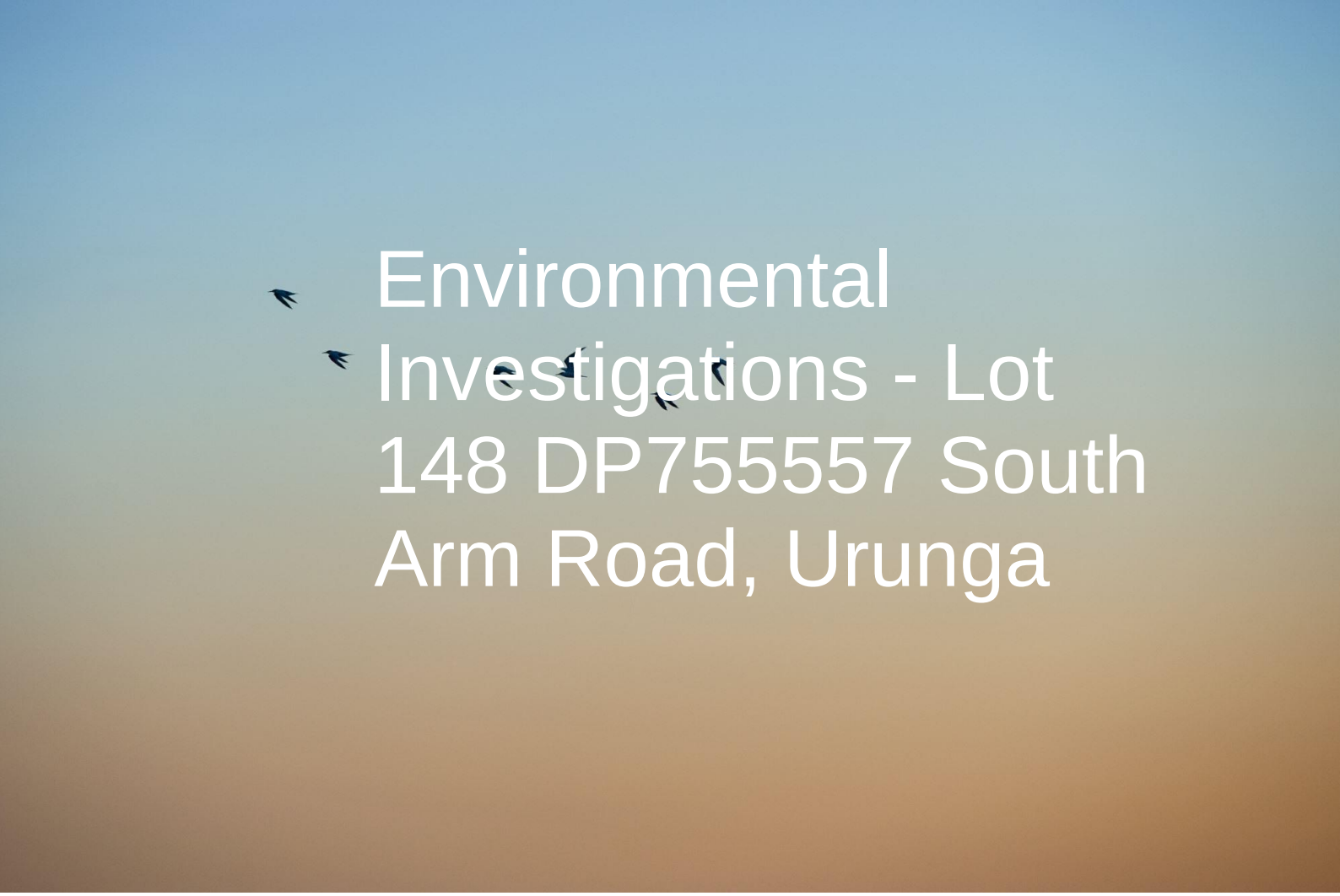

Environmental Investigations - Lot 148 DP755557 South Arm Road, Urunga

20 February 2024

For: Col, Joy & Shane Wood C/-Denis Atkinson Planning

Authored by: Strider Duerinckx

Ref	Ver	Date	Distribution
2021-258-02	A	29/11/21	Client, Planner
	B	8/8/22	Client, Planner
	C	20/2/24	Client, Planner
	D	15/11/24	Client, Planner

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1 Introduction

Earth Water Consulting Pty Limited (EWC) was engaged by Col, Joy & Shane Wood C/-Denis Atkinson Planning (the "Client") to undertake a preliminary Environmental Site Assessment (PESA), a Preliminary Acid Sulfate Soil (PASS) assessment and Wastewater Capability Assessment (WCA) for Lot 148 DP755557 South Arm Road, Urunga (the "Site") (Figure 1).

1.1 Objectives

The purpose of the environmental investigations were to provide sufficient preliminary information to support a planning proposal for the rezoning of the Site for a reduced minimum lot size of 1ha. These included:

- For the PESA:
    - Investigate the Site history and identify potentially contaminating activities that are currently being performed on the Site or that may have been performed on the Site in the past; and
    - Make a preliminary assessment of potential contamination issues for residential development based on the Site history review.
- The specific objective of the PASS investigation was to assess the risk of ASS being present that could be affected by the proposed development.
- The specific objective of the WCA is to provide confirmation of a 1ha minimum lot size would be sustainable for effluent land application.

1.2 Suitability to Undertake Works

Strider Duerinckx has project managed and signs off on this investigation. Strider is an environmental geologist with >20 years experience in contaminated sites, acid sulfate and wastewater investigations. Strider is a CEnvP (Site Contamination Specialist) accredited.

2 Proposed Development

It is understood that a planning proposal will be submitted to allow LEP rezoning to R5 of a 6.1ha portion of the 31.5ha property (Figure 2). It is expected that future subdivision would be undertaken to allow a future seven (7) lot rural residential subdivision of the R5 portion into lots of between 0.9-1.4ha. The preliminary lot layout is presented in Figure 2.

3 Scope of Work

3.1 PESA

This 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 banana cultivation and cattle tick dip sites registers;
    - Review of geology and hydrogeology including groundwater bores (risk of contamination migration); and
    - Review of environmental constraints such as groundwater dependent ecosystems (sensitive receptors).
- A site walkover of the Site to assess current layouts, surface conditions, presence hazardous building materials that may result subsurface contamination, and the presence of any obvious previous contaminating activities (such as current or historical fuel storage);
- Preparation of a Conceptual Site Model (CSM); and
- Presentation of this PESA report, including conclusions and recommendations on the contamination status of the property and suitability of the rezoning application and future subdivision.

3.2 PASS

The PASS investigation was undertaken in reference to the Acid Sulfate Soil Manual (ASSMAC, 1998). The scope of work included:

- A desktop review of surface, geology, hydrogeology, geomorphic and ASS risk conditions;
- A site inspection and walkover to assess for indicative ASS biomes and features;
- Drilling of four (4) boreholes;
- Collection of nine (9) soil samples at various soil profiles present and screening for ASS; and
- Preparation of this report which describes the results of our investigation.

3.3 WCA

The wastewater capability assessment utilised general site and soil constraints outlined in the DLG (1998) guideline. The scope of work included:

- A desktop review of topographical, geological, landscape features and vegetation features of the Site;
- A site inspection of typical landforms the future subdivision could occur on;
- Modelling of typical effluent application and development footprints; and
- Provision of a minimum lot size assessment including a plan of land available for onsite wastewater application.

4 Site Description

4.1 Site Identification

The Site is known as Lot 148 DP755557 and is approximately 31.5ha in area (Figure 1).

4.2 Location and Features

The Site is situated between the northern side of the Kalang River delineating Newry Island and the southern side of South Arm Road, Urunga. South Arm Road progresses southeast northwest along a ridgeline adjacent to the northern property boundary.

From the South Arm Road ridgeline, the groundsurface generally slopes down to the south and south-east on a series of small ridgeline spurs towards an intermittent drainage gully becoming a mapped wetland system. Situated parallel to the north of the Kalang River, a long ridgeline frames the southern boundary of the property with the groundsurface falling both south to the River and north towards the intermittent drainage and wetland system. Open grazing pasture occupies the ridges with remnant vegetation in the gullies and throughout the wetland system. An existing open shed is situated on the southern ridgeline towards the southeastern corner of the property.

4.3 Surrounding Land Use

The surrounding land use is detailed in **Table 1**.

Table 1: Surrounding Landuse

North	South	West	East
Open pasture remnant forest and wetland.	Kalang River and Newry Island rural residential.	Remnant forest and rural residential.	Open pasture and wetland system

5 Site Inspection

A site inspection was undertaken on 28 October 2021 by staff of EWC. During the inspections it was noted that:

- The existing shed with fenced boundary is modern with no Asbestos Containing Materials (ACM);
- Access is via an unsealed gravel driveway from the northwestern corner of the property which follows a ridgeline flanking the western property boundary.
- Stormwater from South Arm Road drains to multiple discharge zones to the south of the ridgeline;
- The forest area gullies are relatively untouched with no apparent rubbish or dump zones; and

- Swamp type vegetation is located low in the landscape close to the river height of <5mAHD.

Typical Site details are shown the following photographs.

Photograph 1 – Looking south from the north-western corner of the property towards intermittent drainage confluences, with the driveway occupying the tree line to the right.

Photograph 2 – Looking west along the southern ridgeline from the south-eastern corner of the property at the existing shed site

Photograph 3 – Looking north from the southern ridgeline across the wetland system in the mid ground and the northern ridgeline of South Arm Road in the background

Photograph 4 – Looking south from a ridgeline spur of the northern ridge of South Arm Road across the wetland system in the midground and the southern ridgeline in the background.

Photograph 5 – Looking north upslope from a ridgeline spur towards the northern ridgeline crest of South Arm Road

Photograph 6 – Looking north uplslope along a moderately sloping ridgeline spur situated in the north-eastern corner of the property connecting the northern ridgeline of South Arm Road

6 Geology, Hydrogeology and Topography

6.1 Topography

The property boundary on the South Arm Road ridgeline is situated at approximately 20.0mAHD and groundsurfaces fall to the south and southeast across a series of cleared ridgeline spurs and vegetated gullies towards a low lying intermittent drainage that becomes a mapped wetland in the middle of the property at approximately <4.0mAHD. The southern ridgeline parallel to the Kalang River is situated at approximately 19mAHD with groundsurfaces falling south to the River and north towards the intermittent drainage and wetland system

6.2 Geology

Based on the Coffs Harbour 1:25,000 Coastal Quaternary Geology Map, the northern ridgeline of South Arm Road and its associated ridgeline spurs and the southern ridgeline adjacent to the Kalang River are underlain by Palaeozoic aged sedimentary siltstones and minor conglomerates of the Bellingen Slate (Pnbf) formation. The low-lying wetland system of the Site is underlain by Undifferentiated Quaternary-aged sediments (Qu) including alluvial and swamp deposits, coastal sand and estuarine deposits.

6.3 Soils

We reviewed the Soil Landscapes of Central and Eastern NSW which indicates that the elevated sections of the Site made up by the ridgelines and spurs are underlain by erosional soils belonging to the Pine Creek Soil Landscape. The lower lying wetland areas of the Site are underlain by the swamp soils belonging to the Charlmont Soil Landscape.

6.4 Hydrogeology

No licensed groundwater bores are located on the Site. There are a number of registered groundwater bores clustered amongst the pre-existing rural land near the northwest corner of the Site, including:

- GW305496 (48.0m depth, domestic);
- GW303040 (36.0m depth, domestic and stock);
- GW051440 (11.9m depth, domestic and stock);
- GW054412 (9.4m depth, domestic and stock); and
- GW051274 552m (12.2m depth, stock).

There is a registered bore GW20510011 (unknown) in the rural residential area to the northeast of the Site.

Groundwater is expected at >20m depth on along the ridgelines of the Site underlain by clayey residual soils and bedrock.

6.5 Acid Sulfate Soils

We reviewed the Macksville 1:100,000 ASS Risk Map. This mapping indicates that the crests and slopes of the Site are mapped with negligible ASS risk (Class 5 buffer within 500m of mapped ASS) and the low-lying wetland area at <4mAHD is mapped with a high risk of occurrence 1m below ground level (Class 2 and 2a) (Figure 4).

7 Environmental Sensitivity

A number of comments and submissions were received on the initial Planning Proposal (PP) submission:

- The NSW DPI provided commentary on residential development in proximity to fish habitat (Ref C24/759, dated 29 September 2024). This response noted that:
    - SEPP Coastal Wetlands are key fish habitat which would constitute Type 1/Class 1 key fish habitat. A 50-100m buffer is recommended between residential developments and Type 1 fish habitat;
    - The increase in residential development may also impact on priority oyster aquaculture areas with a referral buffer to DPI of 200m development within 200m to mapped POAA waterways.
- The NSW DCCEEW provided a commentary (Ref DOC24/745774-15 undated) on the proposed development in relation to High Environmental Value (HEV) areas and flooding.

A review of SEPP Resilience and Hazards (2021) has been undertaken by EWC:

- Part 2.2 Div 1 Coastal wetlands and littoral Rainforests area covers a portion of the Site as presented in Figure 2, with no developed portions covering the wetland, and development on land covered by the proximity layer (s2.8). Under s2.8 development must be assessed for no significant impact on the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest;
- The Site is not covered by coastal vulnerability area;
- The Site is covered by the coastal environmental area (s2.10);
    - Under s2.10 development must be assessed for no adverse impact on the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment, coastal environmental values and natural coastal processes, the water quality of the marine estate, in particular the cumulative impacts of the proposed development on any of the sensitive coastal lakes, marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms, existing public open space and safe access to and along the foreshore, beach, headland

or rock platform for members of the public, including persons with a disability, aboriginal cultural heritage, practices and places, the use of the surf zone; and

- If adverse impact cannot be reasonably avoided the consent authority must assess how the development can be modified to manage the impact or minimise the impact.

The impact of contamination, ASS and onsite wastewater application in respect of the environmental sensitivity are addressed in the following sections.

8 PESA Site History

8.1 Previous Environmental Investigations

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

8.2 Aerial Photographs

A review of aerial photographs from 1956-2019 was undertaken, and the results are summarised in Table 2. Aerials pre 1956 are not available in the region.

Table 2: **No. 9 Aerial Photograph Review**

Year	Site	Surrounding Land
1956	The Site is extensively cleared of forested areas within elevations suitable for grazing. Majority of gullies and wetland areas on lower elevations are vegetated by remnant shrub and trees. Riparian vegetation on the northern bank of the Kalang River is evident.	To the north, Lot 200 is extensively cleared with a dwelling and associated farm shed on the southern side of South Arm Road. To the east, cleared low lying alluvial floodplains adjacent to the Kalang River. To the south, cleared alluvial floodplains on Newry Island with no riparian vegetation on the southern bank of the Kalang River. Under grazing operation. To the west, remnant forest vegetation and backswamp.
1967	Minor vegetation regeneration of previously cleared areas. Linear clearance of vegetation for above ground power running north-east from the southwestern corner.	Minor vegetation regeneration of previously cleared Lot 200.
1973	Further clearing and thinning of regeneration as seen in 1967 and of existing vegetation across the Site including of ridgeline spur gullies.	Further clearing and thinning of regeneration as seen in 1967 and of existing vegetation across Lot 200.

Year	Site	Surrounding Land
1980	Moderate vegetation regrowth of previously cleared gullies and low-lying intermittent drainages.	Minor vegetation regrowth of previously cleared areas on Lot 200. Clearing adjacent to the northwestern corner of the Site and a residential dwelling and shed structure south of the South Arm Road ridgeline. Additional residential dwellings approximately 500m to the north.
1989	Continued vegetation regeneration and regrowth of gullies.	Further clearing towards to the northwestern corner of the Site. Continued vegetation regeneration and regrowth of Lot 200. Subdivision and residential development of Newry Island land to the north-east.
1994	As above. No changes evident.	Continued vegetation regeneration and regrowth on Lot 200 to the north. Further residential development to the north adjacent to South Arm Road. Addition of Riverside Drive to the north-east with residential development not yet initiated. Large water tank to the far north in the state forest.
2004	Moderate vegetation regeneration and regrowth across the Site	Continued significant vegetation regeneration and regrowth on Lot 200. Significant residential development on Riverside Drive and adjacent to the South Arm Road (>20 dwellings). Further residential development to the far North of the Site.
2010	As above. No changes evident.	Minor clearing and thinning of vegetation on Lot 200 ridgeline spurs.
2015	As above. No changes evident.	Minor clearing and thinning of vegetation on Lot 200 ridgeline spurs. Construction underway for the Nambucca Heads to Urunga Pacific Highway Upgrade Project (NH2U) to the northwest.

Year	Site	Surrounding Land
2019	As above. No changes evident. Slashing of paddocks evident.	Addition of a corrugated farm shed in Lot 200 to the north. Construction of four large dwellings on the primary ridgeline adjacent to South Arm Road to the north of the Site.
2020	As above. No changes evident.	Construction of one large dwelling on the primary ridgeline adjacent to South Arm Road to the north of the Site.
2021	Construction of a shed on the southern ridgeline.	As above.

8.3 NSW EPA Records

A search of the NSW EPA's contaminated land record revealed no investigation or remediation notices have been issued on the Site 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 indicated that no current licenses have been held for potentially contaminating activities on the Site or adjacent lots, nor notices issued.

Surrendered activities include former Licensed activities pertaining to application of herbicides on waterways throughout the Bellingen Shire and NSW. Similarly, former Licensed activities pertaining to ceased road construction for the Nambucca Heads to Urunga Pacific Highway Upgrade project which is adjacent to Lot 200 to the north of the Site have been surrendered.

