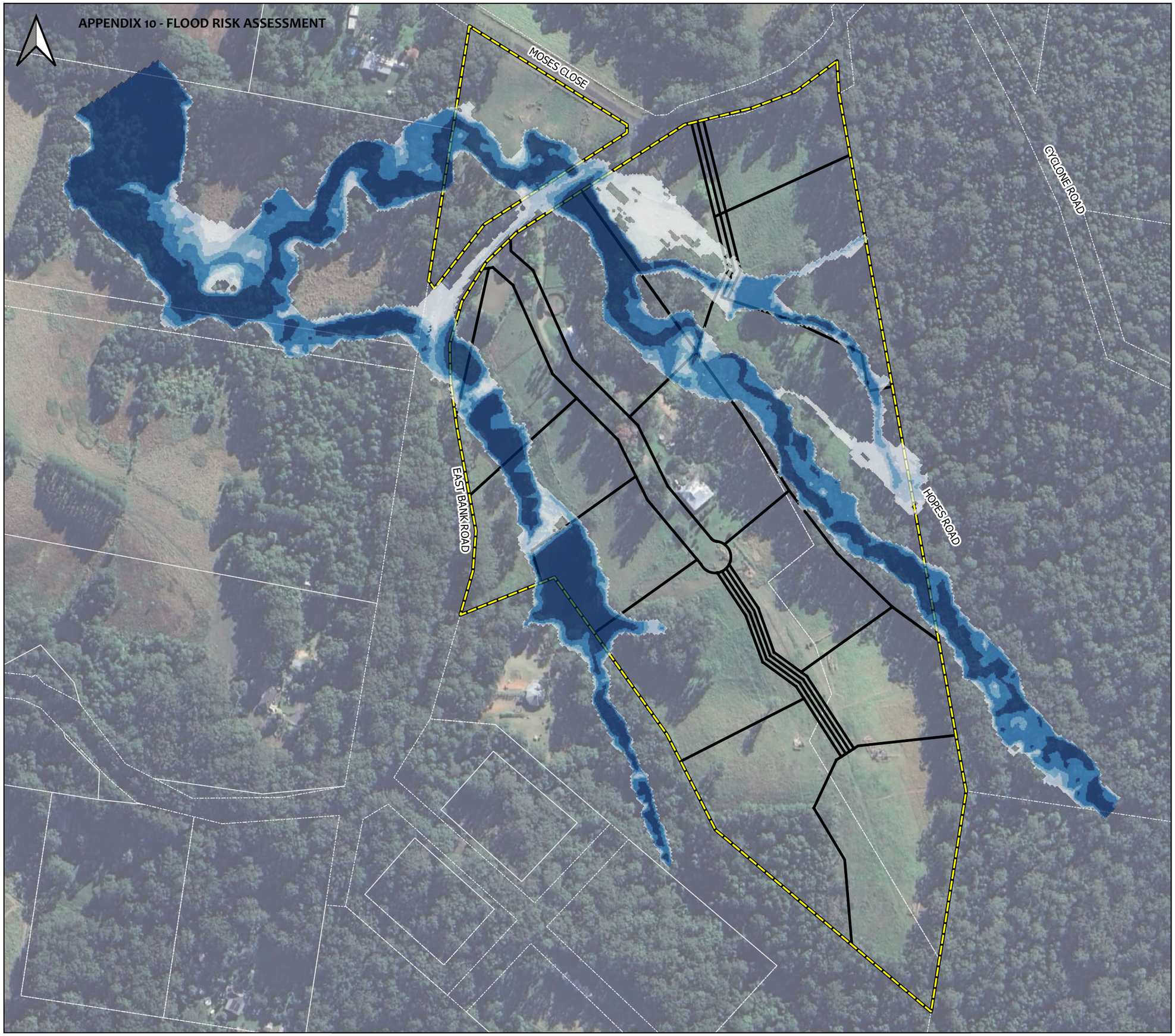
Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A

**Appendix E.23**

Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

PMF Depth (m)

Band 1 (Gray)

- <= 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

CHCC Transport

- Road Labels
- Layout

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Probable Maximum Flood Depth

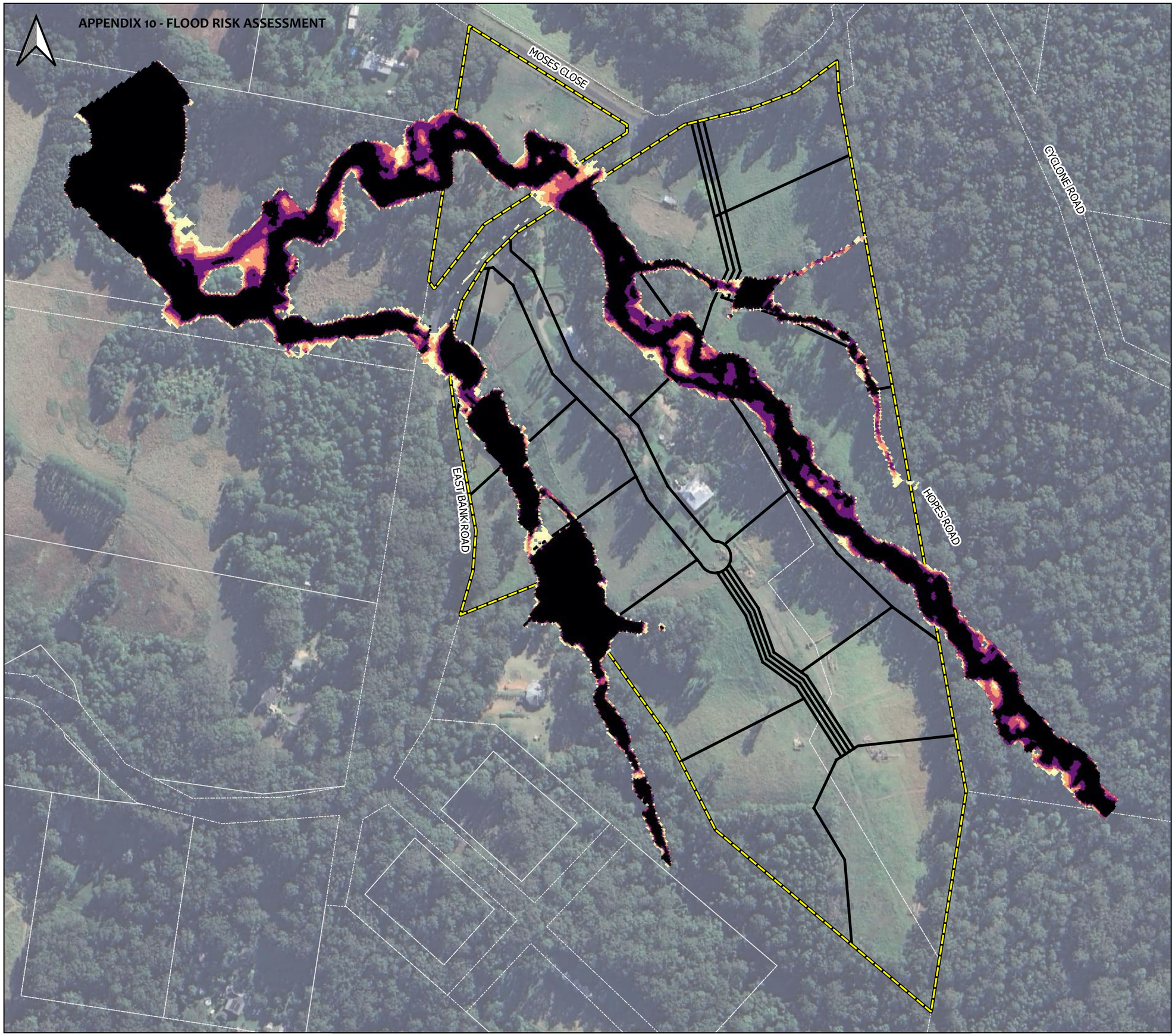
Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A

**Appendix E.24**

Date: 13/08/2024




## Legend

- Cadastre
- Site Boundary

CHCC Transport

- Road Labels
- Layout

PMF Time Above H1 Hazard (hrs)
Band 1 (Gray)

- <= 1
- 1 - 2
- 2 - 3
- 3 - 5
- > 5

Project Name:
218 East Bank Road
Coramba
Flood Impact Assessment

Title:
Probable Maximum Flood Time Above H1 Hazard

Scale (at A3)
1:3,000
0 25 50 75 100
Metres
Geocentric Datum of Australia 1994
Map Grid of Australia Zone 56

DOWNS ROADSIDE ENGINEERING

Project Number: 10101
Rev: A

**Appendix E.25**

Date: 13/08/2024

# Planning Proposal
# Eastbank Road Coramba

# 218 Eastbank Road Coramba

# Traffic and Transport Impact Assessment

December 2022

George Stulle Traffic Engineering
P 0418 219 358
E george.stulle@exemail.com.au

Development: Eastbank Road Road Large Lot Residential Lands Planning Proposal

Site Address: 218 Eastbank Road Coramba 2450.

Prepared for: Matt Cooper
Land Metrics Pty Ltd

Document reference: 003 - MC

| Document Status | Issue | By | Issued to | Date |
|---|---|---|---|---|
| **Draft** | **A** | **GS** | **MC** | **8/12/22** |
| **Final** | | | | **12/12/22** |
| | | | | |

# Contents

# 1 Introduction

## 1.1 Scope

This traffic and transport impact assessment report has been prepared as part of a planning proposal application to Coffs Harbour City Council for rezoning of land at 218 Eastbank Road Coramba.

The property is included in the Coffs Harbour City Council Local Growth Management Strategy as a candidate area for Large Lot Residential development. The proposal comprises a potential rezoning of land from RU2 Rural Landscape to R5 Large Lot Residential and C2 Environmental Conservation where appropriate.

This report assesses the impact of the proposed rezoning and subdivision of land to 15 lots on the operation of the surrounding transport network infrastructure and services.

# 2 Existing Conditions

## 2.1 Location

The planning proposal relates to a property at 218 Eastbank Road Lot 1 and 2 DP 1093448 Coramba. The property is located on Eastbank Road approximately 2.5 km from the Coramba end of Eastbank Road.

***Figure 1 Site location 218 Eastbank Road Coramba***

The property encompasses two lots totalling approximately 20.5ha and is currently zoned RU2 Rural Landscape. The property includes an existing dwelling and associated out buildings. Both lots have frontage to Eastbank Road (approx. 600m) with two existing driveway accesses to Eastbank Road. The property includes a creek gully which physically separates the north lot from the south lot. The north lot includes land on the west side of Eastbank Road with access to Eastbank Road.

The property is included in the Coffs Harbour City Council Local Growth Management Strategy to 2040 as a candidate area for Large Lot Residential development.

## 2.2 Existing Transport Network

**Roads**

**Eastbank Road** is a two-lane, two-way undivided rural roadway. The road is a local rural collector road providing secondary access between the townships of Coramba and Nana Glen as well as access to rural properties and State Forests.

Eastbank Road comprises generally of 3.0m wide or greater travel lanes and variable width shoulders with undulating road geometry and frequent horizontal curves. The speed zone at the Coramba end of Eastbank Road is 50km/h where there is higher density residential development. The speed zone reverts to the rural 100km/h for the rest of the road length.

In the vicinity of the subject site Eastbank Road is constrained by horizontal and vertical curves on both the southern and northern approach to the site which limit vehicle speeds.

**Moses Close** is a two-way rural road servicing about 5 rural lots of various size. The road is approximately 9000m in length from its intersection at Eastbank Road to its turning area at the western end.

***Figure 2 Moses Close at Eastbank Road***

## 2.3 Existing Traffic Volumes

Coffs Harbour City Council traffic survey data shows 2018 ADT volumes on Eastbank Road south of the site to be less than 500 vehicles per day with peak hour volumes less than 50 vehicles per hour (CHCC Classifier data week beginning 14 April 2018, Appendix C).

Moses Close only services a small number of residential lots with traffic volumes well less than 100 vehicles per day.

There are no significant traffic generating developments on Eastbank Road so traffic growth would be limited to a nominal 1% per annum with no impact on the traffic impact assessments in this report.

# 3 Development Description

The development comprises a potential rezoning of land described in Sect 2.1 from RU2 Rural Landscape to R5 Large Lot Residential and E2 Environmental Conservation where appropriate.

A preliminary lot layout has been prepared for the proposal generally taking into account the site characteristics. The site is constrained by a creek gully and environmental corridor which precludes the provision of a single point of vehicular access for all the lots on the eastern side of Eastbank Road.

The preliminary lot plan has resulted in a potential yield of 15 lots (13 additional lots) as depicted in the concept plans included in Appendix A.

**Proposed Lot 1** will utilise a new driveway access off Moses Close with removal of an existing access from the Moses Close / Eastbank Road intersection.

**Proposed Lots 2 to 11** will utilise a new public road access with intersection to Eastbank Road.

**Proposed lots 12, 14 and 15** will gain access via right of carriageway and utilise an existing driveway access to Eastbank Road.

**Proposed Lot 13** will utilise a new driveway access to Eastbank Road.

# 4 Traffic Impact Assessment

## 4.1 Development Traffic Generation

Using a daily vehicle trip generation rate of 10 per dwelling, the proposal could generate 150 trips per day on Eastbank Road. An existing dwelling and business however already accounts for traffic generation from two of the proposed lots.

Transport for NSW data provided as part of an update to the Guide to Traffic Generating Developments show that low density residential dwellings in 'Regional' areas generate average daily trip rates of 7.4 per dwelling and peak hour trips at 0.8 per dwelling.

The additional traffic generated by the proposal would therefore likely be in the order of 100 vehicles per day and less than 12 trips per peak hour.

These minor increases in traffic will have no impact on levels of service or road safety on the surrounding road network.

## 4.2 Proposed Access analysis

**Proposed Eastbank Road / Subdivision Road intersection**

The proposal will require a new subdivision road intersection on Eastbank Road to service 10 of the proposed lots. The proposed intersection is located on the northern departure of a small radius horizontal curve on Eastbank Road.

Approximate curve geometry and sight distance requirements are shown in Figure 3 below.


***Figure 3 Proposed intersection location Eastbank Road Coramba***

A simple assessment of the likely intersection performance against Austroads warrants for intersection upgrade shows that with peak 2032 main road flows ($Q_M$) below 100 veh/hour, Austroads Figure A 10: Warrants for turn treatments on the major road at unsignalised intersections (Figure 5 below) shows that a BAR turn treatment is suitable for the proposed Eastbank Road intersection.

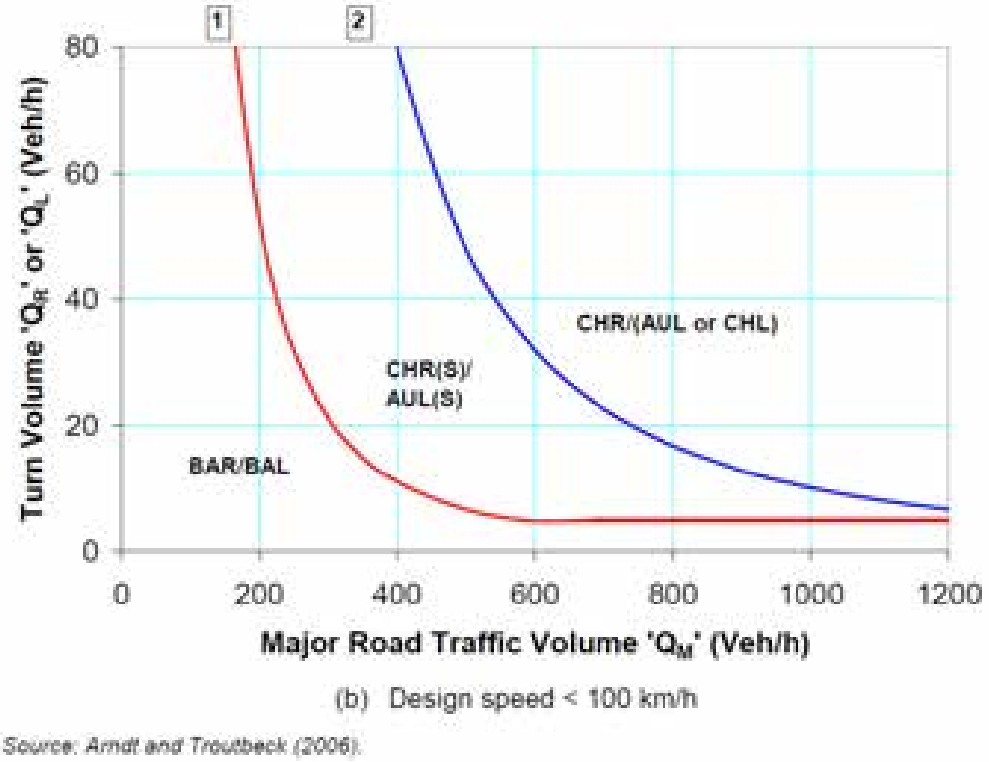



***Figure 4 Austroads Guide to Road Design Part 4: Intersections and Crossings - General Figure A 10: Warrants for turn treatments on the major road at unsignalised intersections***

Provision for sight distance at the intersection is proposed as shown in Figure 3. The intersection sight distance requirements are based on an 80km/h approach speed.

Council design plans for reconstruction of the two Eastbank Road curves on the north and south approaches to the proposed rezoning are included in Appendix B of this report. The nominated design speed for the curves is 60km/h. Driving of the two curves indicate a maximum operating speed of around 80 km/h however so this has been adopted as a conservative approach for the sight distance assessments.

In addition, the existing curve characteristics of the curve on Eastbank Road on the southern approach to the proposed intersection show a centreline radius of approximately 136m with superelevation on the curve of 6% - 8%. Figure 1 of this report shows that the Eastbank Road horizontal geometry is characterised by horizontal curves of similar or lesser standard, particularly south of the subdivision site.

Austroads Guide to Road Design Part 3: Geometric Design provides guidance on determination of road section operating speeds. Table 3.4: Section operating speeds, Figure 5 below, shows operating speeds for road sections with horizontal curves in the range 130m – 215m to be less than 80km/h.

| Range of radii in section (m) | Single curve section radius (m) | Section operating speed (km/h) | Range of radii in section (m) | Single curve section radius (m) | Section operating speed (km/h) |
|---|---|---|---|---|---|
| 45–65 | 55 | 50 | 180–285 | 235 | 84 |
| 50–70 | 60 | 52 | 200–310 | 260 | 86 |
| 55–75 | 65 | 54 | 225–335 | 280 | 89 |
| 60–85 | 70 | 56 | 245–360 | 305 | 91 |
| 70–90 | 80 | 58 | 270–390 | 330 | 93 |
| 75–100 | 85 | 60 | 295–415 | 355 | 96 |
| 80–105 | 95 | 62 | 320–445 | 385 | 98 |
| 85–115 | 100 | 64 | 350–475 | 410 | 100 |
| 90–125 | 110 | 66 | 370–500 | 440 | 103 |
| 100–140 | 120 | 68 | 400–530 | 465 | 105 |
| 105–150 | 130 | 71 | 425–560 | 490 | 106 |
| 110–170 | 140 | 73 | 450–585 | 520 | 107 |
| 120–190 | 160 | 76 | 480–610 | 545 | 108 |
| 130–215 | 175 | 77 | 500–640 | 570 | 109 |
| 145–240 | 190 | 79 | 530+ | 600 | 110 |
| 160–260 | 210 | 82 | – | – | – |

***Figure 5 Austroads Guide to Road Design Part 3: Table 3.4 Section operating speeds***

The individual curve on approach to the proposed subdivision intersection can also be assessed using Austroads Guide to Road Design Part 3: Figure 7.8: Rural roads: relationship between speed, radius and superelevation.

With curve radius 140m and superelevation of 7% it can be seen from the table below that the curve operating speed would again be less than 80km/h.

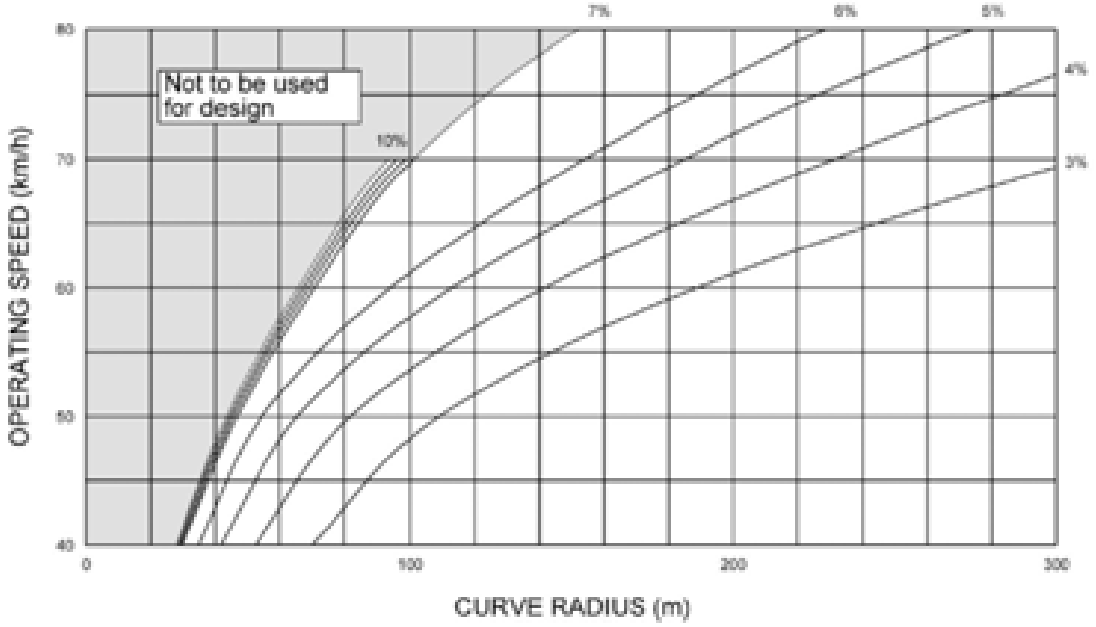



***Figure 6 Austroads Guide to Road Design Part 3: Figure 7.8: Rural roads: relationship between speed, radius and superelevation (V < 80 km/h)***

This would also apply to the smaller radius curve on the northern approach to the site.

Having established the appropriate design speed for the proposed subdivision intersection design is 80km/h, Austroads Guide to Road Design Part 4A provides sight distance requirements for vehicles at Intersections with the critical sight distance on Eastbank Road being the Safe Intersection Sight Distance. Table 3.2 of the Austroads guide provides minimum Safe Intersection Sight distance (SISD) for sealed roads as shown in Figure 7 below.

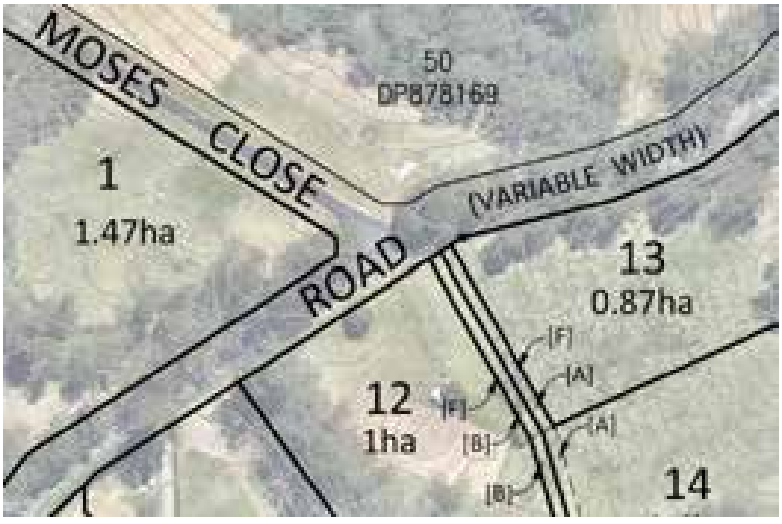
| Design speed (km/h) | Based on safe intersection sight distance for cars[1] $h_1$ = 1.1; $h_2$ = 1.25, $d$ = 0.36[2]; Observation time = 3 sec | | | | | |
|---|---|---|---|---|---|---|
| | $R_T$ = 1.5 sec[3] | | $R_T$ = 2.0 sec | | $R_T$ = 2.5 sec | |
| | SISD (m) | K | SISD (m) | K | SISD (m) | K |
| 40 | 67 | 4.9 | 73 | 6 | – | – |
| 50 | 90 | 8.6 | 97 | 10 | – | – |
| 60 | 114 | 14 | 123 | 16 | – | – |
| 70 | 141 | 22 | 151 | 25 | – | – |
| 80 | 170 | 31 | 181 | 35 | – | – |
| 90 | 201 | 43 | 214 | 49 | 226 | 55 |
| 100 | 234 | 59 | 248 | 66 | 262 | 74 |
| 110 | – | – | 285 | 87 | 300 | 97 |
| 120 | – | – | 324 | 112 | 341 | 124 |
| 130 | – | – | 365 | 143 | 383 | 157 |

***Figure 7 Austroads Guide to Road Design Part 4A Table 3.2: Safe intersection sight distance (SISD) and corresponding minimum crest vertical curve size for sealed roads (S < L)***

Safe intersection sight distance for an 80km/h design speed is 181m. The proposed subdivision concept has been designed to provide for road and road reserve widening on Eastbank Road to ensure that the required Safe Intersection Sight Distance can be achieved at the proposed subdivision intersection.

**<u>Proposed Eastbank Road / ROC intersection</u>**

The proposed ROC access to Eastbank Road will be a driveway access servicing a maximum of three lots in accordance with Coffs Harbour Council development specifications. The proposed driveway will replace an existing driveway access at the same location.



The driveway currently has sight distances measured on Eastbank Road of 190m to the south and 157m to the north.