8.4 Other Contaminating Sites

The Site is not known to have been nor located adjacent to any known Defence sites, former gasworks, PFAS contaminated, loose fill asbestos insulation registered, dry cleaners, fire rescue, gas terminals, liquid fuel depots, active mines or quarries, derelict mines, petrol stations, power stations, electrical substations, telephone exchanges, active or historical waste management facilities (landfills) or wastewater treatment facilities.

A current licensed activity for waste disposal (EPL 5896) is held by the Bellingen Shire Council for the operation of the Raleigh Waste Management Centre which is located approximately 2,700m north of the Site. No risk is associated with this facility.

A lapsed license for a demolished cattle tick dip site was situated to the northeast of the site at >1,000m on Short Cut Road which expired in 1937.

8.5 Historical ownership

A search of historical owners was undertaken of the Site. The results are summarised in **Table 2**, and the results are included in Appendix A.

Table 3: Historical Ownership for Lot 148 DP755557

Date of Acquisition and term held	Registered Proprietor(s)
16.05.1907 (1907 to 1926)	James Henderson
15.01.1926 (1926 to 1953)	France Tyson
29.04.1953 (1953 to 1963)	Cecil Tyson (School Teacher) Eunice Elma Lois Jackson (Married Woman) (Re the Estate of France Tyson)
21.09.1963 (1963 to 1965)	Douglas George Menz
08.09.1965 (1965 to 1966)	William Henry Willett (Farmer)
19.08.1966 (1966 to 1969)	Archibald Stewart Crombie (Farmer)
28.05.1969 (1969 to 1973)	Roy Gordon Riddel (Dentist) Joyce Eirene Riddel (Married Woman)
17.01.1973 (1973 to 1977)	Roy Gordon Riddel (Dentist)
29.03.1977 (1977 to 2020)	Susan Elizabeth Riddel (Nursing Sister) Now Susan Elizabeth Geraldine Sheehy Robert Bruce Riddel (Plumber)
15.04.2020 (2020 to date)	Shane Anthony Wood Elaine Joy Wood Colin Mervyn Wood

8.6 Summary of Site History

The historical review has identified that the Site underwent extensive clearing in potential grazing areas prior to 1956 with succeeding cycles of regeneration and clearing leading to present vegetated gullies and cleared ridges. A sole open sided shed was constructed in 2021 and exists on the site. The elevated land has typically been subject to cattle grazing with lower lying areas remaining vegetated. First recorded land acquisition was in 1907, and current acquisition was in 2020.

Surrounding farmland has been subject to similar land clearing patterns to the Site. Periods of residential development in surrounding areas commenced since 1989 and have spiked since 2019 where land has become available.

There is no evidence of agricultural use of the Site, and an inferred private forestry use or grazing has been undertaken on the property since at least the 1950's.

9 PESA Check Sampling

9.1 Potential Areas and Contaminants of Concern

Based on the site history and a walkover, for the planning proposal LEP rezoning change, no Areas of Environmental Concern (AECs) and associated Contaminants of Concern (CoC) were identified that would impact on the proposed development.

Potential for contamination due to agricultural grazing and associated activities was investigated with the collection of three check samples. Two check samples were collected on ridgeline spurs connecting to the northern ridge of South Arm Road and one check sample was collected on the southern ridgeline parallel to the Kalang River. Samples were analysed for generic Contaminants of Concern (CoC) for grazing use (Figure 3).

Table 4: Areas of Environmental Concern

AEC	CoC
Residential development	heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), OCP and Organophosphorus Pesticides (OPP).

9.2 Investigation Criteria

The investigation criteria adopted for this PESA are health-based investigation levels for residential sites with access to soil for home grown vegetables at less than the 10% of the daily intake, provided in NEPM (NEPC 2013) Guidelines. In addition, Environmental Investigation Levels (EILs) are adopted based on background concentrations tested from nearby properties. The investigation criteria are shown in the attached Table LR1.

9.3 Sampling Methodology

Samples were collected from 0-150mm depth into laboratory supplied glass jars with Teflon lids. 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 Eurofins Laboratory for analysis. The laboratory reports are included in Appendix B.

9.4 Analytical Results

The soil analytical results are summarised in the attached Table LR1. Comparison of discrete sample results to the investigation criteria indicated that:

- Concentrations of OCP and OPP were reported below the laboratory Limit of Reporting (LOR) for all samples; and
- Concentrations of Cadmium, Mercury and Nickel were all reported below the laboratory LOR, and concentrations of Arsenic, Chromium, Copper, Lead and Zinc were reported above the LOR but well below the Investigation Criteria for all samples analysed.

The analytical results confirm the generally unimpacted status of the property.

10 ASS Investigations

10.1 Biophysical Indicators

The desktop review indicated that potential dwelling allotments will be underlain by sedimentary bedrock and the resultant residual clay loam soils. An inspection of the area confirms no salt scalding or salt tolerant vegetation are present in the proposed building envelopes, no apparent shallow groundwater, and wet eucalypt type forest vegetation is present at the lower slopes and gullies towards low lying alluvial swamp.

Potential ASS has been mapped in the low-lying wetland area extending from the eastern boundary to the middle of the Site. All low-lying areas are not expected to be developed as these are also flood prone so restricted by Bellingen Shire Council DCP 2017.

10.2 Subsurface Conditions

Site soils were observed by drilling four (4) boreholes (BH1, BH2, BH3 and BH4) to a maximum depth of 1.2m depth using a powered auger. Borehole locations are shown in Figure 3, and a copy of the borehole logs are presented in Appendix C.

Natural residual soil profiles were observed in the borehole, and were found to be representative of the Pine Creek Soil Landscape, with a shallow topsoil layer underlain by orange to white clay.

Jarosite mottling was not observed in the natural soils. No rotten egg odours, shell pieces, dark grey to black anaerobic soils or muds were encountered.

No groundwater inflow was observed in the borehole to the depth drilled.

10.3 ASS Screening Test Results

Nine soil samples were collected and selected for field screening tests to determine their likelihood of containing Potential or Actual ASS (Pass/Aass) and whether further laboratory analyses would be necessary. The selected soil samples were placed in a chilled container (~4 C) and only removed when analysis was conducted.

Samples were forwarded to Eurofins-MGT for initial screening analysis. The lab report is included in Appendix B. In summary:

- The pH_f of analysed samples ranged from 4.9-6.0. These indicate no Aass are present;
- The pH_{fox} of all analysed samples ranged between 3.3-4.4. The results indicate that no Pass are present; and
- The rate of reaction and pH change from ph_f to pH_{fox} was moderate (2.0) for all samples with the exception of (ASS1 0-0.2) which yielded an extreme reaction (4.0). An extreme reaction with hydrogen peroxide is common in shallow organic rich topsoils and does not indicate the presence of ASS.

Coastal soils are naturally acidic and the regional vegetation is adapted to acidic conditions. The field screening confirms that shallow soil disturbance in the area of the proposed dwellings will not disturb ASS.

No further investigations or ASS management area required for the proposed subdivision to proceed.

11 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.

11.1 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, watercourses, littoral rainforests and wetlands;
- 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 5), and the available area compared to the wastewater envelope required.

11.2 Assumed OSMS

Secondary treatment was selected as default due to the environmental sensitivity of the South Arm Road area.

Water and nutrient balance modelling was undertaken (Appendix D) to assess a typical require wastewater Effluent Management Area (EMA). Based on a typical 4 bedroom dwelling a minimum footprint of 446m^2 is required for sustainable on-site wastewater land application base don the hydraulic and nutrient loading. Allowing for a reserve area of equal footprint, this equates to 892m^2 total wastewater envelope required for general assessment purposes.

11.3 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.

11.4 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 9,530-9,888m^2 and are situated on the northern side of the South Arm Road ridgeline.

Table 5: Comparative Lots Assessed

Address	Lot Area (m^2)
180 South Arm Road	9,530
186 South Arm Road	9,540
194 South Arm Road	9,650
200 South Arm Road	9,888

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.

11.5 MLS Assessed Available EMA

Table 6 and Figure 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. (%)	>892m^2 Area Available for EMA?
180	9,530	3,745	6,840	2,686	39	Yes
186	9,540	2,270	5,833	3,705	64	Yes
194	9,650	1,933	5,517	3,576	65	Yes
200	9,888	1,833	6,870	3,044	44	Yes

1. House, driveway, shed etc
2. Includes developed area, protected vegetation and buffers to waterways and boundaries

11.6 Onsite Wastewater Impacts on Sensitive Environments

An assessment of the effect of on-site wastewater application at the Site following rezoning is presented in **Table 7** below.

Table 7: Environmental Sensitivity

Guideline	Comment
NSW DPI (2023): On-site wastewater systems should: • have disinfection; • have sub-surface dispersal of effluent; • be located on hill crests or convex slopes; • be greater than 100 metres from waterways; • have a minimum depth of 600 millimetres to the water table; • have high sun and wind exposure; and • be located so as to not be affected by flooding, surface wetness or erosion.	The recommended EMAs for the proposed planning proposal rezoning for 7 lots are all secondary treated with disinfection, utilise subsurface irrigation for land application, are located on slopes that are open paddock and not eroding, >100m to the Kalang River, not flood prone, and have >0.6m of depth to groundwater.

Guideline	Comment
The NSW DPI commentary on residential development in proximity to fish habitat (Ref C24/759, dated 29 September 2024): • A 50-100m buffer is recommended between residential developments and Type 1 fish habitat;	DLG (1998) Guidelines recommend a minimum buffer of 40m be utilised from on-site wastewater land application to intermittent waterways. The coastal swamp is intermittent and 40m is achievable. Appendix R of AS/NZS1547:2012 provides for risk assessments on various landscape features including surface waters of 15-100m. A risk assessment has been undertaken (Appendix E) and a "moderate" risk to the downslope wetland has been assessed with a suitable buffer of 25m. 40m is available. A water and nutrient balance suggests that there is ample area on the property for secondary treated and disinfected wastewater to be land applied to manage the hydraulic and nutrient loading from future dwellings.
SEPP Resilience and Hazards (2021), Part 2.2 Div 1, s2.8 Coastal Wetlands and Littoral Rainforests Proximity zone: • No significant impact on the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest; or • No significant impact on the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.	As per comments in response to the DPI (above) the proposed wastewater EMAs sit outside the DLG (1998) Guideline setbacks to intermittent waterways, outside the AS/NZS1547:2012 risk assessed setbacks to intermittent and permanent waterways, and between 935-4328m2 of EMA is available whilst hydraulic and nutrient balance modelling suggests only 446m^2 is required for sustainable effluent application (doubled to 892m^2 for duplication of the area for reserve). As such no significant impact on the adjacent wetland or littoral rainforest is expected. Groundwater is not a significant receptor at the Site and is located at >9.4m depth. As such, significant groundwater impacts are not expected.
SEPP Resilience and Hazards (2021), Part 2.2 Div 1, s2.10 Coastal Environmental Area: • No adverse impact on the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment;	Secondary treated effluent with disinfection is proposed, with land application based on sustainable soil loading rates, with modelled rainfall and evaporation water balance, and 50 year lifecycle nutrient balance models, not on flood prone land, and with setbacks that meet published guidelines and risk assessed

Guideline	Comment
• No adverse impact on the coastal environmental values and natural coastal processes, the water quality of the marine estate, in particular the cumulative impacts of the proposed development on any of the sensitive coastal lakes, marine vegetation; native vegetation and fauna and their habitats, undeveloped headlands and rock platforms.	standards. As such, an adverse impact on the coastal environmental values is not expected. No coastal lakes are present downstream, and the proposed OSMS meets the DPI Guideline for OSMS's in vicinity of POAAs.

12 Conclusions and Recommendations

The PESA has identified that the Site has no significant Areas of Environmental Concern or Contaminants of Concern that would impact the proposed residential subdivision. Check sampling confirmed that shallow soil concentrations of heavy metals are very low and within expected background ranges, and no pesticide contamination is present.

The ASS investigation confirmed that residual clay soils are located beneath the existing dwellings and surrounds, with mapped low probability ASS risk only present in the low-lying wetland portion of the Site well away from the proposed subdivision building envelopes. Field screening and biophysical indicators confirm no ASS.

Having undertaken a minimum lot size and land capability assessment for the proposed subdivision of Lot 1 148 DP755557 South Arm Road, Urunga, EWC consider that there is the opportunity for the sustainable application of wastewater following subdivision of the existing properties into smaller lots of ~1ha.

We recommend that a Land Capability Assessment (LCA) is undertaken during development application for the subdivision. The LCA would be a detailed site and soil assessment to AS/NZS1547:2012 and present refined wastewater envelopes for each lot.

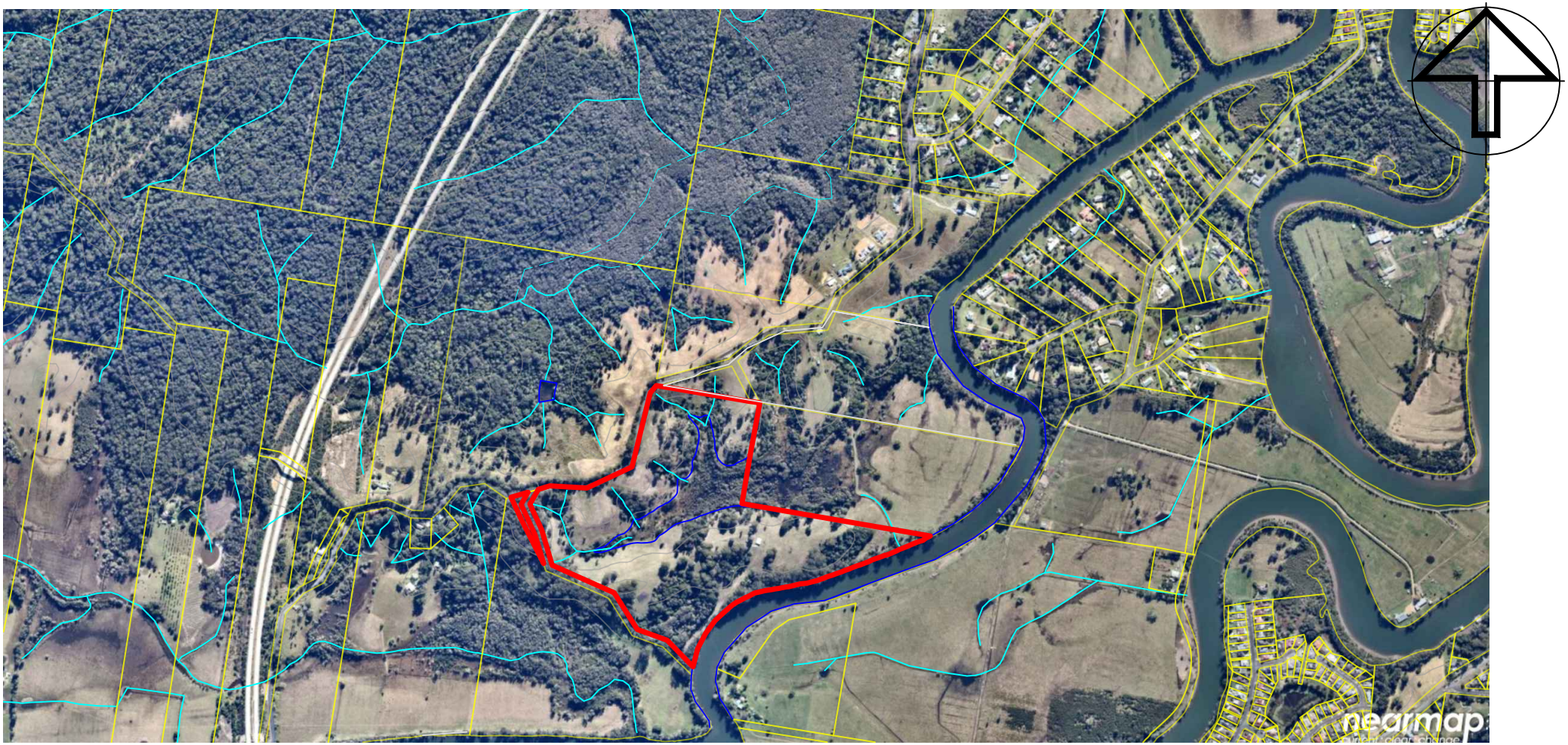
13 References

ASSMAC, *Acid Sulfate Soil Manual.* Acid Sulfate Soils Management Advisory Committee, August 1998.

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. 2020. *Consultants Reporting on Contaminated Land*. NSW Environment Protection Authority.