***Eastbank Road Proposed ROC sight distance to the south***

***Eastbank Road Proposed ROC sight distance to the north***

Austroads Guide to Road Design Part 4A Section 3.4 Sight Distance at Property Entrances provides modified sight distance requirements on roads 'with tighter horizontal and vertical alignments, or vegetation'. This section provides extended design domain (EDD) criteria for establishing required sight distance as shown in Figure 8 below.

| Design speed (km/h) | | Based on norm-day safe intersection sight distance[1] $h_1$ = 1.1 $h_2$ = 1.25 $d$ = 0.46[2] $O_T$ = 2.0 sec | | | | | |
|---|---|---|---|---|---|---|---|
| | | $R_T$ = 1.5 sec | | $R_T$ = 2.0 sec | | $R_T$ = 2.5 sec | |
| | | SISD (m) | K | SISD (m) | K | SISD (m) | K |
| 40 | | 53 | 2.9 | 58 | 3.6 | - | - |
| 50 | | 70 | 5.2 | 77 | 6.3 | - | - |
| 60 | | 89 | 8.5 | 97 | 10.1 | - | - |
| 70 | | 110 | 12.9 | 120 | 15.3 | - | - |
| 80 | | 133 | 18.7 | 144 | 22.0 | - | - |
| 90 | | 157 | 26.2 | 169 | 30.5 | 182 | 35.2 |
| 100 | | 183 | 35.6 | 197 | 41.2 | 211 | 47.2 |
| 110 | | 111 | 47.2 | 226 | 54.3 | 241 | 61.9 |
| 120 | | - | - | 257 | 70.1 | 273 | 79.5 |
| 130 | | - | - | 289 | 89.0 | 307 | 101 |
| Do all of the crest curve sizes listed provide acceptable car check case capability[3] | Norm-night[1] | Yes ($d$ = 0.46, $h_1$ = 0.65 m, $h_2$ = 1.25 m, $O_T$ = 1.1 sec) | | | | | |
| | Mean-day | Yes ($d$ = 0.41, $h_1$ = 1.1 m, $h_2$ = 1.25 m, $O_T$ = 2.8 sec) | | | | | |
| | Mean-night[1] | Yes ($d$ = 0.41, $h_1$ = 0.65 m, $h_2$ = 1.25 m, $O_T$ = 1.8 sec) | | | | | |

***Figure 8 Austroads Guide to Road Design Part 4A Table A 10: Minimum EDD safe intersection sight distance and corresponding crest vertical curve size for sealed roads with level grades for the norm-day base case using an observation time of 2.0 seconds***

Minimum safe intersection sight distance for the proposed property access under Extended Domain Design requirements is 144m. The proposed ROC driveway access to Eastbank Road will therefore have adequate sight distance to meet Austroads SISD requirements.

Note that Minimum gap sight distance (MGSD) will also need to be checked during the detail design of access points however on low volume rural roads the required MGSD is significantly less than the SISD available.

Proposed Lot 13 will have a single driveway access which will be required to meet the site distance requirements for domestic driveways in AS2890.1. Figure 3.2 Sight Distance Requirements at Access Driveways in AS2890.1 requires a minimum 95m sight distance for a domestic driveway. The access driveway to Lot 13 will be able to be located to meet sight distance requirements in AS2890.1 for domestic driveways.

**Eastbank Road Traffic and Road Safety Impacts**

The subject site is located on Eastbank Road approximately 2.5km from the Coramba Road intersection. The majority of traffic generation from the proposal will travel to and from the Coramba Road end of Eastbank Road. As previously described, Eastbank Road comprises generally of 3.0m wide or greater travel lanes and variable width shoulders with undulating road geometry and frequent horizontal curves with relatively low traffic volumes.

The road currently functions adequately as a local rural collector road so the additional traffic generated by the proposal (100 vehicles per day and less than 12 trips per peak hour) will have no impact on road safety or amenity on Eastbank Road and no upgrade works are required.

### 4.3 Public Transport and Pedestrian/Cycleway access

Eastbank Road is served by both Town bus and school bus services with an informal bus lay-by located on Coramba Road at the Eastbank Road intersection. School bus services operate on Eastbank Road. The local bus route map is included in Appendix D of this report.

Dedicated bicycle infrastructure is lacking on Coramba Road and Eastbank Road however this is typical of facilities available in rural areas.

# 5 Coffs Harbour DCP 2015

Coffs Harbour Development Control Plan 2015 C1.8 Subdivision- Infrastructure requirements for Rural and Large Lot Residential Subdivisions applies to the land and requires in part that:

> • *Subdivision of land in a zone to which this control applies may comprise access via a right of carriageway only where the access services no more than three resulting lots.*
> • *Where access is provided to service more than three resulting lots, the access is to be dedicated as a public road and constructed in accordance with Council's Development Specifications*.

Appendix A of this report shows details of the proposed public road access to the site. Public Road access will include the required 20m road reserve width to a cul-de sac located where topographic constraints limit the feasibility of construction of 6.0m wide road construction.

Proposed lots 5 and 9 will have access to the cul-de-sac, and can be conditioned accordingly in any development consent, leaving three lots with access via ROC in accordance with the DCP.

# 6 Coffs Harbour Local Growth Management Strategy

Chapter 6 of the Coffs Harbour Local Growth Management Strategy includes commentary and requirements for future large lot residential development.

It should be noted that the Site Selection Criteria assessment carried out in relation to Eastbank Road classifies the road as *"class 1 or 2 sealed roads (or roads capable of that classification at minimal cost to Council)"* and that "*East Bank Road is sealed and in generally good condition. Minor seal improvements can be made from developer conditions/ contributions as required."*

No significant upgrade works on Eastbank Road or any intersections on Eastbank Road were identified as required in adoption of the Eastbank Road candidate area.

The assessment however also includes a requirement to limit the number of access points and that *'no private driveway access along Eastbank Road will be acceptable.*'

This requirement counters the possibility of a proliferation of driveway access from individual lots resulting from large lot residential subdivision. Where site constraints and existing conditions on Easbank Road however dictate, alternative proposals should be considered on their merits.

The rezoning proposal includes a concept for a new subdivision road access to service 10 of the proposed lots with a ROC driveway access and a new property access to Eastbank Road proposed to service lots which cannot gain access to the proposed subdivision road.

The proposal effectively replaces three existing driveway accesses to Eastbank Road with an intersection and two driveway accesses. As shown in section 4.2 of this report the proposed driveway accesses will be able to meet relevant standards for traffic safety and provide a superior solution to subdivision access than concentrating all traffic at the proposed intersection.

# 7 Conclusions

1 218 Eastbank Road is included in the Coffs Harbour City Council Local Growth Management Strategy to 2040 as a candidate area for Large Lot Residential development.

2 The proposed 218 Eastbank Road Large Lot Residential Precinct rezoning will have no impact on traffic safety, level of service or amenity on Eastbank Road or the surrounding road network

3 Traffic generation from the proposed development will have no impact on road safety or trigger any warrants for intersection upgrade works at the Coramba Road / Eastbank Road intersection or upgrade of Eastbank Road.

4 No intersection upgrade works at the Coramba Road / Eastbank Road intersection or works required to upgrade Eastbank Road were identified in the Coffs Harbour City Council Local Growth Management Strategy Large Lot Residential development assessment criteria.

5 The rezoning proposal includes a concept for a new subdivision road access to service 10 of the proposed lots with a ROC driveway access and a new property access to Eastbank Road proposed to service lots which cannot gain access to the proposed subdivision road.

6 The rezoning proposal effectively replaces three existing driveway accesses to Eastbank Road with an intersection and two driveway accesses. The proposed driveway accesses will be able to meet relevant standards for traffic safety and provide a superior solution to subdivision access than concentrating all traffic at the proposed intersection.

7 The proposed subdivision concept has been designed to provide for road and road reserve widening on Eastbank Road to ensure that the required Austroads Safe Intersection Sight Distance can be achieved at the proposed subdivision intersection.

8 The proposed Right of Carriageway driveway access and the proposed Lot 13 single driveway access to Eastbank Road included in the subdivision concept will be able to meet the site distance requirements for domestic driveways in Austroads and AS2890.1.

# 9 References

*Roads and Maritime Services Guide to Traffic Engineering Developments*

*Coffs Harbour City Council DCP 2015*

*Coffs Harbour City Council AUS-SPEC Specifications*

*Austroads Guide to Road Design Part 3: Geometric Design*

*Austroads Guide to Road Design Part 4: Intersections and Crossings*

*Coffs Harbour City Council Local Growth Management Strategy to 2040*

# Appendix A – Plan of Proposed Subdivision


NOTE:

- The dimensions, areas and numbers of lots shown hereon are approximate and are subject to verification by field survey.
- The location of all physical features relative to existing or proposed title boundaries shown hereon is approximate and subject to verification by field survey.
- No reliance should be placed on the information shown on this plan for any financial viability or detailed engineering design involving this land.
- Land Metrics Pty Ltd disclaims any liability whatsoever for any loss or damage that is incurred arising from any individual or organisation who uses or relies upon this document for any financial dealing or any other purpose, including as a document which has been prepared to accompany a development application.
- This Plan is not a plan of an approved subdivision nor does it imply that the proposed boundary arrangement would be approved.
- This note remains an intrinsic part of this plan and this plan must not be reproduced without this note.

[A] PROPOSED 'ROC' BENEFITTING PROPOSED LOT 11
[B] PROPOSED 'ROC' BENEFITTING PROPOSED LOT 14
[C] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 6 & 7
[D] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 6 & 8
[E] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 7 & 8
[F] PROPOSED 'ROC' BENEFITTING PROPOSED LOTS 12 & 13

NOTES:
'ROC' = RIGHT OF CARRIAGEWAY
ROAD WIDENING OF EAST BANK ROAD AS SHOWN TO SUPPORT SAFE INTERSECTION SITE DISTANCES AS PER AS1890.1 FOR 80KM SPEED ZONE

DIAGRAM 'A'

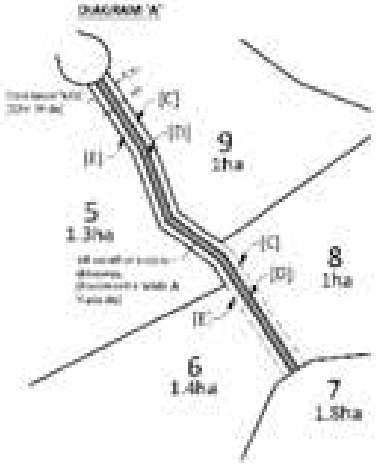



Diagram: Not to Scale

N

DRAFT
181122

Scale: 1:3000 @ A3

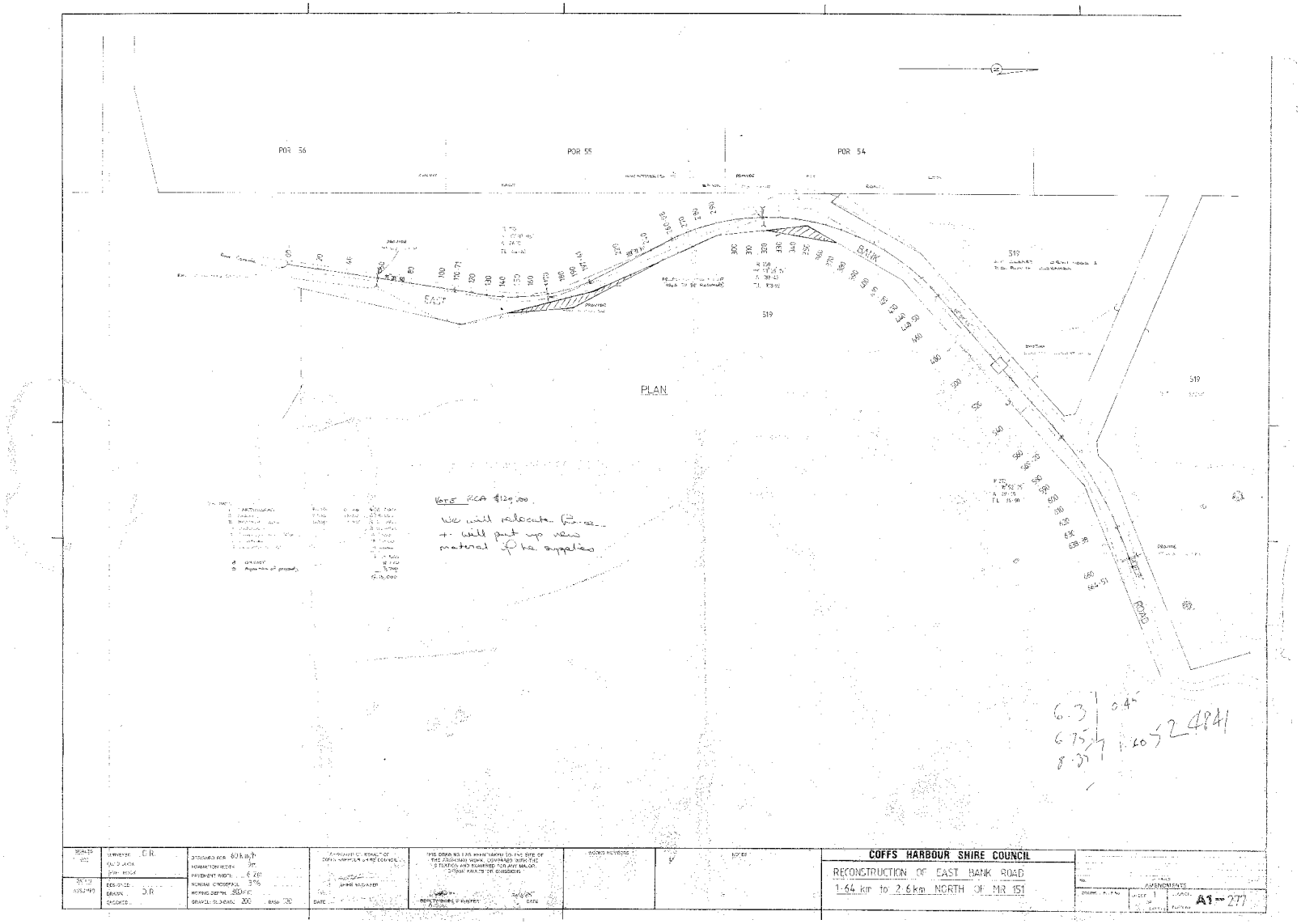
EAST BANK ROAD
PLANNING PROPOSAL
CONCEPT SUBDIVISION
- CLIENT
LOT 1 & 2 DP 809486
NORTH MACQUARIE, CHANNEL

Land Metrics

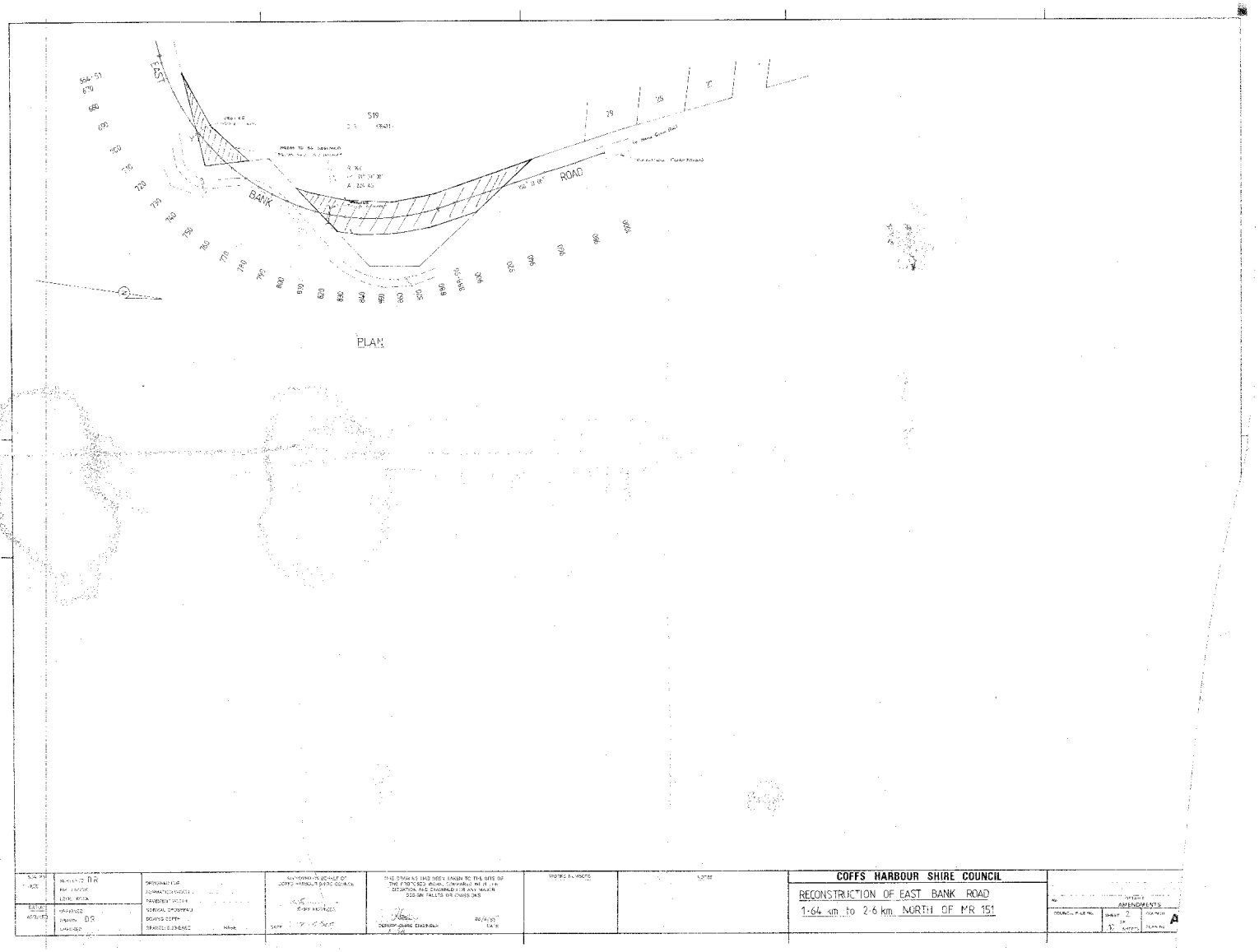
Land Metrics Pty Ltd
PO Box 4007 Port Macquarie NSW 2444
P: 0402 417 541
E: [redacted]

| | |
|---|---|
| Surveyed | Plotted |
| N/A | 18.11.22 |
| Checked | Date |
| MLC | 18/11/2022 |
| Drawing No. | Sheet Size |
| 3021-4250 | A3 |

# Appendix B – City of Coffs Harbour Eastbank Road curve reconstruction plans



# APPENDIX 11 - TRAFFIC IMPACT AND ACCESS ASSESSMENT



# Appendix C – CHCC Traffic Data

## Weekly Vehicle Counts (Virtual Week)

**VirtWeeklyVehicle-20**
**Site:** East Bank Rd.0.1NS
**Description:** **100m South of Tiger Fire Trail Rd on DBC Sign**
**Filter time:** **0:00 Saturday, 14 April 2018 => 0:00 Thursday, 3 May 2018**
**Scheme:** Vehicle classification (AustRoads94)
**Filter:** Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

| | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Averages 1 - 5 | Averages 1 - 7 |
|---|---|---|---|---|---|---|---|---|---|
| **Hour** | | | | | | | | | |
| **0000-0100** | 0.7 | 1.7 | 1.3 | 2.0 | 0.5 | 2.7 | 2.7 | 1.2 | 1.7 |
| **0100-0200** | 0.7 | 0.7 | 1.3 | 1.0 | 0.5 | 0.3 | 0.3 | 0.8 | 0.7 |
| **0200-0300** | 0.3 | 0.3 | 0.3 | 0.5 | 0.0 | 0.7 | 1.0 | 0.3 | 0.5 |
| **0300-0400** | 1.0 | 1.0 | 1.0 | 1.5 | 1.0 | 1.3 | 0.7 | 1.1 | 1.1 |
| **0400-0500** | 1.3 | 0.3 | 1.7 | 0.0 | 1.0 | 1.7 | 1.7 | 0.9 | 1.2 |
| **0500-0600** | 4.0 | 5.0 | 4.0 | 4.0 | 7.0 | 3.7 | 2.7 | 4.7 | 4.2 |
| **0600-0700** | 21.3 | 20.0 | 20.3 | 20.5 | 17.5 | 6.7 | 4.7 | 20.1 | 15.5 |
| **0700-0800** | 31.7 | 26.3 | 24.3 | 29.5 | 32.5 | 15.3 | 10.0 | 28.5 | 23.5 |
| **0800-0900** | **34.3** | 30.3 | 29.7 | 30.0 | 33.5 | 26.7 | 22.3 | **31.5** | 29.3 |
| **0900-1000** | 24.3 | **35.7** | 28.7 | 33.0 | 34.5 | 39.7 | 34.0 | 30.8 | 32.7 |
| **1000-1100** | 30.7 | 24.0 | **32.3** | 25.5 | 32.0 | **44.3** | **44.7** | 28.9 | **33.8** |
| **1100-1200** | 26.3 | 24.3 | 30.7 | **44.5** | **38.0** | 37.3 | 38.3 | 31.5 | 33.5 |
| **1200-1300** | 26.0 | 24.7 | 27.7 | 27.5 | 37.5 | **39.7** | 40.0 | 28.1 | 31.8 |
| **1300-1400** | 26.3 | 23.3 | 24.3 | 25.0 | 31.5 | 36.0 | 40.3 | 25.8 | 29.7 |
| **1400-1500** | 24.0 | 26.3 | 27.3 | 29.0 | 38.0 | 29.7 | **42.0** | 28.2 | 30.6 |
| **1500-1600** | 31.3 | 34.0 | 27.3 | 32.0 | 36.0 | 32.0 | 31.7 | 31.8 | 31.8 |
| **1600-1700** | **35.7** | 38.3 | **34.7** | 35.5 | **40.5** | 31.3 | 23.0 | **36.8** | **33.7** |
| **1700-1800** | 34.0 | **40.3** | 30.3 | **36.5** | 39.5 | 19.3 | 16.0 | 35.8 | 30.1 |
| **1800-1900** | 17.0 | 20.0 | 22.3 | 22.5 | 24.5 | 17.0 | 11.7 | 20.9 | 18.8 |
| **1900-2000** | 12.0 | 16.0 | 9.0 | 13.5 | 11.0 | 8.7 | 7.7 | 12.3 | 11.0 |
| **2000-2100** | 4.3 | 7.3 | 6.3 | 8.5 | 11.0 | 8.7 | 8.7 | 7.2 | 7.6 |
| **2100-2200** | 4.0 | 7.0 | 6.7 | 6.0 | 8.5 | 6.3 | 4.7 | 6.3 | 6.1 |
| **2200-2300** | 2.7 | 2.0 | 2.3 | 3.5 | 5.5 | 6.0 | 2.3 | 3.0 | 3.4 |
| **2300-2400** | 1.7 | 1.3 | 0.7 | 1.5 | 3.0 | 1.3 | 1.0 | 1.5 | 1.4 |
| **Totals** | | | | | | | | | |
| **0700-1900** | 341.7 | 347.7 | 339.7 | 370.5 | 418.0 | 368.3 | 354.0 | 358.8 | 359.5 |
| **0600-2200** | 383.3 | 398.0 | 382.0 | 419.0 | 466.0 | 398.7 | 379.7 | 404.6 | 399.7 |
| **0600-0000** | 387.7 | 401.3 | 385.0 | 424.0 | 474.5 | 406.0 | 383.0 | 409.2 | 404.5 |
| **0000-0000** | 395.7 | 410.3 | 394.7 | 433.0 | 484.5 | 416.3 | 392.0 | 418.2 | 413.8 |
| **AM Peak** | 0800 | 0900 | 1000 | 1100 | 1100 | 1000 | 1000 | | |
| | 34.3 | 35.7 | 32.3 | 44.5 | 38.0 | 44.3 | 44.7 | | |
| **PM Peak** | 1600 | 1700 | 1600 | 1700 | 1600 | 1200 | 1400 | | |
| | 35.7 | 40.3 | 34.7 | 36.5 | 40.5 | 39.7 | 42.0 | | |

*** - No data.**

# Appendix D – Bus Service

ENGINUITY CIVIL PROJECT MANAGEMENT & DESIGN

www.enginuitycivil.com.au

Our Ref: 201202 / Letter 004

22nd August 2022

Jim and Linda Cleary
C/o Keiley Hunter Town Planning
by email keiley@keileyhunter.com.au

Ross Nimmo
MIE Aust CPEng

PO Box 704
Woolgoolga NSW 2456

Phone: 0415 464 340
enginuity42@gmail.com

Attention: Mr Jim and Mrs Linda Cleary

Dear Linda and Jim

**RE: PLANNING PROPOSAL -LOTS 1 AND 2 DP1093448, 218 EAST BANK ROAD, CORAMBA - PRELIMINARY ASSESSMENT OF ACCESS TO EAST BANK ROAD**

**Background**
It is proposed to lodge a Planning Proposal to amend the Coffs Harbour Local Environment Plan 2013 to rezone land in the Orara Way Nana Glen Large Lot Candidate Area from RU2 Rural Landscape to R5 Large Lot Residential and C2 Environmental Conservation. A Concept Proposed Subdivision Plan has been prepared to accompany the application. This preliminary assessment provides a review of the access locations proposed in the Concept Proposed Subdivision Plan, and confirms that suitable access is available for the proposed future use of the site.

**Site Description**
East Bank Road runs from Coramba to Nana Glen in the Coffs Harbour City Council (CHCC) Local Government Area. The proposed development site is approximately 1.9 km north along East Bank Road from the intersection with Coramba Rd. The site consists of two existing lots, Lot 1, and Lot 2 DP1093448. Lot 1 is in two parts either side of East Bank Road and adjoining Moses Close, with 237m frontage to East Bank Road. Lot 2 has approximately 400m of frontage to East Bank Road.

The property frontage to East Bank Road consists of varying horizontal and vertical geometry. A total of four horizontal curves are located along the frontage. Heading from South to North the vertical alignment starts with a long sag vertical curve, then flattens through the middle of the site, and rises steeply at the northern end of the site.

There are two culvert crossings traversing the road corridor. One is in the sag at the southern end of the site, while the other is in the flat middle section of the road frontage. Existing native vegetation is present along the road frontage. There are sections of mature trees, particularly adjacent drainage lines.

**Warrants for turn treatments**
Assessment of the most suitable access location includes consideration of warrants for turn treatments. Warrants for turn treatments are derived from the AUSTROADS Guide to Road

Design. AUSTROADS provides two graphs for the selection of turn treatments. One for design speeds of greater than or equal to 100 km/h (appropriate for high-speed rural roads), and one for design speeds of less than 100 km/h.

CHCC has provided Weekly Vehicle Counts and Speed Statistics for East Bank Road 100m south of Tiger Fire Trail Road (attached). The posted speed limit is 100km/hr and the 85th percentile speed is significantly lower at 67.14 km/hr. Additional studies would be required to confirm the speed environment at the proposed access location.

The Weekly Vehicle Count Data Peak Traffic Volume of 44.7 vehicles per hour (Sunday AM peak) indicates that the likely future design standards will be the lowest of the applicable standards (BAR/BAL). This would be applicable to a speed environment greater than or equal to 100km/hr and satisfy lower speeds.

**Proposed Access Points**

The existing main property access is located on East Bank Road, approximately 100m south of Moses Close. A second access is located slightly north of Moses Close. The proposed Concept Subdivision Plan includes 2 access points to East Bank Road, and access to one lot from Moses Close.