FIGURES



0 300 600 900

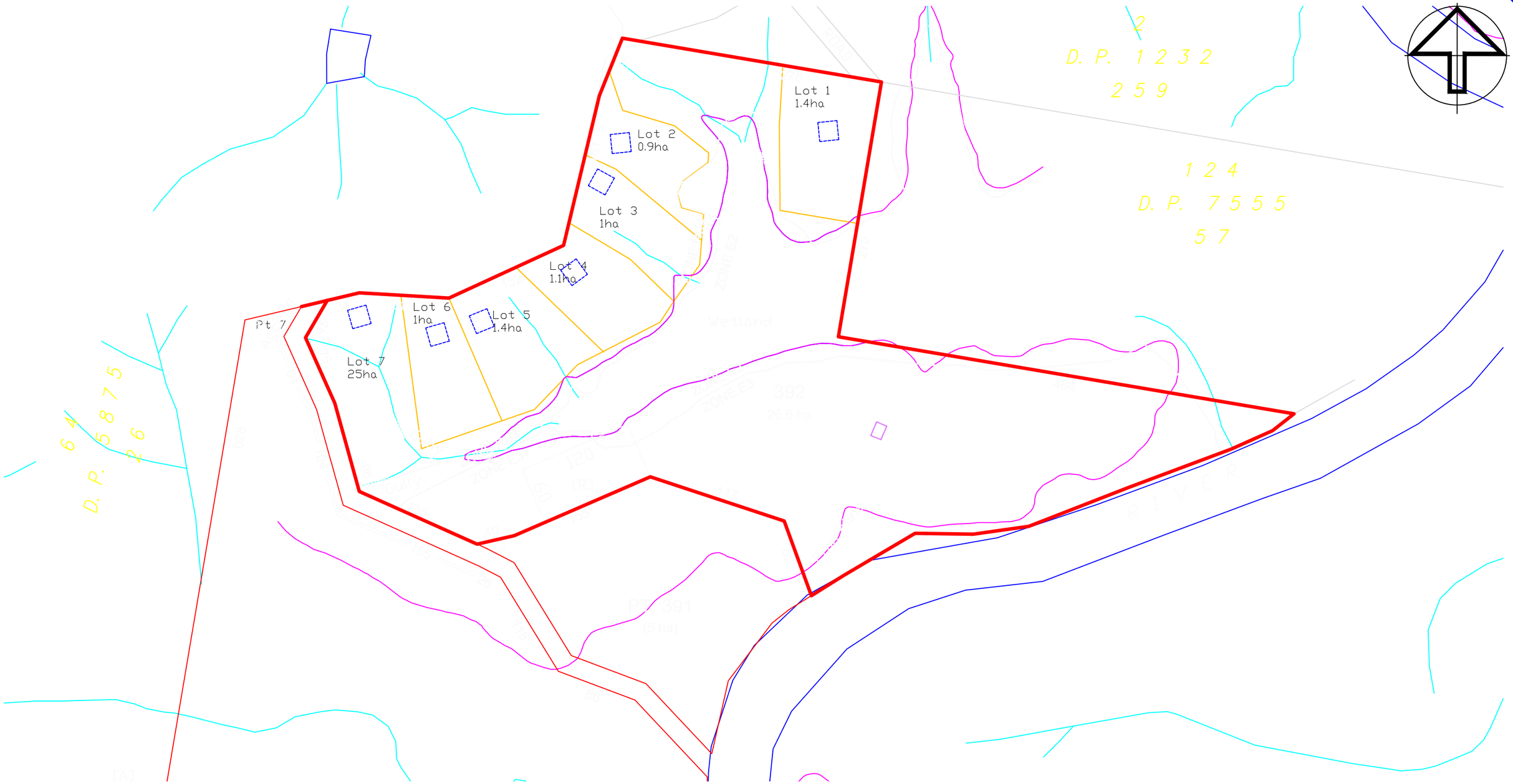
Horizontal Scale (metres) 1:15000

EARTH WATER CONSULTING

LEGEND

- Property Boundary
- Contour (10m)
- Drainage Alignment

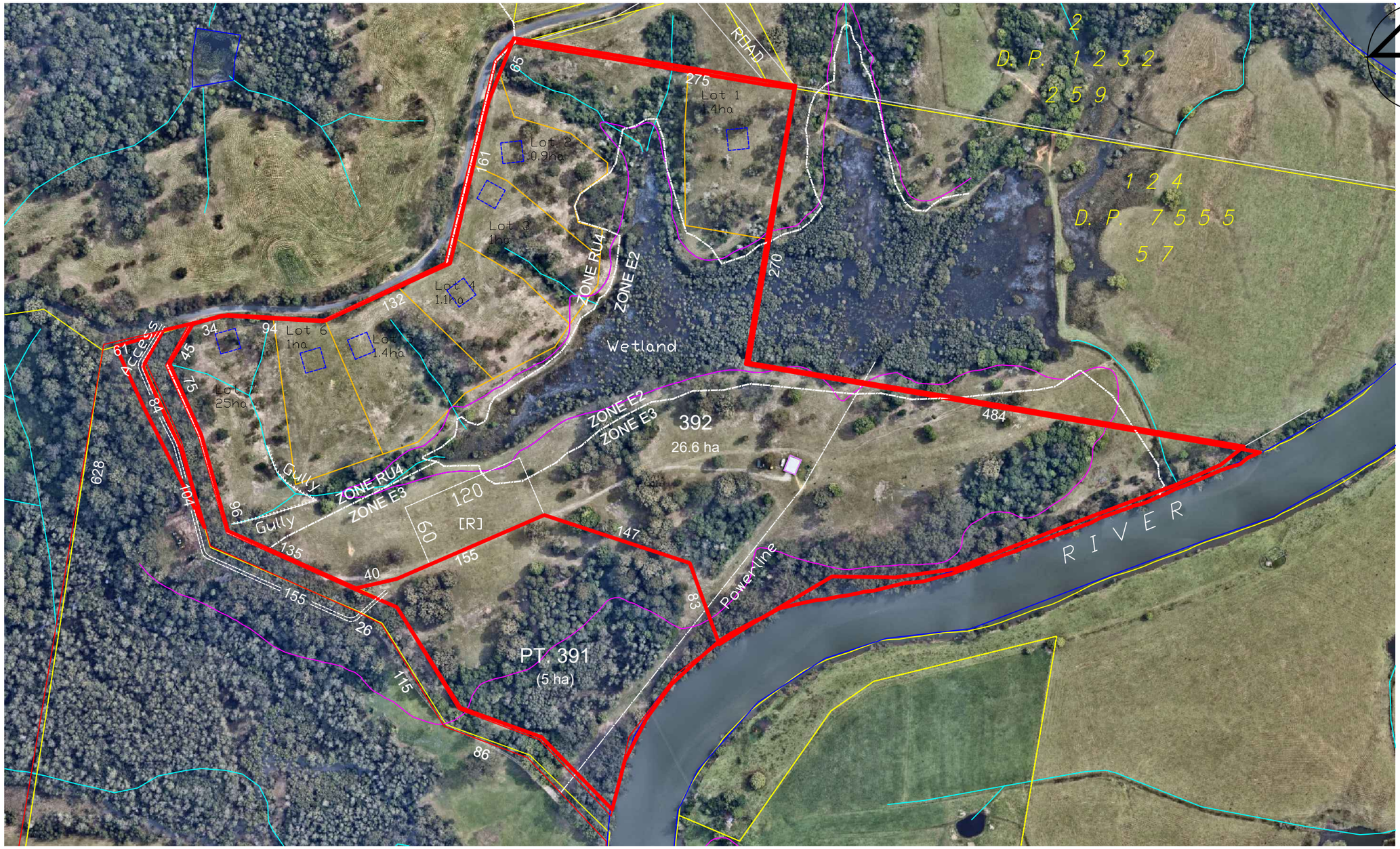
TITLE: Site Location			PROJECT: Environmental Investigations for Lot 148 DP755557 South Arm Rd, Urunga		CLIENT: Joy, Col and Shane Wood
FIGURE: Figure 1					
SHEET: 1 OF 1	ISSUE: C	AUTHOR: SD	DATE: 19/2/24	SCALE: 1:15,000	PROJECT: 2021-258



LEGEND

- Property Boundary
- Drainage Alignment
- 1in100 Flood Extents
- Expected Subdivision Boundary
- Expected Building Envelope

TITLE: Proposed Rezoning and Subdivision			FIGURE: Figure 2
			SHEET: 1 OF 2 / ISSUE: D
PROJECT: Environmental Investigations for Lot 148 DP755557 South Arm Rd, Urunga			CLIENT: Joy, Col and Shane Wood
AUTHOR: SD	DATE: 14/11/24	SCALE: 1:4000	PROJECT: 2021-258



0 100 200

Horizontal Scale (metres) 1:4000

EARTH WATER CONSULTING

LEGEND

- Property Boundary
- Drainage Alignment
- 1in100 Flood Extents
- Expected Subdivision Boundary
- Expected Building Envelope

TITLE: Proposed Rezoning and Subdivision			FIGURE: Figure 2
			SHEET: 2 OF 2 / ISSUE: D
PROJECT: Environmental Investigations for Lot 148 DP755557 South Arm Rd, Urunga			CLIENT: Joy, Col and Shane Wood
AUTHOR: SD	DATE: 14/11/24	SCALE: 1:4000	PROJECT: 2021-258

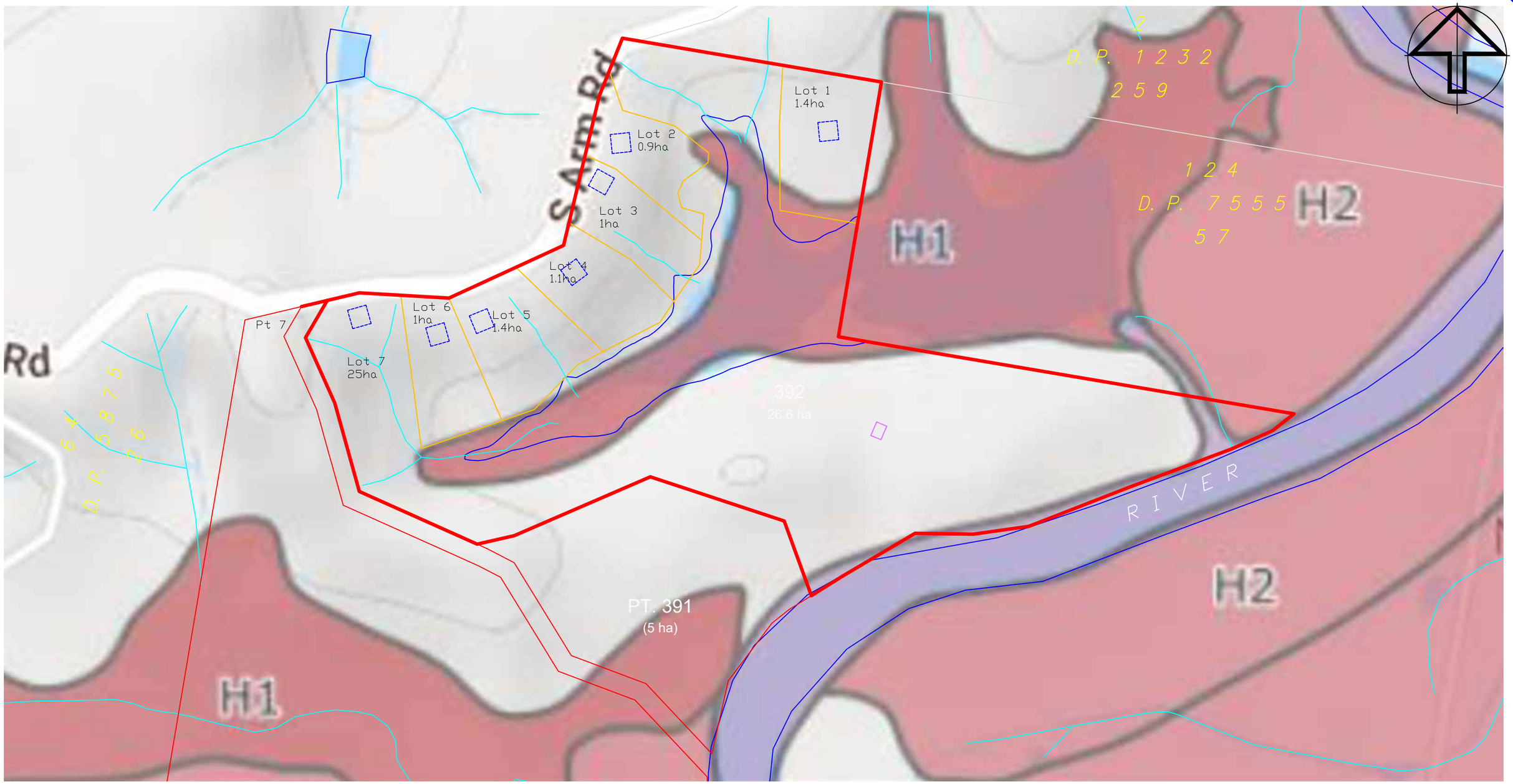
0 100 200

Horizontal Scale (metres) 1:4000

LEGEND

- Property Boundaries
- Adjacent Lots
- Intermittent waterways
- Dams or River
- Contour (2m)
- BDV Mapping Line
- Approx Borehole/Sample Location

TITLE: Existing Site Layout and Sample Locations			FIGURE: Figure 3
			SHEET: 1 OF1 ISSUE: D
PROJECT: Environmental Investigations for Lot 148 DP755557 South Arm Rd, Urunga			CLIENT: Joy, Col and Shane Wood
AUTHOR: SD	DATE: 14/11/24	SCALE: 1:4000	PROJECT: 2021-258



0 100 200

Horizontal Scale (metres) 1:4000

EARTH WATER CONSULTING

LEGEND

- Property Boundary
- Drainage Alignment
- Dam
- Contour Line (20m)
- ASS Class

TITLE: ASS Risk Mapping			FIGURE: Figure 4
			SHEET: 1 OF1 ISSUE: D
PROJECT: Environmental Investigations for Lot 148 DP755557 South Arm Rd, Urunga			CLIENT: Joy, Col and Shane Wood
AUTHOR: SD	DATE: 14/11/24	SCALE: 1:4000	PROJECT: 2021-258

0 40 60 80

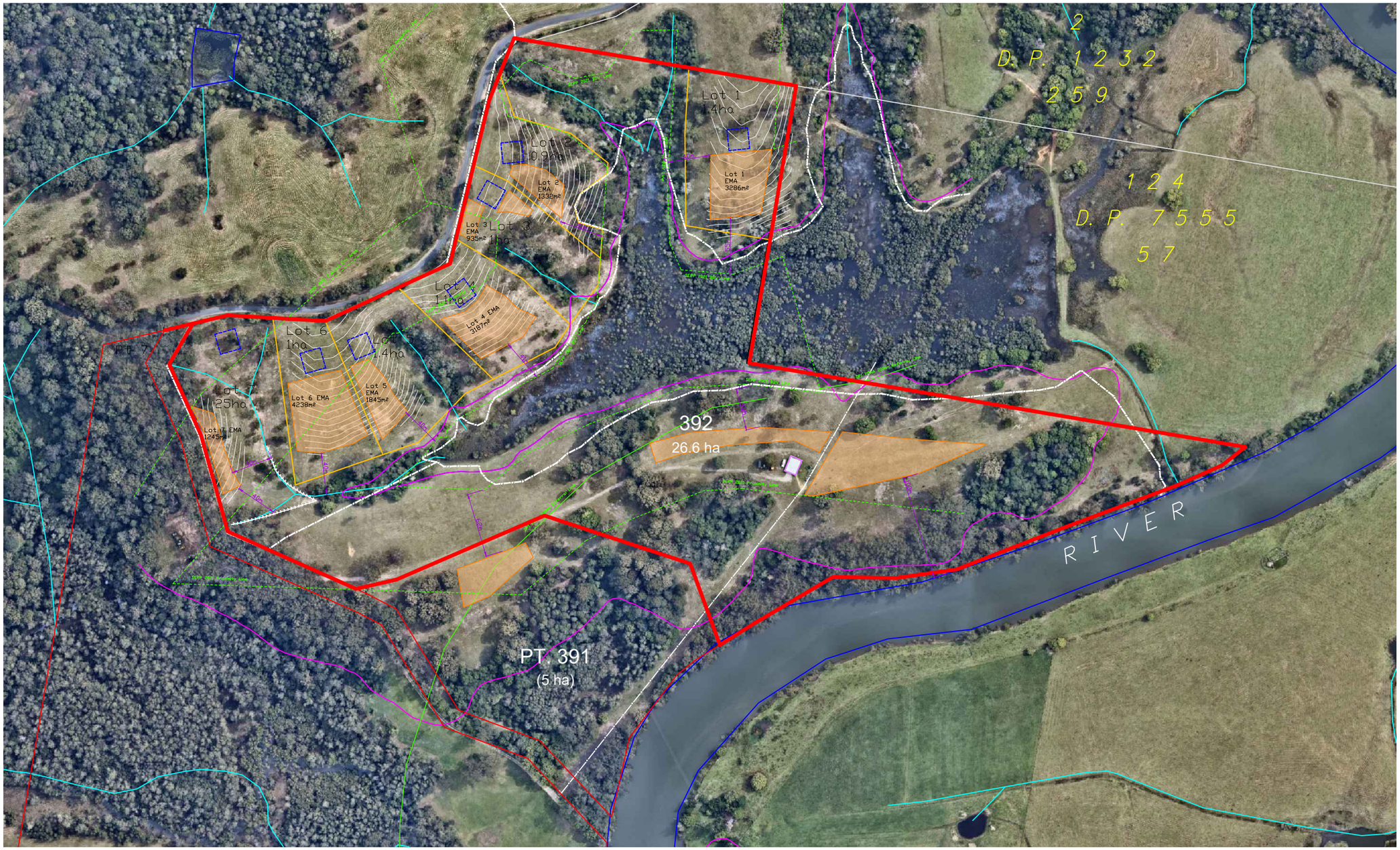
Horizontal Scale (metres) 1:2000

LEGEND

- Property Boundary
- Adjacent Lot
- Drainage Alignment
- Contour (2m)
- EMA Restricted Area
- EMA Available Area