The Concept Subdivision Plan includes a Proposed Road to the south of the existing main property access. This access point is proposed to service 10 lots (lots 2 to 11) of the Proposed Concept Subdivision Plan. The proposed new access point has been shifted south to move away from the existing Tangent Point and improves sight distance to the south. Some vegetation removal would be required for construction of road widening and embankments to accommodate a BAR/BAL treatment if warranted.

The second access location is proposed at the existing gravel access driveway slightly north of Moses Close. This access point is proposed to service 4 lots (lots 12 to 15) of the Proposed Concept Subdivision Plan. Adequate sight distance is available to the south. Some vegetation removal may be required to improve sight distance to the north.

Moses Close provides suitable access to the remaining lot of the proposed Concept Subdivision Plan.

**Conclusions and Recommendations**

East Bank Road and Moses Close provide suitable access for the proposed future use of the site. The property frontage to East Bank Road includes suitable locations to site access points for future subdivision of the site, and weekly vehicle traffic counts indicate that the likely future design standards will be the lowest of the applicable standards.

Yours faithfully

Ross Nimmo

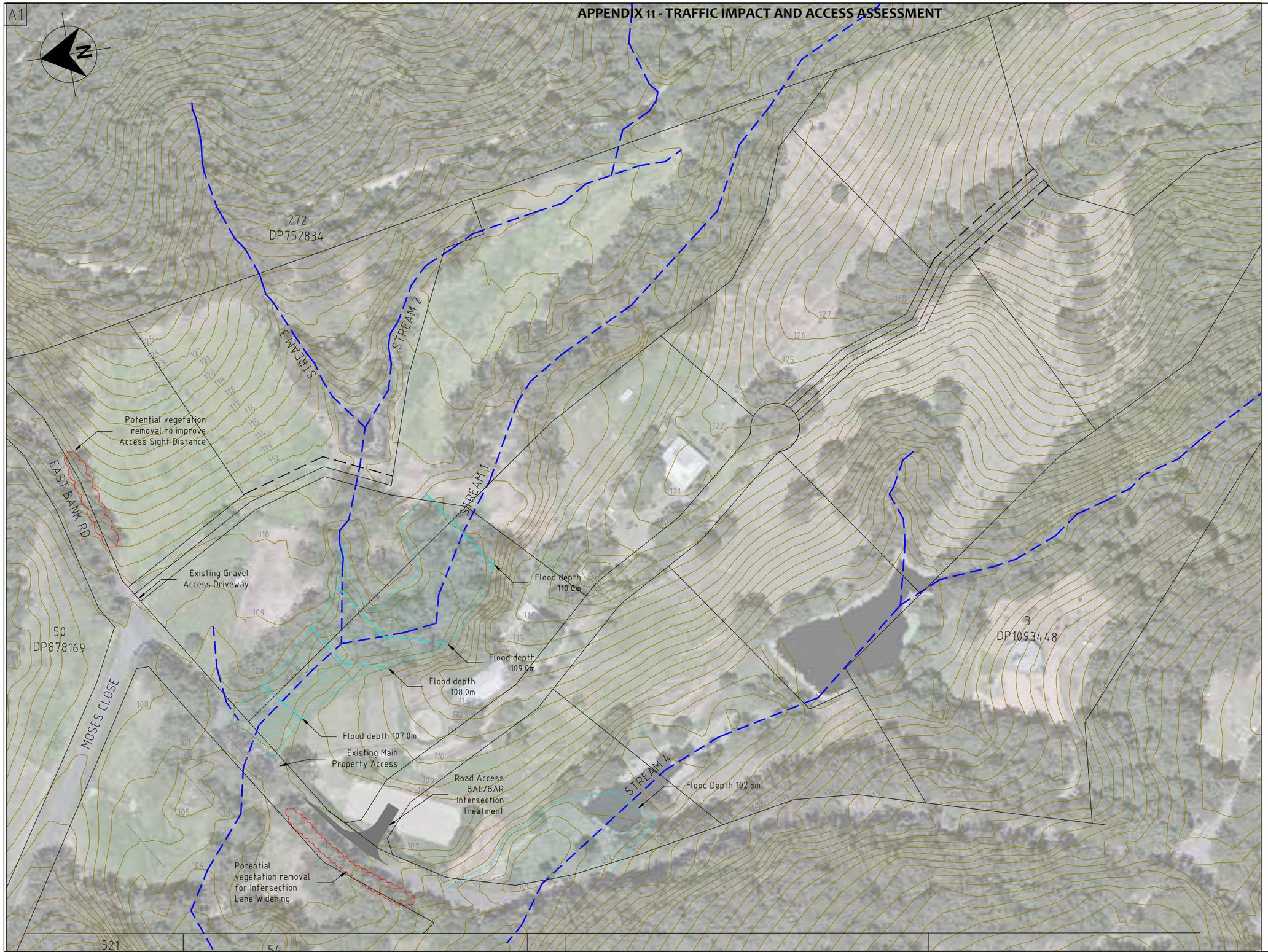
(Civil Engineer / Project Manager)

**Attachments**
SK002 – Access Assessment

East Bank Road Traffic Data

# APPENDIX 11 - TRAFFIC IMPACT AND ACCESS ASSESSMENT

A1




LEGEND

- Extrapolated Flood Extents based on GHD, 2012.
- Water Course / Natural Drainage Lines

NOTE

1. Contours shown are 1.0m LiDAR data (2007) sourced from Coffs Harbour City Council based on 1m DEM.
2. Water Course / Natural Drainage Line alignment has been derived from LIDAR data.
3. Flood Depths / Extents have been etrapolated from Final Report for Orara River Flood Study - 22/15606/14864, June 2012 (GHD). Extents are indicative only and should not be used for any purposes except those oultined in the original report.

## PLANNING PROPOSAL

| Rev. | Date | Revision Details | By | Ver. | App. |
|---|---|---|---|---|---|
| | | | | | |


ENGINUITY CIVIL PROJECT MANAGEMENT & DESIGN

Ross Nimmo MIEAust CPEng NER
Email: enginuity42@gmail.com
enginuitycivil.com.au
Mobile: 0415 464 340


Client: JIM AND LINDA CLEARY

Project: 218 EASTBANK ROAD CORAMBA



| | | | |
|---|---|---|---|
| Drawn | RWN | Signed RWN | Date 22/08/22 |
| Designed | | Signed | Date |
| Verified | | Signed | Date |
| Approved | | Signed | Date |

Drawing Title: ACCESS ASSESSMENT LOTS 1 AND 2 DP1093448

Project No. 201202

Scale 1:1000

Drawing No. SK002 Rev. 0

20 10 0 10 20 30 40 50 100mm

# East Bank Road Corambola

## Weekly Vehicle Counts (Virtual Week)

**Description:** **100m South of Tiger Fire Trail Rd on DBC Sign**
**Filter time:** **0:00 Saturday, 14 April 2018 => 0:00 Thursday, 3 May 2018**
**Scheme:** Vehicle classification (AustRoads94)
**Filter:** Cls(1-10) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

| | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Averages 1 - 5 | Averages 1 - 7 |
|---|---|---|---|---|---|---|---|---|---|
| **Hour** | | | | | | | | | |
| **0000-0100** | 0.7 | 1.7 | 1.3 | 2.0 | 0.5 | 2.7 | 2.7 | 1.2 | 1.7 |
| **0100-0200** | 0.7 | 0.7 | 1.3 | 1.0 | 0.5 | 0.3 | 0.3 | 0.8 | 0.7 |
| **0200-0300** | 0.3 | 0.3 | 0.3 | 0.5 | 0.0 | 0.7 | 1.0 | 0.3 | 0.5 |
| **0300-0400** | 1.0 | 1.0 | 1.0 | 1.5 | 1.0 | 1.3 | 0.7 | 1.1 | 1.1 |
| **0400-0500** | 1.3 | 0.3 | 1.7 | 0.0 | 1.0 | 1.7 | 1.7 | 0.9 | 1.2 |
| **0500-0600** | 4.0 | 5.0 | 4.0 | 4.0 | 7.0 | 3.7 | 2.7 | 4.7 | 4.2 |
| **0600-0700** | 21.3 | 20.0 | 20.3 | 20.5 | 17.5 | 6.7 | 4.7 | 20.1 | 15.5 |
| **0700-0800** | 31.7 | 26.3 | 24.3 | 29.5 | 32.5 | 15.3 | 10.0 | 28.5 | 23.5 |
| **0800-0900** | **34.3** | 30.3 | 29.7 | 30.0 | 33.5 | 26.7 | 22.3 | **31.5** | 29.3 |
| **0900-1000** | 24.3 | **35.7** | 28.7 | 33.0 | 34.5 | 39.7 | 34.0 | 30.8 | 32.7 |
| **1000-1100** | 30.7 | 24.0 | **32.3** | 25.5 | 32.0 | **44.3** | **44.7** | 28.9 | **33.8** |
| **1100-1200** | 26.3 | 24.3 | 30.7 | **44.5** | **38.0** | 37.3 | 38.3 | 31.5 | 33.5 |
| **1200-1300** | 26.0 | 24.7 | 27.7 | 27.5 | 37.5 | **39.7** | 40.0 | 28.1 | 31.8 |
| **1300-1400** | 26.3 | 23.3 | 24.3 | 25.0 | 31.5 | 36.0 | 40.3 | 25.8 | 29.7 |
| **1400-1500** | 24.0 | 26.3 | 27.3 | 29.0 | 38.0 | 29.7 | **42.0** | 28.2 | 30.6 |
| **1500-1600** | 31.3 | 34.0 | 27.3 | 32.0 | 36.0 | 32.0 | 31.7 | 31.8 | 31.8 |
| **1600-1700** | **35.7** | 38.3 | **34.7** | 35.5 | **40.5** | 31.3 | 23.0 | **36.8** | **33.7** |
| **1700-1800** | 34.0 | **40.3** | 30.3 | **36.5** | 39.5 | 19.3 | 16.0 | 35.8 | 30.1 |
| **1800-1900** | 17.0 | 20.0 | 22.3 | 22.5 | 24.5 | 17.0 | 11.7 | 20.9 | 18.8 |
| **1900-2000** | 12.0 | 16.0 | 9.0 | 13.5 | 11.0 | 8.7 | 7.7 | 12.3 | 11.0 |
| **2000-2100** | 4.3 | 7.3 | 6.3 | 8.5 | 11.0 | 8.7 | 8.7 | 7.2 | 7.6 |
| **2100-2200** | 4.0 | 7.0 | 6.7 | 6.0 | 8.5 | 6.3 | 4.7 | 6.3 | 6.1 |
| **2200-2300** | 2.7 | 2.0 | 2.3 | 3.5 | 5.5 | 6.0 | 2.3 | 3.0 | 3.4 |
| **2300-2400** | 1.7 | 1.3 | 0.7 | 1.5 | 3.0 | 1.3 | 1.0 | 1.5 | 1.4 |
| **Totals** | | | | | | | | | |
| **0700-1900** | 341.7 | 347.7 | 339.7 | 370.5 | 418.0 | 368.3 | 354.0 | 358.8 | 359.5 |
| **0600-2200** | 383.3 | 398.0 | 382.0 | 419.0 | 466.0 | 398.7 | 379.7 | 404.6 | 399.7 |
| **0600-0000** | 387.7 | 401.3 | 385.0 | 424.0 | 474.5 | 406.0 | 383.0 | 409.2 | 404.5 |
| **0000-0000** | 395.7 | 410.3 | 394.7 | 433.0 | 484.5 | 416.3 | 392.0 | 418.2 | 413.8 |
| **AM Peak** | 0800 | 0900 | 1000 | 1100 | 1100 | 1000 | 1000 | | |
| | 34.3 | 35.7 | 32.3 | 44.5 | 38.0 | 44.3 | 44.7 | | |
| **PM Peak** | 1600 | 1700 | 1600 | 1700 | 1600 | 1200 | 1400 | | |
| | 35.7 | 40.3 | 34.7 | 36.5 | 40.5 | 39.7 | 42.0 | | |

# East Bank Road Corcoran
## Speed Statistics by Hour

**Description:** **100m South of Tiger Fire Trail Rd on DBC Sign**
**Filter time:** **0:00 Saturday, 14 April 2018 => 0:00 Thursday, 3 May 2018**
**Scheme:** Vehicle classification (AustRoads94)
**Filter:** Cls(1-10) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

**Vehicles** = 7862
**Posted speed limit** = 100 km/h, Exceeding = 4 (0.051%), Mean Exceeding = 101.98 km/h
**Maximum** = 104.7 km/h, **Minimum** = 11.1 km/h, **Mean** = 58.8 km/h
**85% Speed** = 67.14 km/h, **95% Speed** = 72.54 km/h, **Median** = 59.04 km/h
**20 km/h Pace** = 49 - 69, **Number in Pace** = 6105 (77.65%)
**Variance** = 79.75, **Standard Deviation** = 8.93 km/h