EARTH WATER CONSULTING

TITLE: Comparative Lot Size Constraints			FIGURE: Figure 5
			SHEET: 1 OF1 ISSUE: C
PROJECT: Environmental Investigations for Lot 148 DP755557 South Arm Rd, Urunga			CLIENT: Joy, Col and Shane Wood
AUTHOR: SD	DATE: 19/2/24	SCALE: 1:2000	PROJECT: 2021-258



0 100 200

Horizontal Scale (metres) 1:4000

LEGEND

- Property Boundaries
- Intermittent Waterways
- Dams
- 1in100 Flood Level
- Areas Available for Application of Wastewater

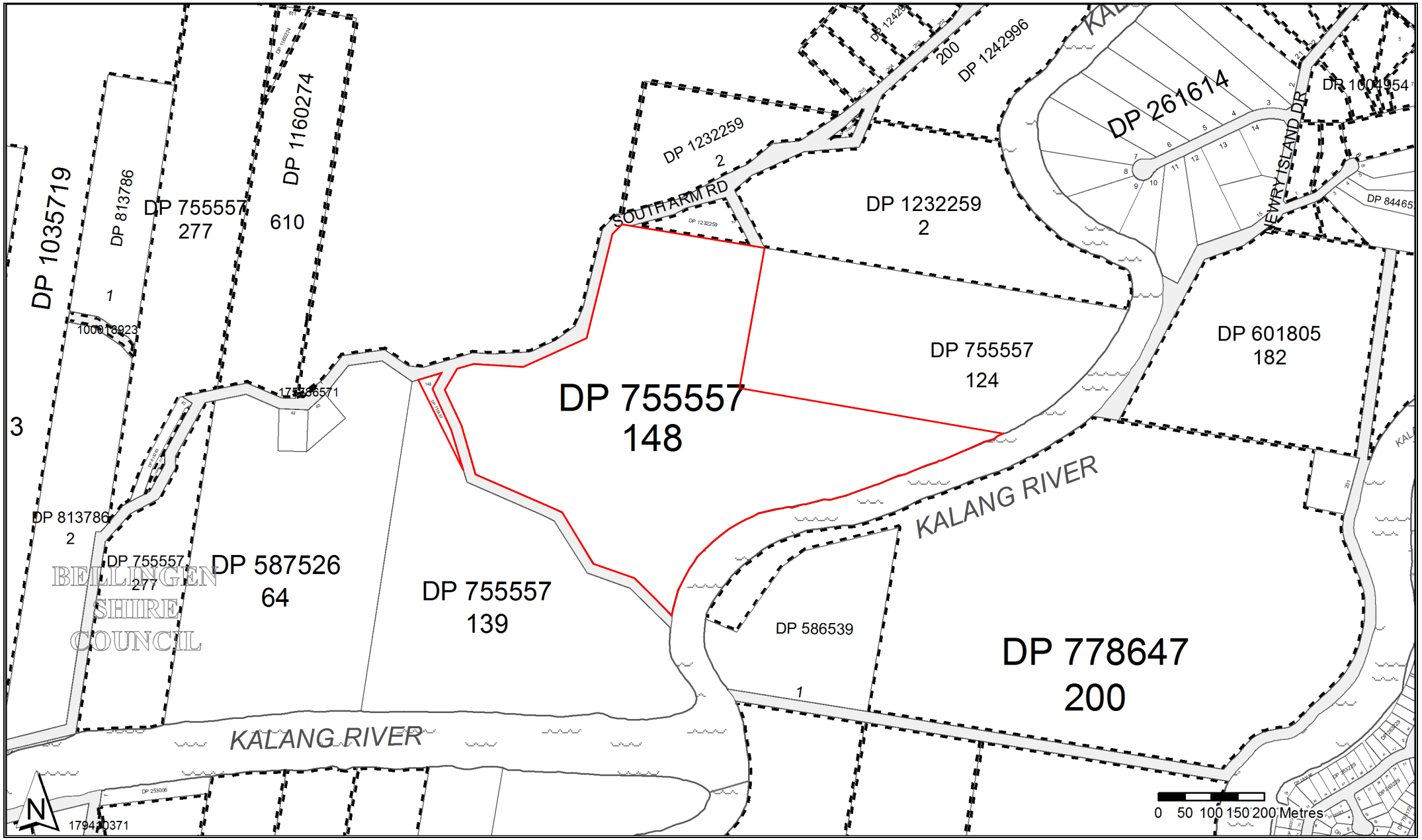
TITLE: Available Wastewater Envelopes			FIGURE: Figure 6
			SHEET: 1 OF1 ISSUE: D
PROJECT: Environmental Investigations for Lot 148 DP755557 South Arm Rd, Urunga			CLIENT: Joy, Col and Shane Wood
AUTHOR: SD	DATE: 14/11/24	SCALE: 1:4000	PROJECT: 2021-258

APPENDIX A

Cadastral Records Enquiry Report : Lot 148 DP 755557

Ref : LS026369_AS - 313 South Arm

Locality : URUNGA
Parish : SOUTH BELLINGEN
LGA : BELLINGEN
County : RALEIGH



Report Generated 11:28:52 AM, 16 November, 2021
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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

Req:R911281 /Doc:CP 01074-1714 P /Rev:25-Nov-2012 /NSW LRS /Prt:16-Nov-2021 11:26 /Seq:1 of 1
© Office of the Registrar-General /Src:INFOTRACK /Ref:LS026369_AS - 313 South Arm

Amended Survey

L. B. BELLINGEN.

93/2239

PLAN OF PORTIONS 139. 148

County of Raleigh   Parish of South Bellingen

LAND DISTRICT OF ~~KEMPSEY~~ Bellingen LAND BOARD DISTRICT OF GRAFTON

~~Resumed Area №~~ ~~Pastoral Holding~~. Eastern Division.

~~Applied for under the Section of the Crown Lands Act of 188 by~~

~~Por. № C.P. № 9~~ / This plan has been prepared in D.S. Office from data supplied on plan R449.1714 and Sketch plan with papers LB.93-2239

~~Por. № C.L. № 9~~ /

Cancels R449.1714

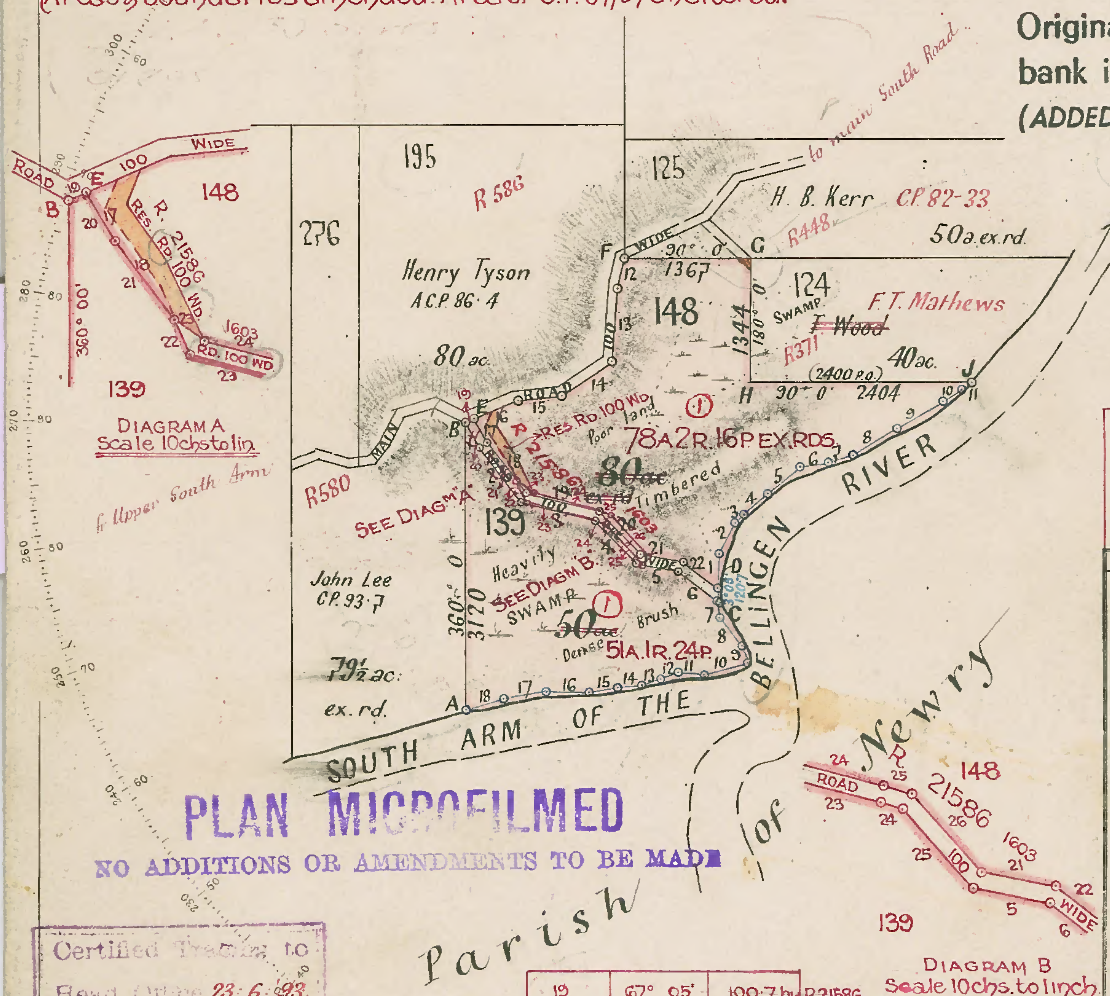
① Pors 139 & 148 C.P. 07·97 of 16th May James Henderson Now Cecil Tyson and Eunice Elma Lois Jackson. Sale completed. Sls.49-4079.

The west boundary of portion 139 and northern boundaries of portion 148 re-marked 3rd Oct 07 by L.S. H.A. Evans LB 07.4424

1ac. 1r. 24p. resumed from portion 148 for road R.21586 1603 & 1ac. 1r. 24p added to portion 139 Gaz. 22.11.1940 R.38/328. Areas & boundaries amended. Area of C.P. 07/97 unaltered.

Within the Urara Gold Field Proclaimed 12th Aug 1881, partly open to Conditional Purchase

Original plan indicates bank is the portion boundary (ADDED FOR MICROFILM PURPOSES)



PLAN MICROFILMED
NO ADDITIONS OR AMENDMENTS TO BE MADE

Certified Tracing to Head Office 23:6:93

Parish

Azimuth taken from Por. 124

Field Book Vol. ...... Folio

Reference to Corners

Corner	Bearing	From	Links	№ on Tree
A	328° 45	Ironbark	5½	139. 276
B	344° 23	Gum	19	139. 276
C	Gum on corner			139
D	356° 05	Gum	133	148
E	56° 43	Gum	105	148
F	281° 55	Blackbutt	50	125. 148
G	90° 00	Tallowwood	38	124. 148
H	352° 00'	Blackbutt	13½	124. 148
J	242° 00	Tea-tree	7	124. 148

Value of Improvements

1074-1714

19	67° 05'	100·7 by R21586 1603
20	150° 20'	303.0
21	143° 06'	537·1 Caln.
22	154° 54'	233·8 Caln.
23	104° 29'	772·7 Caln.
24	107° 48'	127·5 Caln.
25	138° 50'	574·9 Caln.

Portion № 139 Reference to Traverse

Line	Bearing	Distance
~~1~~	~~150° 20'~~	~~321~~
2	143° 06'	719
3	103° 58'	823
~~4~~	~~135° 30'~~	~~651~~
5	101° 00'	~~494~~ 425·5 Caln.
6	127° 10'	521-550 cor.
7	171° 49	204
8	145° 20'	376
9	157° 45'	176
10	255° 30'	493
11	274° 00'	275
12	253° 00'	214
13	249° 35'	198
14	264° 30'	269
15	260° 39'	318
16	270° 15'	459
17	259° 30'	470
18	253° 16'	427

23	126° 43'	211·8 Caln
24	104° 29'	728·5 by R.21586 1603
25	107° 48'	158·2 by R.21586 1603
26	138° 50'	568·4 by R.21586 1603

Portion № 148

Line	Bearing	Distance
1	3° 05'	380
2	27° 35	384
3	42° 00'	115
4	48° 26'	336
5	49° 50'	439
6	81° 17'	306
7	72° 26'	288
8	59° 08'	550
9	59° 54'	575
10	56° 17'	234
11	51° 28'	138
12	192° 09'	322
13	183° 50'	800
14	235° 44	656
15	263° 48'	466
16	247° 05	511 — 611·7
17	150° 20'	303
18	143° 06'	~~677~~ 537·1 Caln.
~~19~~	~~103° 58'~~	~~816~~
~~20~~	~~135° 30'~~	~~648~~
21	101° 00'	~~486~~ 414·4 Caln.
22	127° 10'	477

(June 1883 Origl Sur) I hereby certify that I in person made and on the 15th March 1893 completed the survey represented on this plan on which are written the bearings and lengths of the lines measured by me and I declare that the survey has been executed in accordance with the regulations published for the guidance of licensed Surveyors and the practice of the Department of Lands.

Original Survey by George Parsons
Amended do H. A. Evans Licensed Surveyors

Transmitted to the District Surveyor with my letter of 30th Sept. 83 N° 43 and 25th March 93 N° 8

~~Voucher №~~ ~~Passed~~
Calculation Book № 1682 Folios 67 & 68
Checked and Charted 7th June 93 H. B. Howell
Examined J. Burt 20 June 1893
Plan approved 20th June 1893

Scale 20 Chains to an Inch.

№ of lith. 09148

R1074.1714

Lithographed & Printed at the Department of Lands, Sydney, N.S.W., Jan. 1891.

Req:R911286 /Doc:CT 09622-143 CT /Rev:08-Feb-2011 /NSW LRS /Pgs:ALL /Prt:16-Nov-2021 11:26 /Seq:1 of 2
© Office of the Registrar-General /Src:INFOTRACK /Ref:LS026369_AS - 313 South Arm

[redacted]

09622143

G.

NEW SOUTH WALES

IFICATE OF TITLE

ERTY ACT, 1900, as amended.

For Grant (title prior to 1st edition) see description.

Vol. 9622 Fol. 143

1st Edition issued 7-1-1964

J485359

Vol. 9622 Fol. 143 (Page 1)

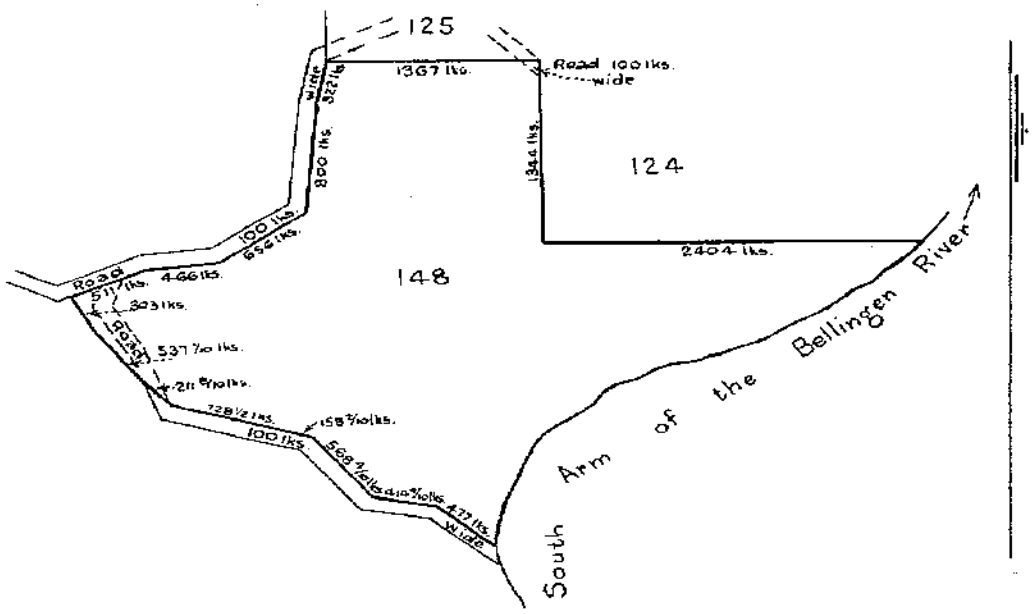
I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

Witness S Maclennan

CANCELLED

Registrar-General.

PLAN SHOWING LOCATION OF LAND SEE AUTO FOLIO



Area: 78 ac. 2 rd. 16 per.
This area does not include the areas of the roads 100 links wide.

J485359 RD

Scale: 10 chains to one inch.

ESTATE AND LAND REFERRED TO

Estate in Fee Simple in that piece of land in the Shire of Bellingen, Parish of South Bellingen, and County of Raleigh being Portion 148 granted on 28th February, 1963 by Crown Grant Volume 8434 Folio 183. Excepting thereout the roads 100 links wide and the minerals reserved by the Crown Grant.

Registrar General.

FIRST SCHEDULE (Continued overleaf)

DOUGLAS GEORGE ~~WEST~~ of Tumbarumba, Farmer.

Registrar General.

SECOND SCHEDULE (Continued overleaf)

1. GRM Reservations and conditions, if any, contained in the Crown Grant(s) above referred to.

Registrar General.

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TITLES OFFICE.

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR-GENERAL ARE CANCELLED.

41180S V. C. N. BLIGHT, GOVERNMENT PRINTER

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	ENTERED	Signature of Registrar-General
~~William Henry Willett of Lower South Arm, near Urunga, farmer~~	~~Transfer~~	~~K111131~~	~~8-9-1965~~	~~22-9-1965~~	[signature]
~~Archibald Stewart Crombie of Urunga, Farmer~~	~~Transfer~~	~~K127568~~	~~19-8-1966~~	~~2-9-1966~~	[signature]
~~Roy Gordon Riddel of Coff's Harbour, Dentist and Joyce Eileen Riddel his wife as joint tenants~~	~~Transfer~~	~~L526523~~	~~28-5-1969~~	~~2-10-1969~~	[signature]
~~Roy Gordon Riddel of Coff's Harbour, Dentist~~	~~Notice of Death~~	~~N196445~~	~~12-1-1973~~	~~13-11-1973~~	[signature]
Susan Elizabeth Riddel, Nursing Sister and Robert Bruce Riddel, Plumber both of Korora as tenants in common in equal shares	Transfer	Q134850	—	29-3-1977	[signature]

J485360. T643265 K42759 L526523 -524 N802417 N196445 Q134850 [illegible margin notations]

CANCELLED

SEE AUTO FOLIO

SECOND SCHEDULE (continued)

INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	PARTICULARS	ENTERED	Signature of Registrar-General	CANCELLATION		
~~Mortgage~~	~~J485360~~	~~21.9.1963~~	~~to Cecil Tyson, of Federal near Lismore, Schoolteacher and Eunice Elma Lois Jackson, wife of Edward Douglas Jackson, of Armidale, Shopkeeper.~~	~~17.2.1964~~	[signature]	Discharged	J643265	[signature]
~~mortgage~~	~~K111132~~	~~8-9-1965~~	~~to Douglas George King of Lower South Arm near Urunga, farmer~~	~~22-9-1965~~	[signature]	Discharged	K127567	[signature]
~~Mortgage~~	~~L521524~~	~~28-5-1969~~	~~to Archibald Stewart Crombie of Urunga, Farmer~~	~~2-10-1969~~	[signature]	Discharged	N802417	[signature]

FORM No. 183A

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR-GENERAL ARE CANCELLED

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Historical Title

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE
16/11/2021 11:26AM

FOLIO: 148/755557

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 9622 FOL 143

Recorded	Number	Type of Instrument	C.T. Issue
3/12/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
18/1/1989		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
26/4/1991		AMENDMENT: TITLE DIAGRAM	
20/10/2004	AB36236	CHANGE OF NAME	
20/10/2004	AB36237	MORTGAGE	EDITION 1
18/7/2012	AH120656	DEPARTMENTAL DEALING	
9/9/2018	AN695392	DEPARTMENTAL DEALING	EDITION 2 CORD ISSUED
15/4/2020	AQ30554	DISCHARGE OF MORTGAGE	
15/4/2020	AQ30555	TRANSFER	
15/4/2020	AQ30556	MORTGAGE	
15/4/2020	AQ30557	MORTGAGE	EDITION 3
19/5/2021	AR60490	TRANSFER OF MORTGAGE	EDITION 4

*** END OF SEARCH ***

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Received: 16/11/2021 11:26:46

Req:R911287 /Doc:DL AQ030555 /Rev:14-Apr-2020 /NSW LRS /Prt:16-Nov-2021 11:27 /Seq:1 of 2
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System Document Identification

Form Number: 01T-e
Template Number: t_nsw18
ELN Document ID: 548745812
ELN NOS ID: 548745814

TRANSFER

New South Wales
Real Property Act 1900

Land Registry Document Identification

AQ30555

Stamp Duty: 9789609-001

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.

LODGED BY:

Responsible Subscriber: JASON MCCLUNG SOLICITOR ABN 78771225670
Address: PO BOX 1011
Coffs Harbour 2450
Telephone:
ELNO Subscriber Number: 18960
Customer Account Number: 502109
Document Collection Box: 1W
Client Reference: 20001 Wood

LAND TITLE REFERENCE

148/755557

TRANSFEROR

SUSAN ELIZABETH GERALDINE SHEEHY

ROBERT BRUCE RIDDEL

TRANSFEREE

SHANE ANTHONY WOOD
Share of whole of land/interest: 1/ 2
ELAINE JOY WOOD
COLIN MERVYN WOOD
as Joint Tenants
Share of whole of land/interest: 1/ 2
Tenancy: Tenants in Common

CONSIDERATION

The transferor acknowledges receipt of the consideration of $700,000.00

ESTATE TRANSFERRED

FEE SIMPLE

The Transferor transfers to the Transferee the Estate specified in this Instrument and acknowledges receipt of any Consideration shown.

SIGNING FOR TRANSFEROR

I certify that:

1. The Certifier has taken reasonable steps to ensure that this Registry Instrument or Document is correct and compliant with relevant legislation and any Prescribed Requirement.
2. The Certifier has retained the evidence supporting this Registry Instrument or Document.
3. The Certifier holds a properly completed Client Authorisation for the Conveyancing Transaction including this Registry Instrument or Document.
4. The Certifier has taken reasonable steps to verify the identity of the transferor.

Party Represented by Subscriber:

SUSAN ELIZABETH GERALDINE SHEEHY
ROBERT BRUCE RIDDEL

Signed By: Jay Wendell Clowes
ELNO Signer Number: 7549
Signer Capacity: Practitioner Certifier
Digital Signing Certificate Number:

Req:R911287 /Doc:DL AQ030555 /Rev:14-Apr-2020 /NSW LRS /Prt:16-Nov-2021 11:27 /Seq:2 of 2
© Office of the Registrar-General /Src:INFOTRACK /Ref:LS026369_AS - 313 South Arm

Signed for Subscriber: FISHBURN WATSON O'BRIEN PTY LIMITED ABN 70163802319

FISHBURN WATSON O'BRIEN SOLICITORS

Subscriber Capacity: Representative Subscriber

ELNO Subscriber Number: 3773 **Customer Account Number:** 500812

Date: 14/04/2020

SIGNING FOR TRANSFEREE

I certify that:

1. The Certifier has taken reasonable steps to ensure that this Registry Instrument or Document is correct and compliant with relevant legislation and any Prescribed Requirement.
2. The Certifier has retained the evidence supporting this Registry Instrument or Document.
3. The Certifier holds a properly completed Client Authorisation for the Conveyancing Transaction including this Registry Instrument or Document.
4. The Certifier has taken reasonable steps to verify the identity of the transferee.

Party Represented by Subscriber:

SHANE ANTHONY WOOD
ELAINE JOY WOOD
COLIN MERVYN WOOD

Signed By: Anne Teresa Gillin **Signer Capacity:** Practitioner Certifier

ELNO Signer Number: 20057 **Digital Signing Certificate Number:**

Signed for Subscriber: ANNE TERESA GILLIN ABN 43081108207

NAMBUCCA VALLEY LEGAL

Subscriber Capacity: Representative Subscriber

ELNO Subscriber Number: 8979 **Customer Account Number:** 501379

Date: 14/04/2020

Title Search

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 148/755557

SEARCH DATE	TIME	EDITION NO	DATE
16/11/2021	11:26 AM	4	19/5/2021

LAND

LOT 148 IN DEPOSITED PLAN 755557
LOCAL GOVERNMENT AREA BELLINGEN
PARISH OF SOUTH BELLINGEN COUNTY OF RALEIGH
(FORMERLY KNOWN AS PORTION 148)
TITLE DIAGRAM CROWN PLAN 1074.1714

FIRST SCHEDULE

SHANE ANTHONY WOOD
IN 1/2 SHARE
ELAINE JOY WOOD
COLIN MERVYN WOOD
AS JOINT TENANTS IN 1/2 SHARE
AS TENANTS IN COMMON (T AQ30555)

SECOND SCHEDULE (4 NOTIFICATIONS)

1 LAND EXCLUDES MINERALS AND IS SUBJECT TO RESERVATIONS AND CONDITIONS IN FAVOUR OF THE CROWN - SEE CROWN GRANT(S)
2 LAND EXCLUDES THE ROAD(S) SHOWN IN THE TITLE DIAGRAM
3 AQ30556 MORTGAGE TO RICHARD JOHN BROWNING & ELAINE JOY BROWNING (SEE AR60490)
4 AQ30557 MORTGAGE TO ELAINE JOY BROWNING & RICHARD JOHN BROWNING

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

* Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title. Warning: the information appearing under notations has not been formally recorded in the Register. InfoTrack an approved NSW Information Broker hereby certifies that the information contained in this document has been provided electronically by the Registrar General in accordance with Section 96B(2) of the Real Property Act 1900.

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APPENDIX B

Earth Water Consulting Pty Limited
2-16 Lourdes Avenue
Urunga
NSW 2455

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Strider Duerinckx**

Report **837177-S**
Project name URUNGA
Project ID 2021-258
Received Date Nov 02, 2021

Client Sample ID			**S-1**	**S-2**	**S-3**	**ASS1 0-0.2**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-No04063**	**S21-No04064**	**S21-No04065**	**S21-No04066**
Date Sampled			**Oct 29, 2021**	**Oct 29, 2021**	**Oct 29, 2021**	**Oct 29, 2021**
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
a-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
b-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
d-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
g-HCH (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Toxaphene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Dibutylchlorendate (surr.)	1	%	111	109	129	-
Tetrachloro-m-xylene (surr.)	1	%	98	93	99	-
Heavy Metals						
Arsenic	2	mg/kg	3.2	4.0	5.4	-
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	-
Chromium	5	mg/kg	13	17	22	-
Copper	5	mg/kg	8.4	5.9	10	-
Lead	5	mg/kg	10	7.7	11	-
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Nickel	5	mg/kg	< 5	< 5	< 5	-
Zinc	5	mg/kg	18	6.8	12	-

Client Sample ID			S-1	S-2	S-3	ASS1 0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-No04063	S21-No04064	S21-No04065	S21-No04066
Date Sampled			Oct 29, 2021	Oct 29, 2021	Oct 29, 2021	Oct 29, 2021
Test/Reference	LOR	Unit				
% Moisture	1	%	38	25	29	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	-	-	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	-	-	3.3
Reaction Ratings*[S05]	0	-	-	-	-	4.0

Client Sample ID			ASS1 0.5-0.7	ASS1 1.0-1.2	ASS2 0-0.2	ASS2 0.6-0.8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-No04067	S21-No04068	S21-No04069	S21-No04070
Date Sampled			Oct 29, 2021	Oct 29, 2021	Oct 29, 2021	Oct 29, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	5.1	5.5	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	4.1	3.3	3.9
Reaction Ratings*[S05]	0	-	2.0	2.0	2.0	2.0

Client Sample ID			ASS2 1.0-1.2	ASS3 0-0.2	ASS3 0.7-0.9	ASS3 1.0-1.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-No04071	S21-No04072	S21-No04073	S21-No04074
Date Sampled			Oct 29, 2021	Oct 29, 2021	Oct 29, 2021	Oct 29, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	5.3	5.2	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	3.7	4.2	4.1
Reaction Ratings*[S05]	0	-	2.0	2.0	2.0	2.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Organochlorine Pesticides	Sydney	Nov 12, 2021	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Metals M8	Sydney	Nov 02, 2021	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Acid Sulfate Soils Field pH Test	Brisbane	Nov 08, 2021	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
% Moisture	Sydney	Nov 02, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

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NATA # 1261 Site # 20794

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Company Name: Earth Water Consulting Pty Limited
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Project Name: URUNGA
Project ID: 2021-258

Order No.: 2021-258
Report #: 837177
Phone: 0402 6083 96
Fax:

Received: Nov 2, 2021 8:10 AM
Due: Nov 9, 2021
Priority: 5 Day
Contact Name: Strider Duerinckx

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Organochlorine Pesticides	Acid Sulfate Soils Field pH Test	Metals M8	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254									
Sydney Laboratory - NATA # 1261 Site # 18217						X		X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							X		
Mayfield Laboratory - NATA # 1261 Site # 25079									
Perth Laboratory - NATA # 2377 Site # 2370									
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	S-1	Oct 29, 2021		Soil	S21-No04063	X		X	X
2	S-2	Oct 29, 2021		Soil	S21-No04064	X		X	X
3	S-3	Oct 29, 2021		Soil	S21-No04065	X		X	X
4	ASS1 0-0.2	Oct 29, 2021		Soil	S21-No04066		X		
5	ASS1 0.5-0.7	Oct 29, 2021		Soil	S21-No04067		X		
6	ASS1 1.0-1.2	Oct 29, 2021		Soil	S21-No04068		X		
7	ASS2 0-0.2	Oct 29, 2021		Soil	S21-No04069		X		
8	ASS2 0.6-0.8	Oct 29, 2021		Soil	S21-No04070		X		
9	ASS2 1.0-1.2	Oct 29, 2021		Soil	S21-No04071		X		

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Sample Detail						Organochlorine Pesticides	Acid Sulfate Soils Field pH Test	Metals M8	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254									
Sydney Laboratory - NATA # 1261 Site # 18217						X		X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							X		
Mayfield Laboratory - NATA # 1261 Site # 25079									
Perth Laboratory - NATA # 2377 Site # 2370									
External Laboratory									
10	ASS3 0-0.2	Oct 29, 2021		Soil	S21-No04072		X		
11	ASS3 0.7-0.9	Oct 29, 2021		Soil	S21-No04073		X		
12	ASS3 1.0-1.2	Oct 29, 2021		Soil	S21-No04074		X		
Test Counts						3	9	3	3

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs..

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM where no positive PFAS results have been reported have been reviewed and no data was affected.

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QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-HCH	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-HCH	mg/kg	< 0.05			0.05	Pass	
d-HCH	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-HCH (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	100			70-130	Pass	
4.4'-DDD	%	98			70-130	Pass	
4.4'-DDE	%	106			70-130	Pass	
4.4'-DDT	%	82			70-130	Pass	
a-HCH	%	93			70-130	Pass	
Aldrin	%	109			70-130	Pass	
b-HCH	%	85			70-130	Pass	
d-HCH	%	85			70-130	Pass	
Dieldrin	%	107			70-130	Pass	
Endosulfan I	%	101			70-130	Pass	
Endosulfan II	%	88			70-130	Pass	
Endosulfan sulphate	%	94			70-130	Pass	
Endrin	%	93			70-130	Pass	
Endrin aldehyde	%	93			70-130	Pass	
Endrin ketone	%	85			70-130	Pass	
g-HCH (Lindane)	%	95			70-130	Pass	
Heptachlor	%	74			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heptachlor epoxide			%	97			70-130	Pass	
Hexachlorobenzene			%	108			70-130	Pass	
Methoxychlor			%	99			70-130	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	93			80-120	Pass	
Cadmium			%	98			80-120	Pass	
Chromium			%	93			80-120	Pass	
Copper			%	92			80-120	Pass	
Lead			%	97			80-120	Pass	
Mercury			%	98			80-120	Pass	
Nickel			%	95			80-120	Pass	
Zinc			%	92			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	S21-No10406	NCP	%	87			70-130	Pass	
4.4'-DDD	S21-No10406	NCP	%	109			70-130	Pass	
4.4'-DDE	S21-No10406	NCP	%	97			70-130	Pass	
4.4'-DDT	S21-No10406	NCP	%	85			70-130	Pass	
a-HCH	S21-No10406	NCP	%	85			70-130	Pass	
Aldrin	S21-No10406	NCP	%	96			70-130	Pass	
b-HCH	S21-No10406	NCP	%	101			70-130	Pass	
d-HCH	S21-No10406	NCP	%	88			70-130	Pass	
Dieldrin	S21-No10406	NCP	%	96			70-130	Pass	
Endosulfan I	S21-No10406	NCP	%	93			70-130	Pass	
Endosulfan II	S21-No10406	NCP	%	96			70-130	Pass	
Endosulfan sulphate	S21-No10406	NCP	%	84			70-130	Pass	
Endrin	S21-No10406	NCP	%	105			70-130	Pass	
Endrin aldehyde	S21-No10406	NCP	%	85			70-130	Pass	
Endrin ketone	S21-No10406	NCP	%	88			70-130	Pass	
g-HCH (Lindane)	S21-No10406	NCP	%	82			70-130	Pass	
Heptachlor	S21-No10406	NCP	%	92			70-130	Pass	
Heptachlor epoxide	S21-No10406	NCP	%	94			70-130	Pass	
Hexachlorobenzene	S21-No10406	NCP	%	92			70-130	Pass	
Methoxychlor	S21-No10406	NCP	%	99			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S21-No07560	NCP	%	98			75-125	Pass	
Cadmium	S21-No07560	NCP	%	104			75-125	Pass	
Chromium	S21-No07560	NCP	%	82			75-125	Pass	
Copper	S21-No07560	NCP	%	85			75-125	Pass	
Lead	S21-No07560	NCP	%	101			75-125	Pass	
Mercury	S21-No07560	NCP	%	96			75-125	Pass	
Nickel	S21-No07560	NCP	%	90			75-125	Pass	
Zinc	S21-No07560	NCP	%	97			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S21-No10414	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
a-HCH	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-HCH	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-HCH	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-HCH (Lindane)	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S21-No10414	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	S21-No10414	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S21-No04665	NCP	%	18	18	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S21-No04065	CP	mg/kg	5.4	8.7	46	30%	Fail	Q15
Cadmium	S21-No04065	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S21-No04065	CP	mg/kg	22	31	31	30%	Fail	Q15
Copper	S21-No04065	CP	mg/kg	10	16	44	30%	Fail	Q15
Lead	S21-No04065	CP	mg/kg	11	17	44	30%	Fail	Q15
Mercury	S21-No04065	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S21-No04065	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	S21-No04065	CP	mg/kg	12	17	31	30%	Fail	Q15
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S21-No04070	CP	pH Units	5.4	5.3	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S21-No04072	CP	pH Units	5.3	5.3	pass	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