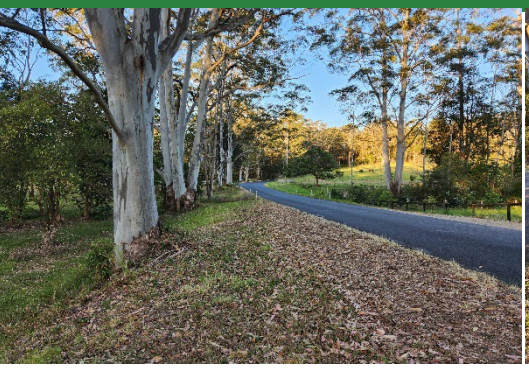
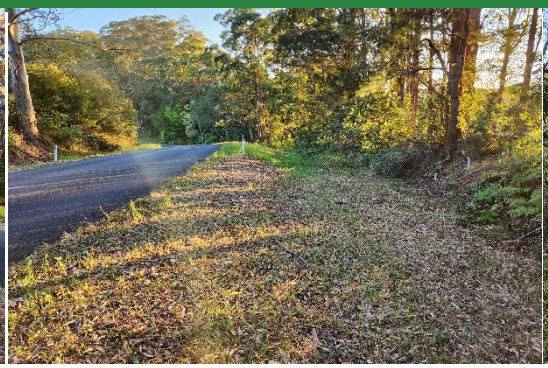
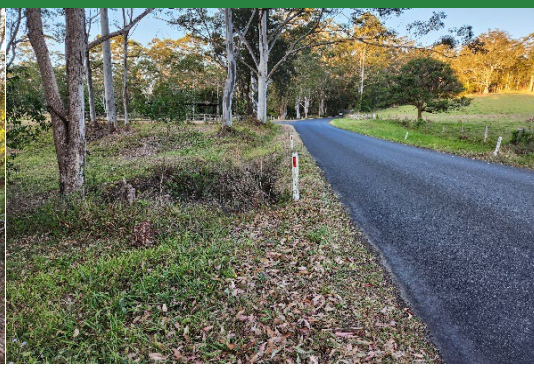
### Hour Bins

| Time | Bin | Min | Max | Mean | Median | 85% | 95% | >PSL 100 km/h |
|---|---|---|---|---|---|---|---|---|
| 0000 | 32 0.407% | 36.0 | 69.9 | 52.5 | 53.7 | 63.4 | 69.5 | 0 0.000% |
| 0100 | 13 0.165% | 34.5 | 73.3 | 53.4 | 52.0 | 66.8 | 73.3 | 0 0.000% |
| 0200 | 9 0.114% | 50.5 | 74.1 | 61.8 | 60.7 | 72.7 | 74.1 | 0 0.000% |
| 0300 | 20 0.254% | 45.9 | 68.0 | 58.2 | 57.7 | 65.1 | 68.0 | 0 0.000% |
| 0400 | 22 0.280% | 44.0 | 80.8 | 60.2 | 59.7 | 69.2 | 80.2 | 0 0.000% |
| 0500 | 80 1.018% | 33.3 | 92.4 | 63.1 | 62.5 | 70.1 | 73.8 | 0 0.000% |
| 0600 | 295 3.752% | 12.0 | 95.8 | 60.5 | 61.6 | 69.2 | 72.8 | 0 0.000% |
| 0700 | 447 5.686% | 28.0 | 91.7 | 61.2 | 61.6 | 69.4 | 72.8 | 0 0.000% |
| 0800 | 557 7.085% | 36.6 | 86.1 | 61.0 | 61.6 | 68.8 | 73.9 | 0 0.000% |
| 0900 | 622 7.911% | 12.6 | 78.9 | 56.7 | 57.6 | 65.2 | 69.0 | 0 0.000% |
| 1000 | 643 8.179% | 11.1 | 100.4 | 57.1 | 57.8 | 65.8 | 71.7 | 1 0.156% |
| 1100 | 636 8.090% | 19.3 | 97.3 | 58.1 | 58.1 | 66.9 | 73.3 | 0 0.000% |
| 1200 | 604 7.683% | 19.7 | 88.1 | 58.5 | 58.7 | 66.6 | 72.1 | 0 0.000% |
| 1300 | 564 7.174% | 16.8 | 86.9 | 58.6 | 58.2 | 66.8 | 73.1 | 0 0.000% |
| 1400 | 582 7.403% | 33.6 | 88.4 | 58.1 | 58.4 | 66.0 | 71.8 | 0 0.000% |
| 1500 | 605 7.695% | 21.2 | 91.7 | 57.9 | 58.1 | 66.8 | 71.6 | 0 0.000% |
| 1600 | 641 8.153% | 30.2 | 101.1 | 59.1 | 59.0 | 67.4 | 72.6 | 1 0.156% |
| 1700 | 572 7.276% | 34.3 | 104.7 | 60.3 | 59.7 | 68.3 | 75.9 | 1 0.175% |
| 1800 | 358 4.554% | 23.8 | 101.6 | 59.2 | 59.4 | 66.8 | 71.7 | 1 0.279% |
| 1900 | 209 2.658% | 22.0 | 89.0 | 58.0 | 57.7 | 65.7 | 72.9 | 0 0.000% |
| 2000 | 145 1.844% | 28.8 | 89.1 | 59.1 | 59.2 | 68.7 | 73.4 | 0 0.000% |
| 2100 | 115 1.463% | 33.4 | 80.9 | 58.3 | 58.4 | 65.9 | 71.1 | 0 0.000% |
| 2200 | 64 0.814% | 35.4 | 75.5 | 55.7 | 55.4 | 63.1 | 71.0 | 0 0.000% |
| 2300 | 27 0.343% | 46.1 | 70.6 | 55.9 | 55.7 | 63.3 | 68.5 | 0 0.000% |
| **----** | **7862 100.0%** | **11.1** | **104.7** | **58.8** | **59.0** | **67.1** | **72.5** | **4 0.051%** |

# Road Safety Audit

## Existing Road: East Bank Road, Coramba

Quality solutions. Sustainable future.

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| UPR | Description | Issued By | Date Issued |
|---|---|---|---|
| 4731-1001 | Version 1 | Leon Petrohelos | 27/09/2023 |
| 4731-1002 | Version 2 | Leon Petrohelos | 05/10/2023 |
| | | | |

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# 1. Project Information

## 1.1 Background

The owners of Lot 1 & 2 DP 1093448, 218 East Bank Road, Coramba have engaged GeoLINK to undertake a Road Safety Audit (RSA) for the existing 2.38km of East Bank Road from the northeast corner of their lot back to the intersection with Coramba Road. East Bank Road runs parallel with Orara Way providing a secondary and more direct link between the rural communities of Coramba and Nana Glen.

The Road Safety Audit of East Bank Road is required due to a request from The City of Coffs Harbour following the owner's submission of a planning proposal for rezoning of land from RU2 Rural Landscape to R5 Large Lot Residential and C2 Environmental Conservation, where appropriate. The proposed rezoning is required to facilitate the subdivision of their two lots into 15 lots. Council have requested the RSA to identify any road safety deficiencies and areas of risk along East Bank Road and to identify any upgrading that may be required to address the deficiencies.

## 1.2 Site Description

The area audited, as shown in **Figures 1.1** and **1.2,** is a 2.38 km stretch of rural road within the City of Coffs Harbour Council local government area. The audit area includes the following intersections with East Bank Road, from south to north:

- Ch. 0: Coramba Road, entry to Country Cubs Preschool and Long Day Care.
- Ch. 400: Unnamed driveway/ARTC access.
- Ch. 1,550: Tiger Fire Road, entry to waste facility and Coramba cemetery.
- Ch. 2,250: Moses Close.

Chainages noted are approximate only, with Ch. 0 being at the southern extent.

All intersections within the audit area are currently rural T-intersections with basic left and right turning treatments, except the intersection with Coramba Road which has channelised right turn into East Bank Road.

The audit area includes land on undulating topography within existing road reserves. It is a rural area comprising a mix of low density residential and medium to large rural lots. Most of the land surrounding East Bank Road within the audit area is zoned RU2 Rural Landscape, with the southern extent up to Ch. 1,050 comprising R5 Large Lot Residential and then south from Ch. 300 to 550 comprises low density residential. The Coramba cemetery is at approximate Ch. 1550. The North Coast Railway runs alongside the low-density residential section of East Bank Road and then diverts further north while East Bank Road takes a northeast trajectory. There are no rail line stoppages within the vicinity of the audit area. The unnamed driveway at Ch. 400 has an at grade crossing of the rail line. A search of bus timetables within the area indicate that public buses do not travel along East Bank Road. A school bus uses the northern and southern portions of East Bank Road for pick up and drop off of school students.

A traffic impact assessment produced for the planning proposal indicates existing traffic volumes on East Bank Road being less than 500 vehicles per day with peak hour volumes less than 50 vehicles per hour and Moses close well less than 100 vehicles per day. (Source: Planning Proposal East Bank Road Coramba Traffic and Trasport impact Assessment December 2022).

The existing two-way undivided carriageway varies in width, being generally a 6 m wide bitumen seal with grass shoulders of varying width between 1-2 m. The road has several non-conforming horizontal curves for a 100 km/h speed environment that do not have curve speed advisory signage.

There is minimal prominent line marking, which includes:

- Line marking of the intersection with Coramba Road including channelised right turn, medians and hold lines.
- A double barrier centreline from the intersection at Coramba Road extending north for approximately 30 m.

The posted speed limit is 50 km/h from Ch. 0 at the southern end of East Bank Road to approximately Ch. 650, where there is an opposing direction speed zone indicating that north of this point the default NSW speed limit applies, which is 100 km/h.


**Figure 1.1 Site Locality *[Source: Whereis.com]***

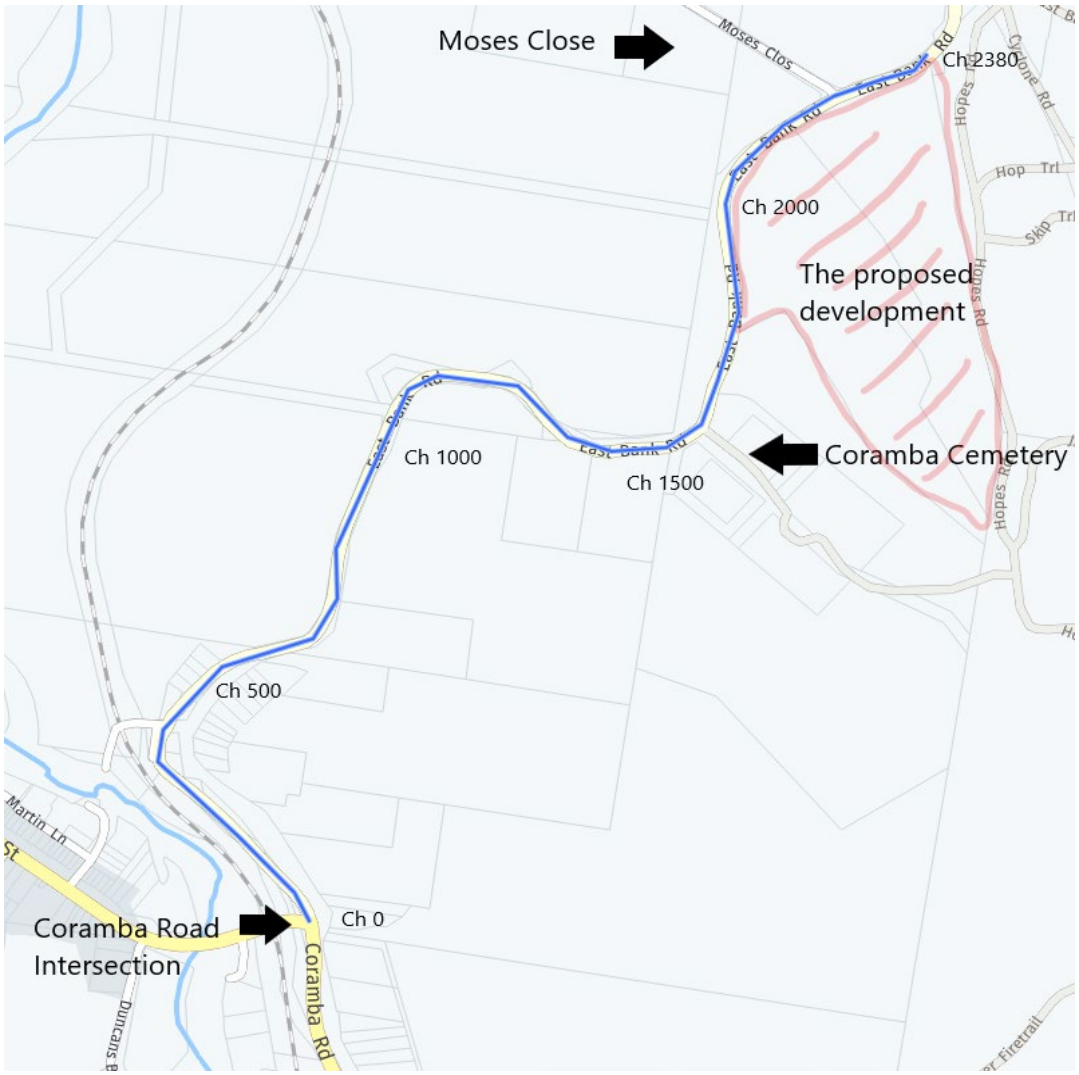



**Figure 1.2 Site Context and Audit Extent *[Source: Whereis.com]***

## 1.3 Information Provided by the Client

The client provided the following documentation to the auditor:

- a Traffic Impact Assessment for the planning proposal (ref. no. 003 - MC) dated 8/12/2022;
- drawing 2021-029 Sheet 1 of the proposed subdivision of Lot 1 and 2, DP 1093448 into 15 lots; and
- an information request from The City of Coffs Harbour on the planning proposal reference 8119039 dated 15 August 2023.

## 1.4 Crash History

Historical crash data records for the years 2017 to 2021 inclusive have been obtained via the NSW Centre for Road Safety website. This data is summarised below. It is noted that speeding was listed as a contributing factor in all these incidents.