Emma Beesley	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
John Nguyen	Senior Analyst-Metal (NSW)
Myles Clark	Senior Analyst-SPOCAS (QLD)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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CHAIN OF CUSTODY RECORD

Eurofins | mgt ABN 50 005 085 521

- [x] Sydney Laboratory — Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2066 — 02 9900 8400 — EnviroSampleNSW@eurofins.com
- [ ] Brisbane Laboratory — Unit 1 21 Smallwood Place Murarrie QLD 4172 — 07 3902 4600 — EnviroSampleQLD@eurofins.com
- [ ] Perth Laboratory — Unit 2 91 Leach Highway Kewdale WA 6105 — 08 9251 9600 — EnviroSampleWA@eurofins.com
- [x] Melbourne Laboratory — 2 Kingston Town Close Oakleigh VIC 3166 — 03 8564 5000 — EnviroSampleVic@eurofins.com

Company	Earth Water Consulting Pty Limited
Address	Unit 6 / 1A MAnna Crescent, Urunga NSW 2455
Contact Name	Strider Duerinckx
Phone №	0402608396
Special Directions	
Purchase Order	2021-258
Quote ID №	Earth Water Consulting
Project №	2021-288
Project Name	Urunga
Project Manager	SD
EDD Format (ESdat, EQuIS etc)	NO
Sampler(s)	NS
Handed over by	SD
Email for Invoice	strider@ewcon.com.au
Email for Results	strider@ewcon.com.au

Analyses (Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing): M8, OCP, ASS pH screen

Page 1 of 2

Containers (Change container type & size if necessary): 500mL Plastic, 250mL Plastic, 125mL Plastic, 200mL Amber Glass, 40mL Vial, 500mL PFAS PET, Jar (Glass or HDPE)

Required Turnaround Time (Default will be 5 days if not ticked) ♦Surcharge will apply
- [ ] Overnight (reporting by 9am)♦
- [ ] Same day♦
- [ ] 1 day♦
- [ ] 2 days♦
- [ ] 3 days♦
- [x] 5 days (Standard)
- [ ] Other( )

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	M8	OCP	ASS pH screen	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL Vial	500mL PFAS PET	Jar (Glass or HDPE)	Sample Comments / Dangerous Goods Hazard Warning
1	S-1	29/10	S	✓	✓									
2	S-2	↓	↓	✓	✓									
3	S-3	↓	↓	✓	✓									
4	ASS1 0-0.2	↓	↓			✓								
5	ASS1 0.5-0.7	↓	↓			✓								
6	ASS1 1.0-1.2	↓	↓			✓								
7	ASS2 0-0.2	↓	↓			✓								
8	ASS2 0.6-0.8	↓	↓			✓								
9	ASS2 1.0-1.2	↓	↓			✓								
10														
	Total Counts													

Method of Shipment: [x] Courier (#) [ ] Hand Delivered [ ] Postal — Name — Signature — Date — Time

Eurofins | mgt Laboratory Use Only						
Received By: PR	(SYD) | BNE | MEL | PER | ADL | NTL | DRW	Signature: [signature]	Date: 2/11	Time: 8.10am	Temperature: 20.5C
Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date	Time	Report №: 837177

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CHAIN OF CUSTODY RECORD

Eurofins | mgt ABN 50 005 085 521

- [ ] Sydney Laboratory — Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2066, 02 9900 8400, EnviroSampleNSW@eurofins.com (ticked by hand)
- [ ] Brisbane Laboratory — Unit 1 21 Smallwood Place Murarrie QLD 4172, 07 3902 4600, EnviroSampleQLD@eurofins.com
- [ ] Perth Laboratory — Unit 2 91 Leach Highway Kewdale WA 6105, 08 9251 9600, EnviroSampleWA@eurofins.com
- [x] Melbourne Laboratory — 2 Kingston Town Close Oakleigh VIC 3166, 03 8564 5000, EnviroSampleVic@eurofins.com

Company	Earth Water Consulting Pty Limited
Address	Unit 6 / 1A MArina Crescent, Urunga NSW 2455
Contact Name	Strider Duerinckx
Phone №	0402608396
Special Directions	
Purchase Order	2021- 258
Quote ID №	Earth Water Consulting
Project №	2021- 258
Project Name	Urunga
Project Manager	SD
EDD Format (ESdat, EQuIS, etc)	
Sampler(s)	MS
Handed over by	SD
Email for Invoice	strider@ewcon.com.au
Email for Results	strider@ewcon.com.au

Analyses (Where metals are requested, please specify "Total" or "Filtered". SUITE codes must be used to attract SUITE pricing): ASS pH Screen

page 2 of 2

Containers (Change container type & size if necessary): 500mL Plastic; 250mL Plastic; 125mL Plastic; 200mL Amber Glass; 40mL Vial; 500mL PFAS PET; Jar (Glass or HDPE)

Required Turnaround Time (Default will be 5 days if not ticked) — ♦Surcharge will apply
- [ ] Overnight (reporting by 9am)♦
- [ ] Same day♦
- [ ] 1 day♦
- [ ] 2 days♦
- [ ] 3 days♦
- [x] 5 days (Standard)
- [ ] Other( )

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	ASS pH Screen	Sample Comments / Dangerous Goods Hazard Warning
1	ASS3 0.2-0.4	29/10	S	✓	
2	ASS3 0.7-0.9	↓	↓	✓	
3	ASS3 1.0-1.2	↓	↓	✓	
4					
5					
6					
7					
8					
9					
10					
		Total Counts			

Method of Shipment: [x] Courier (#) [ ] Hand Delivered [ ] Postal — Name — Signature — Date — Time

Eurofins | mgt Laboratory Use Only									
Received By	MK	(SYD) | BNE | MEL | PER | ADL | NTL | DRW	Signature	[signature]	Date	2/11	Time	8:10AM	Temperature 20.5°C
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report № 837177

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APPENDIX C

Soil Borelog

Borehole No:	**BH1**
Logged by:	NS
Drilling date:	28/10/2021
Drilling method:	Powered Auger
Borehole location:	Figure 4
Borehole coords:	56499167, 6625771

Project ref:	2021-258
Client:	S, C & J Wood
Address:	Lot 148 South Arm Road, Urunga

PROFILE DESCRIPTION

Depth (m)	Sampling depth/name	Graphic Log	Horizon	Texture	Structure	Colour	Mottles	Coarse Fragments	Moisture Condition	Comments
0.1	**ASS1_ 0-0.2**		A1	Clay Loam	Strong	Black	Nil	<5%	SM	Topsoil
0.2										
0.3										
0.4			B1	Clay Loam	Strong	Orangish Brown	Brownish Black	<15%	SM	Transferral fine grained gravel
0.5										
0.6	**ASS1_ 0.5-0.7**		B2	Light Clay	Strong	Brownish Orange	White	<15%	SM	Residual
0.7										
0.8			B3	Light Clay	Strong	Dull Orange	White	<5%	SM	Residual
0.9										
1.0										
1.1	**ASS1_ 1.0-1.2**		B4	Light Clay to Medium Clay	Strong	Pale Grey	White	<5%	SM	Residual
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:	NS
Drilling date:	28/10/2021
Drilling method:	Powered Auger
Borehole location:	Figure 4
Borehole coords:	56498523, 6625777

Project ref:	2021-258
Client:	S, C & J Wood
Address:	Lot 148 South Arm Road, Urunga

PROFILE DESCRIPTION

Depth (m)	Sampling depth/name	Graphic Log	Horizon	Texture	Structure	Colour	Mottles	Coarse Fragments	Moisture Condition	Comments
0.1	**ASS2_ 0-0.2**		A1	Clay Loam	Strong	Brownish black	Nil	<10%	SM	Topsoil f-m grained quartz
0.2										
0.3			B1	Clay Loam	Strong	Dull Brownish Orange	Brown	<5%	SM	Transferral
0.4										
0.5										
0.6			B2	Light Clay	Strong	Pale Yellow Brown	Orange	<10%	SM	Residual
0.7	**ASS2_ 0.6-0.8**									
0.8										
0.9										
1.0			B3	Light Clay to Medium Clay	Strong	Pale Red	Orange Yellow White	<20%	SM	Residual
1.1	**ASS2_ 1.0-1.2**									
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:	NS
Drilling date:	28/10/2021
Drilling method:	Powered Auger
Borehole location:	Figure 4
Borehole coords:	56498999, 6626077

Project ref:	2021-258
Client:	S, C & J Wood
Address:	Lot 148 South Arm Road, Urunga

PROFILE DESCRIPTION

Depth (m)	Sampling depth/name	Graphic Log	Horizon	Texture	Structure	Colour	Mottles	Coarse Fragments	Moisture Condition	Comments
0.1	**ASS3_ 0-0.2**		A1	Clay Loam	Strong	Black	Nil	Nil	SM	Topsoil
0.2										
0.3			B1	Clay Loam	Strong	Dark Brown	Light Grey Brown	Nil	SM	Transferral
0.4										
0.5			B2	Clay Loam	Strong	Pale Brown	Light Grey	<5%	SM	Residual
0.6										
0.7			B3	Light Clay	Strong	Pale Brownish Orange	Orange White	Nil	SM	Residual
0.8	**ASS3_ 0.7-0.9**									
0.9										
1.0										
1.1	**ASS3_ 1.0-1.2**									
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:	NS
Drilling date:	28/10/2021
Project ref:	2021-258
Drilling method:	Powered Auger
Client:	S, C & J Wood
Borehole location:	Figure 4
Address:	Lot 148 South Arm Road, Urunga
Borehole coords:	56498799, 6625915

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	Brownish Black	Nil	<5%	SM	Topsoil
0.2										
0.3			B1	Clay Loam	Strong	Blackish Brown	Pale Brown	<10%	SM	Transferral
0.4			B2	Clay Loam	Strong	Orangish Brown	Red Yellow	Nil	SM	Residual
0.5										
0.6										
0.7	**BH4_ 0.6-0.8**									
0.8										
0.9			B3	Light Clay	Strong	Yellowish Brown	Pale Red	Nil	SM	Residual
1.0			B4	Light Clay	Strong	Pale Red	Pale Brown	<20%	SM	Residual f-m grained quartz
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 D

Nominated Area Water Balance & Storage Calculations

Site Address: **Sth Arm Rd, Urunga**

Proj Ref: 2021-258

Notes: Lots 9-17. Secondary Treatment

Flow Allowance		150	l/p/d
No. of Bedrooms		4	p
Occupancy		1.5	p/room
Design Wastewater Flow	Q	900	L/day
Daily DLR		12.0	mm/day
Crop Factor	C	0.6-0.8	unitless
Retained Rainfall Coefficient	RRc	0.85	untiless
Void Space Ratio	V	0.3	unitless
Nominated Land Application Area	N	80	sqm
Trench/Bed wetted thickness	Ww	0.15	m
Rainfall Data	Urunga (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	123.3	155.1	175.8	118.5	89.4	72.7	38.6	28.5	39	59.7	93.1	114.8	1340.8
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	104.805	131.835	149.43	100.725	75.99	61.795	32.81	24.225	33.15	50.745	79.135	97.58	**942.225**
Effluent Irrigation	W	(QxD)/L	mm/month	348.8	315.0	348.8	337.5	348.8	337.5	348.8	348.8	337.5	348.8	337.5	348.8	**4106.3**
Inputs		RR+W	mm/month	453.6	446.8	498.2	438.2	424.7	399.3	381.6	373.0	370.7	399.5	416.6	446.3	**5048.5**
STORAGE CALCULATION																
Storage remaining from previous month			mm/month		0.0	0.0	23.8	11.6	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	-240.7	-48.7	23.8	-12.2	-26.7	-7.0	-123.1	-207.6	-279.5	-284.5	-267.2	-264.8	**-401.6**
Cumulative Storage	M		mm	0.0	0.0	23.8	11.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**35.4**
Maximum Bed Storage Depth for Area	BS		mm	**23.80**	Is the calculated storage acceptable?			Yes, storage is conservative								

Nominated trench width	0.9	
Total length based on nominated width	88.9	
No. of beds	4	
Individual bed lengths	22.2	
Individual Bed footprints	20.0	
Spacing between beds	1.5	
Width of bed area	8.1	
Total bed area	180	
Nutrient uptake zone	317	2m buffer nutrient uptake allowance

Nutrient Balance

Proj Ref: 2021-258

Site Address: Sth Arm Rd, Urunga

Notes: Secondary treatment

INPUT DATA

Hydraulic Load		900	L/Day	
Effluent N Concentration		30	mg/L	
% Lost to Soil Processes		0.2	Decimal	
Total N Loss to Soil		5400	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		17106	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	21600	mg/day
Area required for nitrogen	**315**	m^2

Phosphorus Balance

P adsorbed	0.8553	kg/m^2
P uptake	0.125	kg/m^2
P generated	197.1	kg
Area required for Phosphorus	**201**	m^2

APPENDIX E

AS1547:2012 Table R1 and R2 Buffer Risk Assessment

Client Wood
Property South Arm Rd
Job Number 2021-258

Feature	Setback Distance Range (m)	Constraint	Constraint Scale			Risk Assessment				Adopted Buffer Distance	
			Low Constraint	High Constraint	Applicable Constraint	Low = 1 Point	Mod = 2 Points	High = 3 Points	Overall Risk Rating	Accept Buffer (m)	Minimum Available Buffer (m)
Intermittent Surface Water / Pond	15-50	Microbial Quality of Effluent	Secondary treated effluent with disinfection	Primary treated effluent	Secondary	X			Moderate	25	40
		Surface Water	Category 1 to 3 soils no intermittent water down gradient within 50m, low rainfall area	Category 4 to 6 soils intermittent surface water <25m down gradient, high rainfall high resource/env. Value	Cat5 soils, high rainfall area			X			
		Slope	0-6% (surface effluent application), 0 -10% (subsurface effluent application)	>10% (surface effluent application) >30% subsurface effluent application	20%		X				
		Position of Land Application Area in Landscape	Downgradient of surface water, property boundary, recreational area	Upgradient of surface water, property boundary, recreational area	Downslope			X			
		Drainage	Category 1 to 2 soils gently sloping area	Category 6 soils, sites with visable seepage, moisture tolerant vegetation, low lying area	Cat5 soils, mod slope, no moisture tolerant veg		X				
		Flood Potential	Above 1 in 20yr flood contour	Below 1 in 20 year flood Contour	Available EMA above 1 in 100yr flood contour	X					
		Application Method	Drip irrigation or subsurface application of effluent	Surface/above ground application of effluent	Subsurface	X					
Permanent Surface Water / Pond	15-100	Microbial Quality of Effluent	Secondary treated effluent with disinfection	Primary treated effluent	Secondary	X			Moderate	60	100
		Surface Water	Category 1 to 3 soils no surface water down gradient within 100m, low rainfall area	Category 4 to 6 soils permanent surface water <50m down gradient, high rainfall high resource/env. Value	Cat5 soils, high rainfall area			X			
		Slope	0-6% (surface effluent application), 0 -10% (subsurface effluent application)	>10% (surface effluent application) >30% subsurface effluent application	20%		X				
		Position of Land Application Area in Landscape	Downgradient of surface water, property boundary, recreational area	Upgradient of surface water, property boundary, recreational area	Downslope			X			
		Drainage	Category 1 to 2 soils gently sloping area	Category 6 soils, sites with visable seepage, moisture tolerant vegetation, low lying area	Cat5 soils, mod slope, no moisture tolerant veg		X				
		Flood Potential	Above 1 in 20yr flood contour	Below 1 in 20 year flood Contour	Available EMA above 1 in 100yr flood contour	X					
		Application Method	Drip irrigation or subsurface application of effluent	Surface/above ground application of effluent	Subsurface	X					

EVERICK HERITAGE

South Arm Road
Urunga, NSW

Aboriginal Cultural Heritage Assessment

Prepared for Colin, Joy and Shane Wood

Everick Heritage Pty Ltd

August 2022

Report Reference:

Hill, T., A. Cameron, S. Riley and M. Finlayson. 2022. *South Arm Road Urunga: Aboriginal Cultural Heritage Assessment.* Everick Heritage Pty Ltd unpublished report prepared for Colin, Joy and Shane Wood.

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2	A. Cameron	All	25.10.2021	T. Robins
3	M. Finlayson	All	25.10.21	T. Robins
4	T. Hill	All	25.10.21	T. Robins
5	S. Riley	Figure 1-2	1.08.22	T. Robins

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Executive Summary

The following is a report detailing the results of an Aboriginal Cultural Heritage Assessment ('ACHA') for the planning proposal of lands on Lot 148 DP 755557 (the 'Project Area') at South Arm Road, Urunga, New South Wales ('NSW') (the 'Project) to provide for seven 1 hectare rural residential Lots accessed from South Arm Road and a residual rural Lot (Lot 8). Everick Heritage Pty Ltd (the 'Consultant') were commissioned by Colin, Joy and Shane Wood (the 'Proponent') to support a Planning Proposal for the proposed works to be submitted to Bellingen Shire Council.

The ACHA was commissioned for a planning proposal for rural residential lots on South Arm Road, Urunga

The methods used for this assessment comply with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DEECW 2010) ('CoPAI') and all relevant legislation as described in Section 2 of this Report. The following are the broad requirements for compliance with the CoPAI;

a) consultation with the Coffs Harbour and District Local Aboriginal Land Council ('LALC');

b) searches of applicable heritage registers;

c) review of ethnographic and historic resources relevant to the region;

d) review previous archaeological work and the landscape context;

e) summarise the local and regional character of Aboriginal land use and its material traces;

f) formulate a predictive model;

g) conduct an archaeological survey with representatives of the Coffs Harbour and District LALC to identify the potential for harm to Aboriginal objects and appropriate management response; and

h) report on findings and recommended management strategies.