**Table 1.1 Crash Data Records**

| ID | Year | Severity | RUM Code | Location | Lighting |
|---|---|---|---|---|---|
| 1 | 2019 | Moderate Injury (x 1), Minor injury (x2) | 47, Emerging from driveway | T-intersection (Ch 0) | Daylight |
| 2 | 2017 | Killed | 85, Off right of the left bend hit obstruction. | Curve (Ch 650) | Daylight |
| 3 | 2020 | Non-casualty (towaway) | | Curve (Ch 2300) | Daylight |

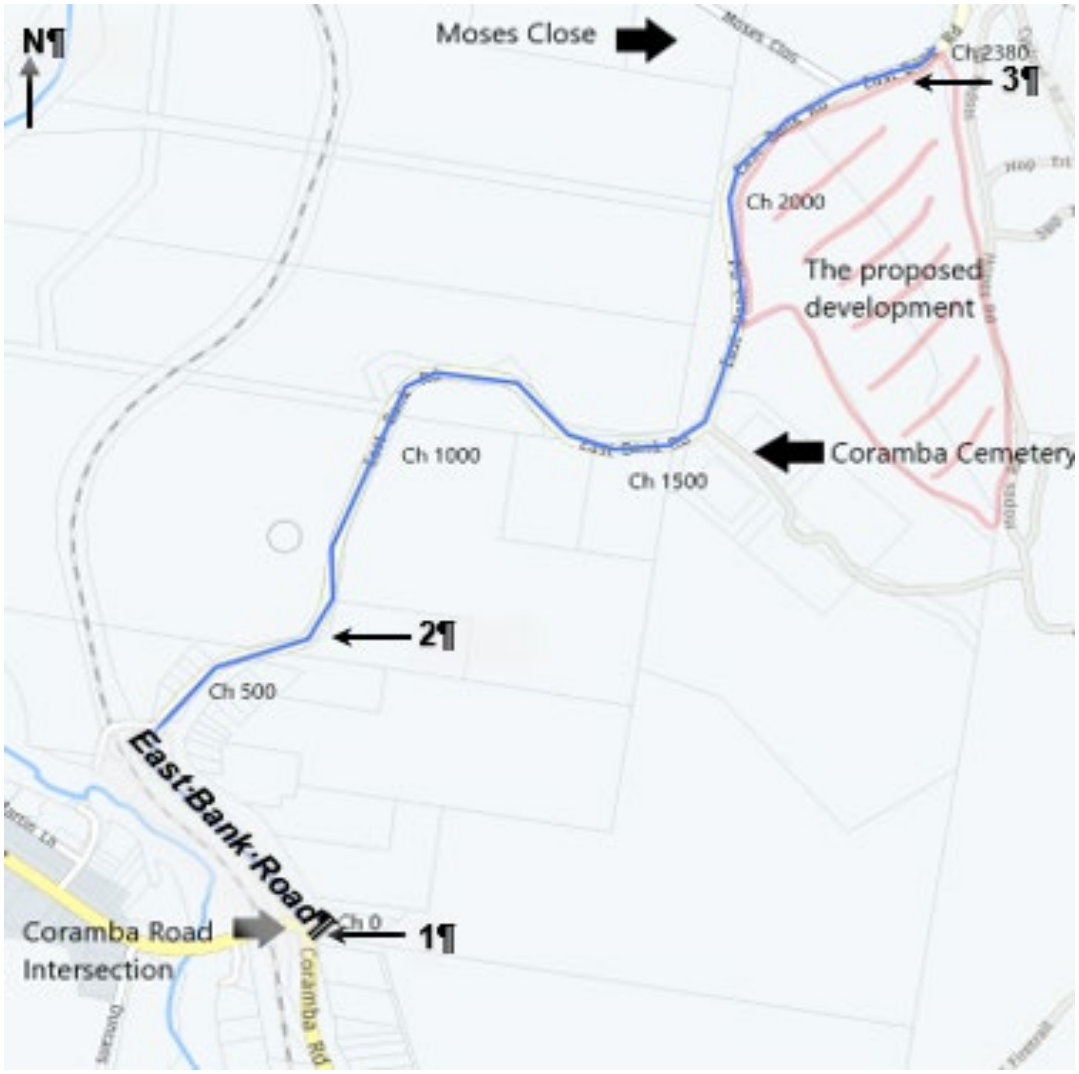



**Figure 1.3 Crash Map *[Source: NSW Centre for Road Safety]***

## 1.5 Audit Scope

This RSA will assess the existing road and road related entities within the audit area, including (where relevant) road alignment, cross section, pedestrian/ cyclist safety, signage, intersections, property access, roadside obstacles, and other related infrastructure within the audit scope. The audit will be carried out to consider the perspective of all road users.

The scope of the RSA is limited to the audit area as described herein.

The objective of the RSA is to identify any potential road safety issues or deficiencies associated with the existing road that may need to be mitigated or rectified. The audit also required to be conducted during daylight and low light (after sunset) driving conditions. Following this the audit team shall collaborate findings and compile a report for submission and review by Council.

Although the RSA will not check the existing roadway against relevant standards and guidelines, some design-related compliance issues may be raised during the audit process.

Positive aspects of the road and infrastructure have not been recorded.

## 1.6 Audit Team

The audit has been carried out by suitably qualified team members registered as Road Safety Auditors by Transport for NSW.

1. **John Starr**
   Dip. Civil Construction Design
   Senior Civil Engineer, GeoLINK
   Level 3 Lead Road Safety Auditor
2. **Leon Petrohelos**
   BE (Civil)(Hons), BBus, MTeach, CPEng, NER, APEC Eng IntPE
   Senior Civil Engineer, GeoLINK
   Level 2 Senior Road Safety Auditor

# 2. Audit Process

## 2.1 Methodology and Responsibilities

The RSA has been undertaken in accordance with:

- Austroads *Guide to Road Safety Part 6: Road Safety Audit* (AGRS06, 2022); *and*
- NSW TfNSW (formerly RMS) *Guidelines for Road Safety Audit Practices* (2011),

The RSA process includes the steps listed in the table below together with the party responsible for each task.

**Table 2.1 Roles and Responsibilities**

| Steps | Responsibility |
|---|---|
| Select the audit team | Client or Designer |
| Provide background information | Client or Designer |
| Hold a commencement meeting | Client and/or Designer and the Audit Team |
| Assess the documents / Inspect the site | Audit Team |
| Write the audit report and issue to client | Audit Team |
| Hold a completion meeting | Client and/or Designer and the Audit Team |
| Write the responses | Client and Designer |
| Implement the changes | Client or Designer |

## 2.2 Commencement Meeting

An initial discussion was had via telephone with Matt Cooper from Land Metrics (a representative of the client), and Leon Petrohelos from GeoLINK (senior auditor) on Tuesday 19 September 2023. Discussions had occurred prior to this date concerning the audit scope between Matt Cooper and John Starr (lead auditor). During these discussions, the scope of the audit was confirmed, as described in this report.

## 2.3 Site Inspections

The audit team arrived at the site on the afternoon of Monday 25 September 2023. Following a brief inspection of the road network in the vicinity of the site, the team began driving the length of East Bank Road in both directions. Dashcam video footage was also recorded during the audit. The audit was undertaken on the afternoon of Monday 25 September 2023 at approximately 4:30 pm (daylight) and again at 6:00 pm (after sunset). The weather was fine at the time of the site visit and visibility was clear.

## 2.4 Previous Audits

It is understood that no previous RSAs have been carried out on East Bank Road.

## 2.5 Safe System

The Safe System approach is regarded as international good practice in road safety and provides an outcome whereby death and serious injury are virtually eliminated amongst users of the road system. The Safe System includes safe roads, safe speeds, safe people, and safe vehicles. There are four key principles that form the basis of the Safe System philosophy:

- People make mistakes that can lead to road crashes.
- The human body has a limited physical ability to tolerate crash forces before harm occurs.
- A shared responsibility exists amongst those who plan, design, build, manage and use roads and vehicles and provide post-crash care to prevent crashes resulting in serious injury or death.
- All parts of the system must be strengthened to multiply their effects. If one part fails, road users are still protected.

In accordance with AGRS06, the Safe System principles must be given due consideration in all activities within the road safety management of a road network, including the RSA. This can be achieved during the RSA process by:

- Identifying and considering key crash types that result in fatal and serious injuries (FSI).
- Relating possible crash forces to tolerable levels, regardless of the likelihood, when identifying and assessing risks/ hazards.
- Consideration of audit findings and mitigation measures by their alignment with the Safe System e.g. in terms of operating speed, impact angles etc.

This audit has focused on the specific crash types that are known to result in higher severity outcomes at relatively lower speed environments to meet Safe System requirements of reducing the risk of fatal and serious injury crashes.

## 2.6 Completion Meeting

The objective of the completion meeting is to allow the auditor(s) to discuss the findings with the client for corrective action, where required. Although the meeting is not an occasion for the client to disagree with the audit findings, it is an opportunity for misunderstandings to be explained.

The completion meeting was held on the 4th of October 2023 between John Starr (Lead Auditor), Leon Petrohelos (senior auditor), Matt Cooper (Land Metrics), Keilley Hunter (Keiley Hunter Town Planning), Jim and Linda Cleary (Client) following submission of the audit report. All findings audit findings were discussed.

# 3. Risk Matrix

The audit findings include a risk ranking, determined using the following tables, based on AGRS06.

**Table 3.1 How often is the problem likely to lead to a crash?**

| Likelihood | Description |
|---|---|
| Almost certain | Once or more per quarter (four times a year or more) |
| Likely | Once a year |
| Possible | Every one to three years |
| Unlikely | Every three to seven years |
| Rare | Less than once every seven years |

**Table 3.2 What is the likely severity of the resulting crash type?**

| Severity | Description |
|---|---|
| Insignificant | Property damage |
| Minor | Minor first aid |
| Moderate | Major first air and/or presents to hospital (but not admitted) |
| Serious | Admitted to hospital |
| Fatal | Death within 30 days of the crash |

**Table 3.3 Resultant Risk Level**

| | Rare | Unlikely | Possible | Likely | Almost Certain |
|---|---|---|---|---|---|
| Insignificant | Negligible | Negligible | Low | Medium | Medium |
| Minor | Negligible | Low | Medium | Medium | High |
| Moderate | Low | Medium | High | High | High |
| Serious | Medium | High | High | Extreme | Extreme |
| Fatal | High | Extreme | Extreme | Extreme | Extreme |

The heavy dashed line in **Table 3.3** represents the Safe System crash outcome threshold whereby everything below the line is expected to result in a FSI crash. In accordance with the Safe System, hazards should be removed, or risks reduced to avoid a resultant risk level below the threshold.

Priorities for mitigation are categorised as **Table 3.4**.

**Table 3.4 Treatment Approach**

| Frequency | Description |
|---|---|
| Negligible | No action required |
| Low | Should be corrected or the risk reduced if the treatment cost is low |
| Medium | Should be corrected of the risk significantly reduced, if the treatment cost is moderate but not high |
| High | Should be corrected or the risk significantly reduced, even if the treatment cost is high. |
| Extreme | Must be corrected, regardless of cost |

Note that no definitive guidance can be given as to the respective monetary values of the terms 'low', 'moderate' or 'high' regarding treatment costs, but it is expected that consideration against the total project cost would be an important factor when categorising mitigation of each risk.

The risk matrix above is aligned to Safe System principles and has been designed to be used with consideration of a 'severity guidance sheet', replicated from AGRS06 below. It is stressed that the information contained within the severity guidance sheet is a general indication only and that professional engineering judgement is required with its usage.

**Table 3.5 Severity Guidance Sheet**

| Crash Type | Crash Speed (km/h) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | < 10 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| Pedestrian (vs HV) | | | | | | | | | | | |
| Cyclist (vs HV) | | | | | | | | | | | |
| Motorcyclist (vs HV) | | | | | | | | | | | |
| Pedestrian (vs car) | | | | | | Fatal | | | | | |
| Cyclist (vs car) | | | | | | | | | | | |
| Pole/tree impact (car) | | | | | Serious injury | | | | | | |
| Motorcyclist (vs car) | | | | | | | | | | | |
| Side impact (HV vs car) | | | | Moderate injury | | | | | | | |
| Side impact (car vs car) | | | | | | | | | | | |
| Head-on (HV vs car) | | Minor injury | | | | | | | | | |
| Head-on (car vs car) | | | | | | | | | | | |

# 4. Audit Findings

The following table details the RSA findings. The client responses were provided by the client and added in the second issue of this report.