The ACHA has been commissioned to provide a cultural heritage assessment for the proposal to rezone the Project Area. The proposal is to subdivide Lot 148 DP 755557 for the creation of eight (8) new lots including a residue Lot (Lot 8) (see Figure 2).

Results

No Aboriginal objects or sites were identified during the survey

A site inspection of the Project Area was undertaken on 22 October 2021 with Uncle Ian Brown and Launa Ferguson from Coffs Harbour and District LALC, Tim Hill (Everick Heritage Principal Northern NSW), Alyce Cameron (Everick Senior Archaeologist) and Everick Archaeologist Matthew Finlayson. The site inspection aimed to identify the potential for the proposed works to impact on Aboriginal objects (Table 3), and primarily focused on areas where the future residential buildings would be located. In this instance that includes the northern ridgeline and associated spurs, and the southern ridgeline.

As a result of the desktop study, field inspection and consultation with Coffs Harbour and District LALC, the following can be concluded:

a) No Aboriginal sites or sites of cultural significance, including archaeological sites, are known to occur within the Project Area.

b) The archaeological inspection was not significantly constrained by ground cover or vegetation. Only short grass covered the Project Area on the northern and southern ridgeline, and there were exposures present on the flat elevated areas and gentle top of slopes.

c) The majority of the Project Area is comprised of either small spurs, slopes, or wetlands. The landform with the most potential for archaeological deposits is the southern ridgeline that overlooks the Kalang River (Lot 8).

d) Having consideration for the predictive model it is considered that the Project Area does not have a high potential to contain Aboriginal sites. It is considered likely that sites in the area would be low density artefact scatters or isolated finds from groups using the ridgeline to traverse between the mountains and the coast.

Based on the desktop assessment, site inspection and consultation with Coffs Harbour and District LALC, it is considered that the proposed works will not likely impact on Aboriginal objects. As such, additional community consultation and investigation is not required to comply with the National Parks and Wildlife Act (1974) and Regulations (2019).

Recommendation 1: Aboriginal Objects Find Procedure

It is recommended that Aboriginal sites officers from the Coffs Harbour and District LALC are engaged as "spotters" during the topsoil removal on Proposed Lot 8 on the southern ridgeline to assist the Proponent to implement the Aboriginal Objects find procedure.

Everick recommends an unexpected find procedure

It is recommended that if suspected Aboriginal material has been uncovered because of development activities within the Project Area:

a) Work in the surrounding area is to stop immediately.

b) A temporary fence is to be erected around the site, with a buffer zone of at least 10 metres (m)around the known edge of the site.

c) An appropriately qualified archaeological consultant is to be engaged to identify the material.

d) Should the works be deemed to have harmed the Aboriginal objects the Heritage NSW should be notified immediately via the EPA Enviro Hotline.

Recommendation 2: Aboriginal Human Remains

Although it is unlikely that Aboriginal Human Remains will be located at any stage during earthworks within the Project Area, should this event arise it is recommended that all works must halt in the immediate area to prevent any further impacts to the remains. The site should be cordoned off and the remains themselves should be left untouched. The nearest Police Station (Bellingen), the Coffs Harbour and District LALC and the Heritage NSW Regional Office (Coffs Harbour) are all to be notified as soon as possible. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the Site for criminal activities, the Aboriginal community and Heritage NSW should be consulted as to how the remains should be dealt with. Work may only resume after agreement is reached between all notified parties, provided it is in accordance with all parties' statutory obligations.

DEFINITIONS

The following definitions apply to the terms used in this report:

Aboriginal Object means any deposit, object, or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction and includes Aboriginal remains.

Aboriginal Place means any place declared to be an Aboriginal Place (under s. 84 of the NPW Act) by the Minister administering the NPW Act, by order published in the NSW Government Gazette, because the Minister is of the opinion that the place is or was of special significance with respect to Aboriginal culture. It may or may not contain Aboriginal Objects.

ACHCRP Guidelines means the Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010).

AHIMS means Aboriginal Heritage Information Management System

AHIP means Aboriginal Heritage Impact Permit.

CoPAI means the Code of Practice for Archaeological Investigation in New South Wales (2010).

Due Diligence Code means the Due Diligence Code for the Protection of Aboriginal Objects in NSW (2010).

LALC means Local Aboriginal Land Council.

LEP means Local Environment Plan

NPW Act means the National Parks and Wildlife Act 1974 (NSW).

NSW means New South Wales.

Project Area means Lot 148 DP 755557 at South Arm Road, Urunga, NSW.

Proponent means Colin, Joy and Shane Wood and all associated employees, contractors, and subcontractors of the same.

The Consultant means qualified archaeological staff and/or contractors of Everick Heritage Pty Ltd.

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1. INTRODUCTION

1.1. Scope of this Assessment

The following is a report detailing the results of an Aboriginal Cultural Heritage Assessment ('ACHA') for the planning proposal of lands on Lot 148 DP 755557 (the 'Project Area') at South Arm Road, Urunga, New South Wales ('NSW') (the 'Project) to provide for seven 1 hectare rural residential Lots accessed from South Arm Road and a residual rural Lot (Lot 8). Everick Heritage Pty Ltd (the 'Consultant') were commissioned by Colin, Joy and Shane Wood (the 'Proponent') to support a Planning Proposal for the proposed works to be submitted to Bellingen Shire Council.

1.2. Assessment Methodology

The methods used for this assessment comply with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DEECW 2010) ('CoPAI') and all relevant legislation as described in Section 2 of this Report. The following are the broad requirements for compliance with the CoPAI:

a) consultation with the Coffs Harbour and District Local Aboriginal Land Council ('LALC');

b) searches of applicable heritage registers;

c) review of ethnographic and historic resources relevant to the region;

d) review previous archaeological work and the landscape context;

e) summarise the local and regional character of Aboriginal land use and its material record;

f) formulate a archaeological predictive model;

g) conduct an archaeological survey with representatives of the Coffs Harbour and District LALC to identify the potential for harm to Aboriginal objects and appropriate management response; and

h) report on findings and recommended management strategies.

1.3. Project Description

The ACHA has been commissioned to provide a cultural heritage assessment for the proposal to rezone the Project Area. The proposal will provide for the subdivision of Lot 148 DP 755557 to create seven 1 hectare rural residential lots to be accessed from South Arm Road and a residual rural Lot (Lot 8).

1.4. Report Authorship

The ACHA was prepared by Principal Consultant (Northern NSW) Tim Hill, Senior Archaeologist Alyce Cameron, Archaeologist Samuel Riley and Archaeologist Matt Finlayson. The Aboriginal community consultation was conducted by Tim Hill.

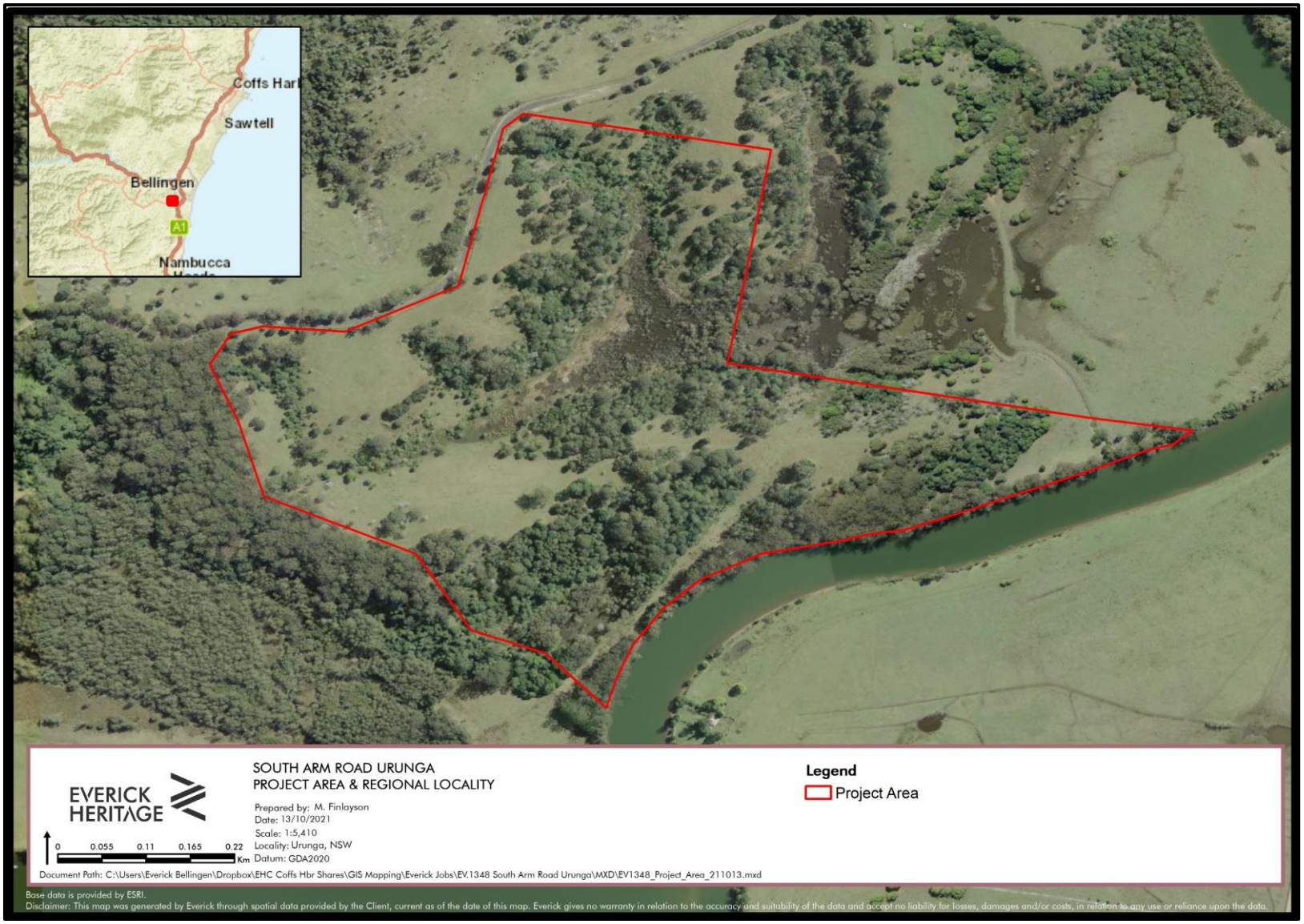

Figure 1: Location of Proposed Works.

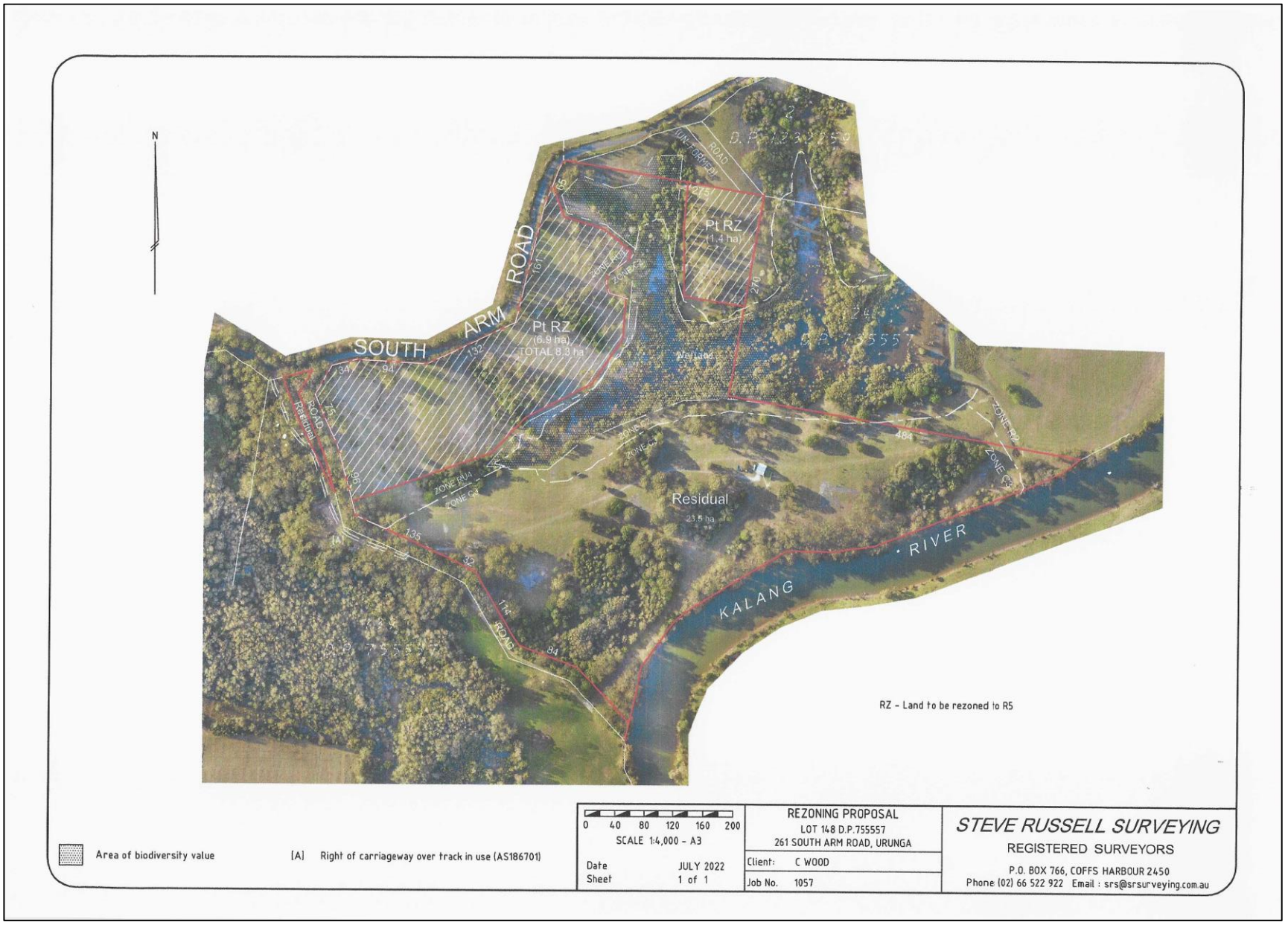

Figure 2: Proposed rezoning layout.

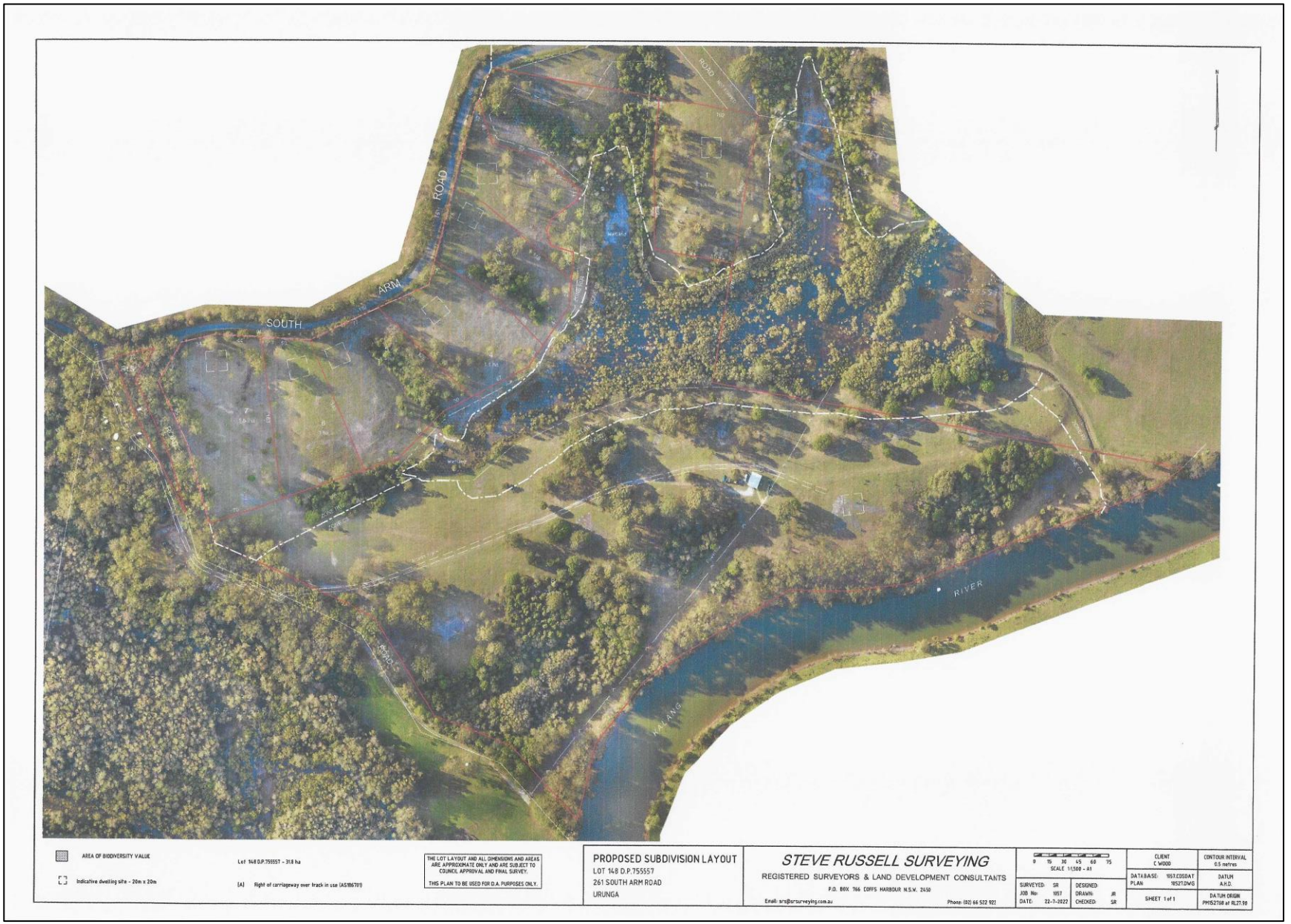

Figure 3: Proposed subdivision layout

2. LEGISLATIVE AND PLANNING CONTEXT

The primary State legislation concerning cultural heritage in NSW is the National Parks and Wildlife Act 1974 (NSW) (NPW Act) and Local Environment Plans (LEP) made under the Environmental Planning & Assessment Act 1979 (NSW). The Commonwealth also has a role in the protection of nationally significant cultural heritage through the Environmental Protection and Biodiversity Conservation Act 1999 (Cth), The Protection of Movable Cultural Heritage Act 1986 (Cth) and the Historic Shipwrecks Act 1976 (Cth).