**Table 4.1 Audit Findings**

| Audit Finding | Risk Ranking | Client Response | |
|---|---|---|---|
| | | Accept? | Comments |
| **1. Intersection with Coramba Road**<br><br>The intersection of East Bank Road and Coramba Road is missing some line marking, driveways to businesses are not line marked and the line marking that exists is of a poor standard. This is exacerbated at night where there is only flag lighting present.<br><br>A driver may not anticipate the intersection turning manoeuvres resulting in confusion and a potential collision with another driver travelling through the intersection.<br><br>It is recommended that:<br>1. Line marking be refreshed with appropriate glass beading.<br>2. The chevron areas that are not line marked be line marked.<br>3. The chevron that is line marked; a raised median could be installed.<br>4. Turning arrows be established.<br>5. Hold lines be established at all driveways and approaches to the intersection.<br><br>  | *Possible*<br>*Moderate*<br><br>**High** | | Intersection considered to be not part of the audit scope. These issues are raised as comments for the road owner. |

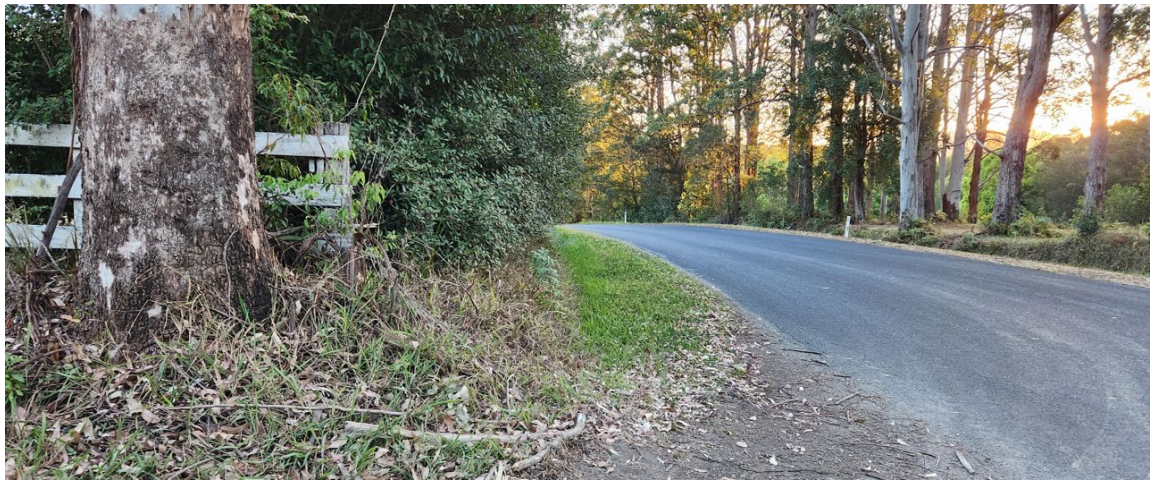
| Audit Finding | Risk Ranking | Client Response | |
|---|---|---|---|
| | | Accept? | Comments |
| **2. East Bank Road Guide Posts**<br>For the audited section of East Bank Road, guide post placement is inconsistent, with several sections where guide posts are missing. Guide posts help convey to the driver the alignment ahead, direction changes and width of road.<br>Without adequate guide posting, drivers may leave the roadway, and obstruct a hazard on the side road. At higher speed sections of audit area this could become fatal.<br>It is recommended that guide posts be reinstated or installed at consistent spacings provided in AS1742.2 for the entire audit length.<br>  | *Possible Fatal*<br>**Extreme** | | This is considered a maintenance issue for the road owner for damaged guideposts to be replaced and additional guide posts be installed as required to conform with AS 1742.2. |

| | | | |
|---|---|---|---|
| **3. Crest at Chainage 300 and Subsequent Horizontal Curve**<br><br>There is a crest on East Bank Road at approximate chainage 300 and a subsequent right-hand bend that is sign posted with a recommended speed of 35 km/hr.<br><br>Although the recommended speed is 35 km/hr drivers were observed travelling above this speed particularly on the downhill grade around the bend travelling northbound.<br><br>Poor sight distance occurs immediately at the crest and travelling both on the downhill grade around the bend, and the uphill grade from the opposite direction.<br><br>There is an inappropriate use of sign, a unidirectional marker (D-1-3) that is no longer used, some Curve Alignment Marker (CAM) (D4-6) signs that appear too low along with a rail line on side road sign and a surface slippery sign and vehicles that are parked obstructing some signs. There is also a mirror installed to help vehicles see around the bend. The signs appeared faded at night and are either dirty or in need of replacement.<br><br>A driver may over anticipate the bend, or inadequately anticipate the existence of a driver in the opposing direction, causing a head on type collision at lower speed, or at higher speed if drivers are travelling at above the recommended speed limit. A driver may also fail to anticipate the horizontal curve and leave the roadway, either by travelling above the recommended speed, misinterpreting the poor signage or to avoid a driver in the opposing direction.<br><br>It is recommended that:<br>1. Central double barrier line be installed both at the crest and at the horizontal curve.<br>2. All signage be cleaned and/or replaced where dirty or faded.<br>3. The unidirectional marker (D4-1-3) and mirror be removed and replaced with additional CAM signage (D4-6) at spacings, height and location in accordance with AS1742.2. Existing CAM signage should be adjusted to the correct height.<br>4. Consideration be given to relocating the surface slippery and rail line on side road signage to before the curve advisory markers.<br>5. Consider placement of “no parking” signage in order to remove vehicles that are parked obstructing signage.<br><br>  | *Possible*<br>*Serious*<br><br>**High** | | The cleaning of signage that is dirty is considered to be a maintenance issue for the road owner.<br><br>The “no parking” signage should be considered by the road authority.<br><br>Line marking and sign rationalisation at this bend, as recommended is considered appropriate. No Parking signage would not be required should the central double barrier line be installed. |

| Audit Finding | Risk Ranking | Client Response | |
|---|---|---|---|
| | | Accept? | Comments |
| **4. Potential for Water Over Road**<br><br>The audit was conducted when there was no evidence of water, however at approximate chainage 300 the steep vertical decline along with poor maintenance of table drains may cause water to pool in slight downpours and travel over the road creating a hazard for drivers.<br><br>A driver may lose traction and either collide with oncoming traffic or impact a roadside hazard.<br><br>It is recommended that the drainage be maintained and/or improved and warning signage be placed that warn drivers of the potential for water over road causing a slippery surface.<br><br>  | *Possible*<br>*Minor*<br><br>**Medium** | | The client who regularly travels this road advises that water does not sheet across the road even in heavy rain. Maintenance of the drains however is considered important for the road maintainer. |
| **5. Potential for Curve Advisory Signage**<br><br>Several non-conforming horizontal bends along the alignment warrant appropriate warning speed limit signage and curve advisory signage to both warn drivers of the approaching bend and also aid in way finding at night.<br><br>There is a risk that drivers will not adjust their speed adequately to safely navigate the horizontal curve. This may result in the driver losing control of their vehicle on the bend and either leaving the road or over-correcting and causing a head-on collision. Due to the numerous roadside hazards within this stretch of East Bank Road, including established trees, power poles and steep embankments, a vehicle leaving the road is likely to result in a serious injury or fatality to the occupants.<br><br>It is recommended that the Austroads warrants be checked for each of the following curves for provision of 'Curve" advance warning signed, advisory speed signs, and Curve Advisory Markers (CAMs):<br><br>• Chainage 300-400 - Southbound<br>• Chainage 500-650<br>• Chainage 1050-1150<br>• Chainage 1200-1300 | *Possible*<br>*Fatal*<br><br>**Extreme** | | It is considered that curve advisory signage and speed advisory signage be specified and installed as required. |

| Audit Finding | Risk Ranking | Client Response | |
|---|---|---|---|
| | | Accept? | Comments |
| • Chainage 1350-1400<br>• Chainage 1500-1600<br>• Chainage 1700-1800<br>• Chainage 1900-2200<br>  | | | |
| **6. Culverts**<br>Several culverts exist along the audit section of East Bank Road which create a roadside hazard if the headwalls are above ground, and/or a steep drop off from the road surface at the location of the culvert.<br>A driver may leave the side of the road due to driver error, and if the side road is unforgiving due to the location of a culvert headwall or drop off this may result in a serious injury if the driver is travelling at the recommended speed.<br>It is recommended that warning signage and guideposts be installed at all culverts not necessarily limited to the following that were observed on site:<br>1. Culvert at Ch.1100<br>2. Culvert at Ch. 1200<br>3. Culvert at Ch. 1800<br>4. Culvert at Ch. 2000<br>Due to the proximity of the culver at chainage 2200 to the road edge, it is recommended that this culvert either be extended to provide more roadside shoulder or safety barrier be installed. | *Rare*<br>*Fatal*<br><br>**High** | | The client concurs with required signage at culverts and the proposed guard railing for the culvert at chainage 2200. The client does not consider extending of the culvert is necessary or required if guard railing is installed.<br>Proposed signage to be confirmed with the council. |

| Audit Finding | Risk Ranking | Client Response | |
|---|---|---|---|
| | | Accept? | Comments |
|  | | | |
| **7. Sight distance at Driveway at Chainage 1550, 161 East Bank Road**<br>The driveway at chainage 1550 directly opposite the entry to the Coramba cemetery and waste transfer station has poor site distance for drivers giving way to the right and for north bound traffic approaching the driveway.<br>The driver exiting may not anticipate an oncoming vehicle resulting in a side impact collision or a driver may swerve to avoid the outgoing vehicle, losing control and impact another hazard on the opposite roadside.<br>Appropriate signage warning northbound traffic beyond the crest already exists. Given the cost involved in improving sight distance exiting the driveway, it is considered that no other action is recommended to mitigate the risk of the hazard occurring. Consideration should be given to forward funding the improvement to sight distance or removing select vegetation to improve sign distance south of the driveway. | *Rare*<br>*Serious*<br>**Medium** | | It is considered that the driveway approval be investigated with the landowner and council. |

| Audit Finding | Risk Ranking | Client Response | |
|---|---|---|---|
| | | Accept? | Comments |
|  | | | |
| **8. Sight distance at Driveway at Chainage 2100, 218 East Bank Road**<br>The driveway at chainage 2100 has poor site distance for drivers giving way to the left and for north bound traffic approaching the driveway.<br>The driver exiting may not anticipate an oncoming vehicle resulting in a side impact collision or a driver may swerve to avoid the outgoing vehicle, losing control and impact another hazard on the roadside.<br>It is recommended that signage be installed to warn northbound traffic of the potential for a vehicle exiting the driveway. Removing or pruning of vegetation on the southern side of the driveway could also improve sight lines when exiting the driveway.<br>  | *Rare*<br>*Fatal*<br><br>**High** | | The access arrangement for this property will be rectified as part of the proposed subdivision. |

| Audit Finding | Risk Ranking | Client Response | |
|---|---|---|---|
| | | Accept? | Comments |
| **9. Southbound Approach to Coramba Road Intersection**<br>There is no advanced warning on the southbound approach to Coramba Road intersection when travelling along East Bank Road.<br>A driver may not anticipate the existence of the intersection resulting in a collision with other vehicles manoeuvring through the intersection.<br>It is recommended that W2-14 (R) signage be installed for the East Bank Road southbound approach to the Coramba Road intersection.<br>  | *Rare*<br>*Serious*<br>**Medium** | | The client has advised that signage of this nature had existed and had since been knocked over or damaged by a travelling vehicle, with a post still existing. The sign should be reinstated by the road maintainer/owner. |
| **10. Roadside Hazards**<br>There are several roadside hazards along the alignment of East Bank Road that if impacted or traversed at speed will result in serious injury or be fatal. These hazards include non-frangible trees, steep non-traversable batter's steeper than 1 in 2.<br>A driver could lose control and roll their vehicle on a non-traversable batter and/or impact a tree.<br>Edge delineation and guideposts will reduce the risk of an incident at speed. Maintenance of the shoulders and removal of leaf litter will also improve wheel traction if a driver were to slightly veer off the road. Barriers could be considered at more severe locations, however given the length of road where hazards exist barriers along the full length may become cost prohibitive, so extra edge delineation or signage may be a feasible alternative. | *Possible*<br>*Fatal*<br>**Extreme** | | Edge delineation like guide posting is considered appropriate. Due to the diverse nature of the road users in the area, barrier guarding is not considered to be appropriate as it would represent an obstruction to the road users. |

| Audit Finding | Risk Ranking | Client Response | |
|---|---|---|---|
| | | Accept? | Comments |
|  | | | |

# 5. Concluding Statement

## 5.1 Identified Deficiencies

The audit process seeks to identify potential safety hazards. However, there is no guarantee that every deficiency has been identified. Further, even if all audit findings are addressed, this will not necessarily guarantee a safe site. Rather, addressing the findings of this report should improve the level of safety offered by the existing road network within the audit area.

As per **Section 4**, several deficiencies have been identified. The risk associated with each issue has been assessed. As per **Table 3.4**, any issue with a risk ranking of 'medium' should be corrected if the cost of treatment is moderate. Issues with a risk rating of 'high' or 'extreme' should be corrected or the risk significantly reduced even if the cost of treatment is high.

## 5.2 Responding to the Audit

As set out in the RSA guidelines, responsibility for the road design always rests with the client, and not with the auditor. A client is under no obligation to accept all the audit findings. Also, it is not the role of the auditor to agree to or approve of the client's response to the audit. Rather, the audit provides the opportunity to highlight potential problems and have them formally considered by the client, in conjunction with all other project considerations.

This formal RSA report should be responded to in writing, giving reasons for each rejection of an audit finding. Acceptance of a finding may require no further comment, but explanation of how or when the action will be taken may be useful. The audit response does not need to be provided to the audit team but should be kept on file as a record of due diligence.

## 5.3 Concluding Statement

Each member of the audit team has examined the documents provided and/or inspected the site as documented in this report. The audit has been carried out independently of the designers in accordance with Austroads *Guide to Road Design Part 6: Road Safety Audit* (2022). The audit has been carried out for the sole purpose of identifying any risks found within the audit scope which could be mitigated to improve the safety of the project. The risks and any associated mitigation measures have been recorded in this report for consideration by the client for implementation.

27 September 2023

John Starr (Audit Team Leader)

27 September 2023

Leon Petrohelos (Audit Team Member)

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