For the purposes of this assessment the State and local legislation are most relevant. The consent authority will be Bellingen Shire Council. The information below lists the legislative and policy framework within which this assessment is set.

2.1. The National Parks and Wildlife Act 1974 (NSW)

The NPW Act is the primary legislation concerning the identification and protection of Aboriginal cultural heritage. It provides for the management of both Aboriginal Objects and Aboriginal Places. Under the NPW Act, an Aboriginal Object is any deposit, object, or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area, regardless of whether the evidence of habitation occurred before or after non-Aboriginal settlement of the land. This means that every Aboriginal Object, regardless of its size or seeming isolation from other Objects, is protected under the Act.

An Aboriginal Place is an area of particular significance to Aboriginal people which has been declared an Aboriginal Place by the Minister. The drafting of this legislation reflects the traditional focus on Objects, rather than on areas of significance such as story places and ceremonial grounds. However, a gradual shift in cultural heritage management practices is occurring towards recognising the value of identifying the significance of areas to Indigenous peoples beyond their physical attributes. With the introduction of the National Parks and Wildlife Amendment Act 2010 (NSW) the former offence provisions under Section 86 of 'disturbing', 'moving', 'removing' or 'taking possession' of Aboriginal Objects or Places have been replaced by the new offence of 'harming or desecrating'. The definition of 'harm' is 'destroying, defacing or damaging an Object'. Importantly, in the context of the management recommendations in this assessment, harm to an Object that is 'trivial or negligible' will not constitute an offence.

The amendments also significantly strengthen the penalty provisions. The issue of intent to harm Aboriginal cultural heritage has been formally addressed by separating it from inadvertent harm. The penalty for individuals who inadvertently harm Aboriginal Objects has been set at

up to $55,000, while for corporations it is $220,000. Also introduced is the concept of 'circumstances of aggravation' which allows for harsher penalties (up to $110,000) for individuals who inadvertently harm Aboriginal heritage in the course of undertaking a commercial activity or have a record for committing similar offences. For those who knowingly harm Aboriginal cultural heritage, the penalty will rise substantially. The maximum penalty will be set at $275,000 or one year imprisonment for individuals, while for corporations it will rise to $1,100,000.

Where a land user has or is likely to undertake activities that will harm Aboriginal Objects, the Director General of Heritage NSW has a range of enforcement powers, including stop work orders, interim protection orders and remediation orders. The amended regulations also allow for a number of penalties in support of these provisions. The NPW Act also now includes a range of defence provisions for unintentionally harming Aboriginal Objects:

a) Undertaking activities that are prescribed as 'Low Impact'.

b) Acting in accordance with the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (2010) (the 'Due Diligence Code').

c) Using a consulting archaeologist who correctly applies the CoPAI.

d) Acting in accordance with an AHIP.

The regulations allow for a range of low impact activities to be undertaken without the need to consult Heritage NSW or a consulting archaeologist. Generally, those who undertake activities of this nature will not be committing an offence, even if they inadvertently harm Aboriginal Objects. For the purposes of this assessment, it is not considered that the proposed management works are 'low impact activities'.

2.2. Due Diligence Code

The Due Diligence Code operates by posing a series of questions for land users before they commence development. These questions are based around assessing the potential for an area of land to contain Aboriginal Objects and previous ground disturbance. An activity will generally be unlikely to harm Aboriginal Objects where it:

a) will cause no additional ground disturbance; or

b) is in a developed area; or

c) in a significantly disturbed area.

Where these criteria are not fulfilled, further assessment for Aboriginal cultural heritage will typically be required prior to commencing the activity.

2.3. The ACHCRP Guidelines (2010) and Community Consultation.

The ACHCRP Guidelines provide an acceptable framework for conducting Aboriginal community consultation in preparation for impacts to Aboriginal cultural heritage. Proponents are required to follow them where a Project is likely to impact on cultural heritage and where they require an Aboriginal Heritage Impact Permit ('AHIP'). However, it has been standard practice to undertake consultation with Aboriginal sites officers from the Local Aboriginal Land Council ('LALC') to assist the proponent to understand their requirements for additional consultation which may include Elders Groups, native title applicant groups or other knowledge holders who might have a particular type of knowledge about an area.

The ACHCRP Guidelines typically take a minimum of 90 days to complete. However, in complicated Projects this period may need to be extended by several months. The Guidelines require public notice of the assessment, preparation of a proposed methodology, undertaking site meetings and excavations where required, the production of a draft report, which is distributed to the registered Aboriginal parties and the production of a final report.

Although not strictly required, a thorough consultation process will treat the ACHCRP Guidelines as a minimum standard of community consultation where impacts to Aboriginal objects cannot reasonably be avoided. Generally, consultants must go to further effort to identify the significance of a given site to the Aboriginal community. This will likely include undertaking additional site inspections if requested by Aboriginal stakeholders, fully resourcing the community by providing copies of past archaeological and environmental assessments in the region and meeting with community members to seek their opinions of the site.

2.4. The Bellingen Local Environmental Plan 2010

The Bellingen LEP 2010 provides statutory protection for items already listed as being of heritage significance (Schedule 5), items that fall under the ambit of the Heritage Act 1977 (NSW) and Aboriginal Objects under the National Parks and Wildlife Act 1974 (NSW). It aims to ensure best practice components of the heritage decision making process are followed.

Under the Bellingen LEP 2010, development consent is required from Bellingen Shire Council for any of the following actions (Part 5.10.4):

a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):

   i. a heritage item,

   ii. an Aboriginal object,

iii. a building, work, relic, or tree within a conservation area,

b) altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,

c) disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged, or destroyed,

d) disturbing or excavating an Aboriginal place of heritage significance,

e) erecting a building on land:

   i. on which a heritage item is located or that is within a heritage conservation area, or

   ii. on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance

f) subdividing land:

   i. on which a heritage item is located or that is within a heritage conservation area, or

   ii. on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.

Regarding Aboriginal Cultural Heritage significance (Part 5.10.8) the consent authority must, before granting consent under this clause to the carrying out of development in a place of Aboriginal heritage significance;

a) consider the effect of the proposed development on the heritage significance of the place and any Aboriginal object known or reasonably likely to be located at the place, and

b) notify the local Aboriginal communities (in such way as it thinks appropriate) about the application and take into consideration any response received within 28 days after the notice is sent.

The Project Area is not identified as an item of environmental heritage (Schedule 5) under the Bellingen Local Environment Plan ('LEP') 2010.

3. ABORIGINAL COMMUNITY CONSULTATION

The ACHCRP Guidelines act as a guide for conducting the community consultation process. It contains a number of minimum consultation standards, one of which requires the preparation of a methodology for conducting the cultural heritage assessment. This methodology outlines the basic steps that need to be undertaken to determine the nature of the cultural heritage of the site, and the approaches required to manage that heritage.

3.1. Community Knowledge

Everick makes a commitment to the Aboriginal community to document the consultation process as fully as possible. We will include all written comments we receive from the Aboriginal community in our final report. This is regardless of whether they are critical of the process we have undertaken or our final recommendations. In doing so, we hope to make an informed and accurate assessment of the significance of any cultural heritage within the Project Area.

Coffs Harbour and District LALC was contacted via email on Friday 15 October 2021 informing them of the Project and requesting sites officer attendance for an inspection late in the subsequent week of the 18th of October (see Appendix B). Matt Smith responses by email on Tuesday 19 October 2021, confirming availability for Uncle Ian Brown and Launa Ferguson for the 22nd of October 2021.

A site inspection of the Project Area was undertaken on 22 October 2021 with Uncle Ian Brown and Launa Ferguson from Coffs harbour and District LALC and Everick Staff Tim Hill (Principal Northern NSW), Alyce Cameron (Senior Archaeologist) and Matt Finlayson (Archaeologist).

4. DESKTOP ASSESSMENT: ABORIGINAL CULTURAL HERITAGE

4.1. Environmental Context

The Project Area is located adjacent to the north bank of the Kalang River (Figure 4). The elevation of the Project Area ranges from 7–37 metres above sea level (ASL). The highest part of the Project Area is adjacent to South Arm Road situated on a ridgeline and slopes southeast. From the ridgeline there are a series of short gently sloping spurs intersected by small drainage lines and gullies. The drainage lines and gullies drain into the wetland at the base of the steep break of slopes from the spurs. Along the southern extent of the Project Area is a lower-lying ridgeline between the wetland and the Kalang River. The slopes from the southern ridgeline towards the swamp / wetland are relatively steep (Figure 4).

The 1967 aerial imagery show that the Project Area has been partially cleared of vegetation (

Figure 5). This aerial also shows the swamp / wetland through the centre of the Project Area. In comparison, the 1997 aerial imagery (

Figure 6) show that much the vegetation present in the Project Area is regrowth. The parish map from 1913 also shows that the Project Area was noted as being partly swamp / wetland (Figure 7). Comparison of the parish maps between 1913 to 1959 (Figure 8) also show that the boundary of the Project Area has had very few changes to it over time.

The current land use of the Project Area is predominately listed as residual native cover, and the current use for it is low intensity grazing.

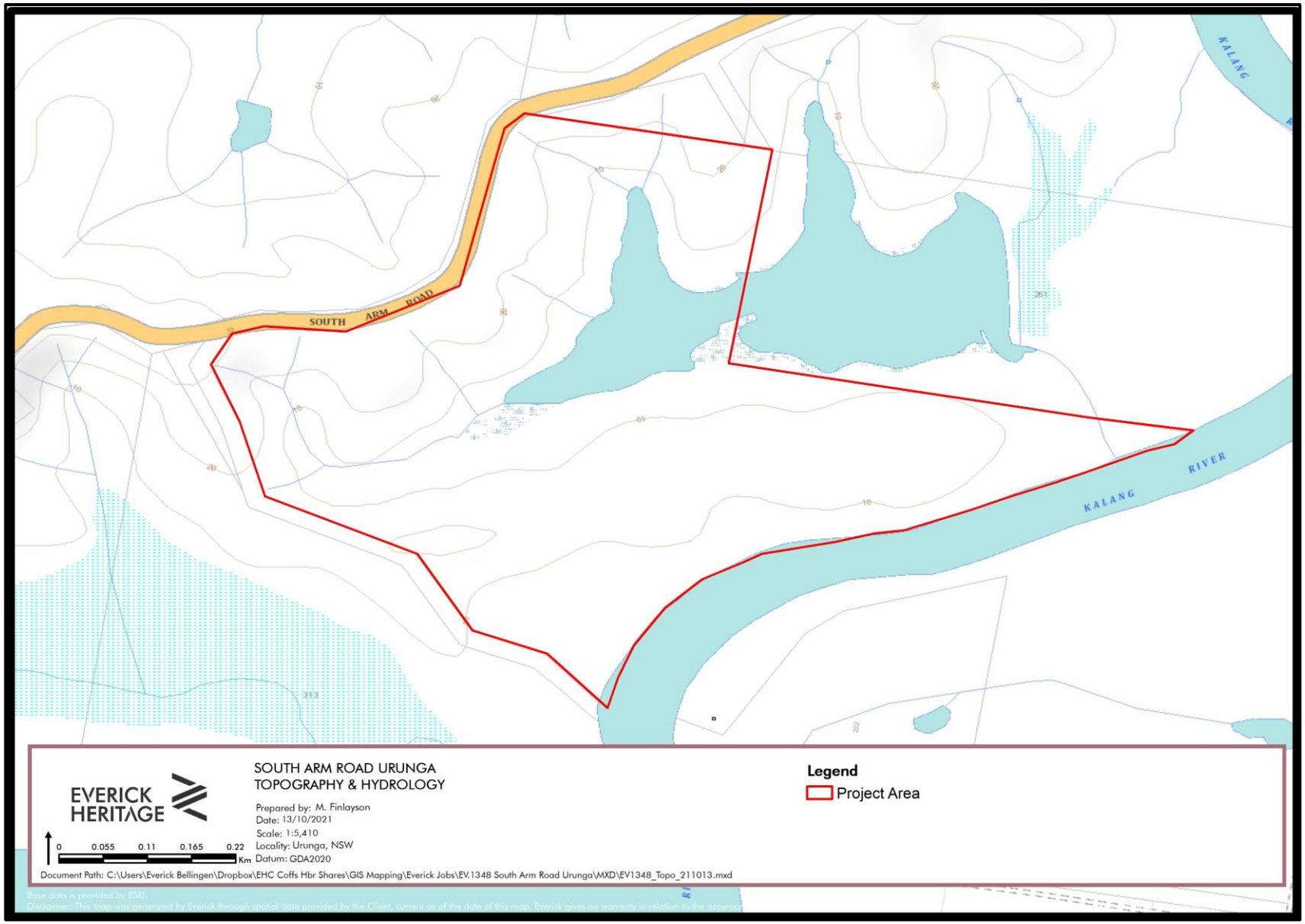

Figure 4: Topography of the Project Area.

Figure 5: 1967 historic aerial.

Figure 6: 1997 historic aerial.

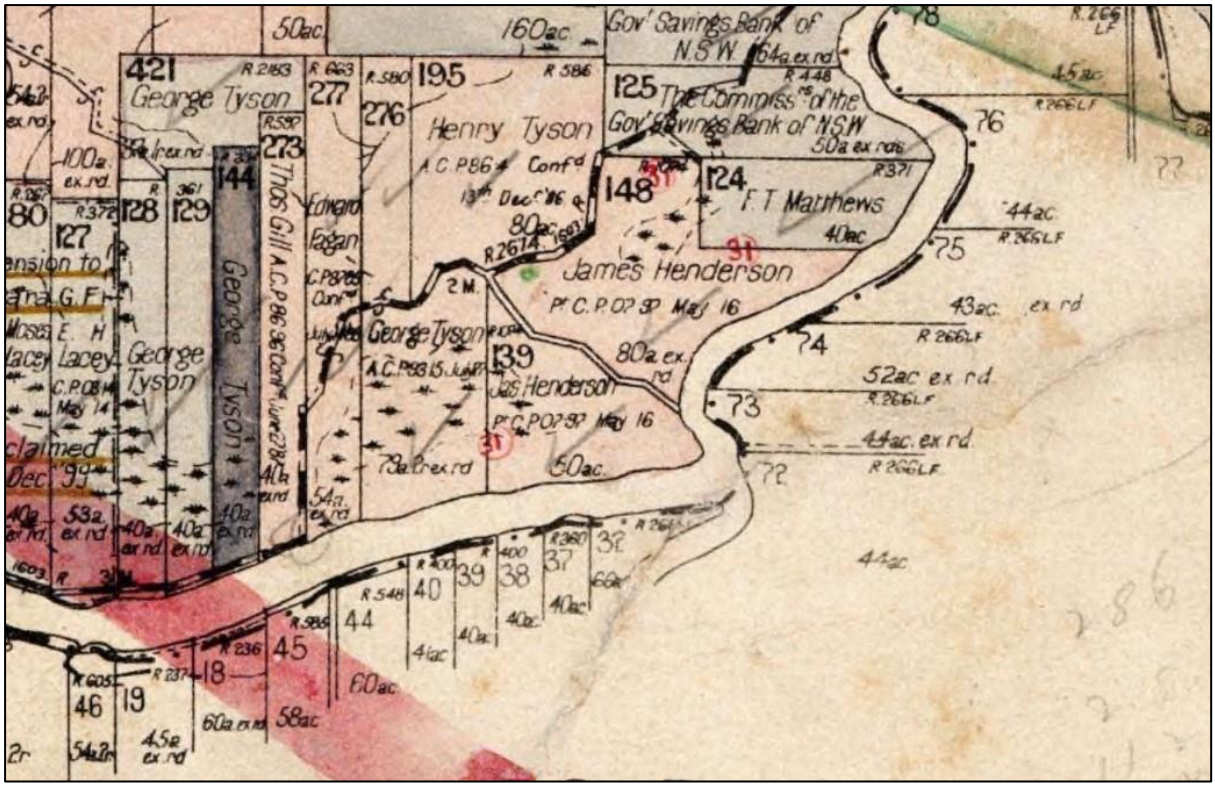

Figure 7: 1913 Parish map.

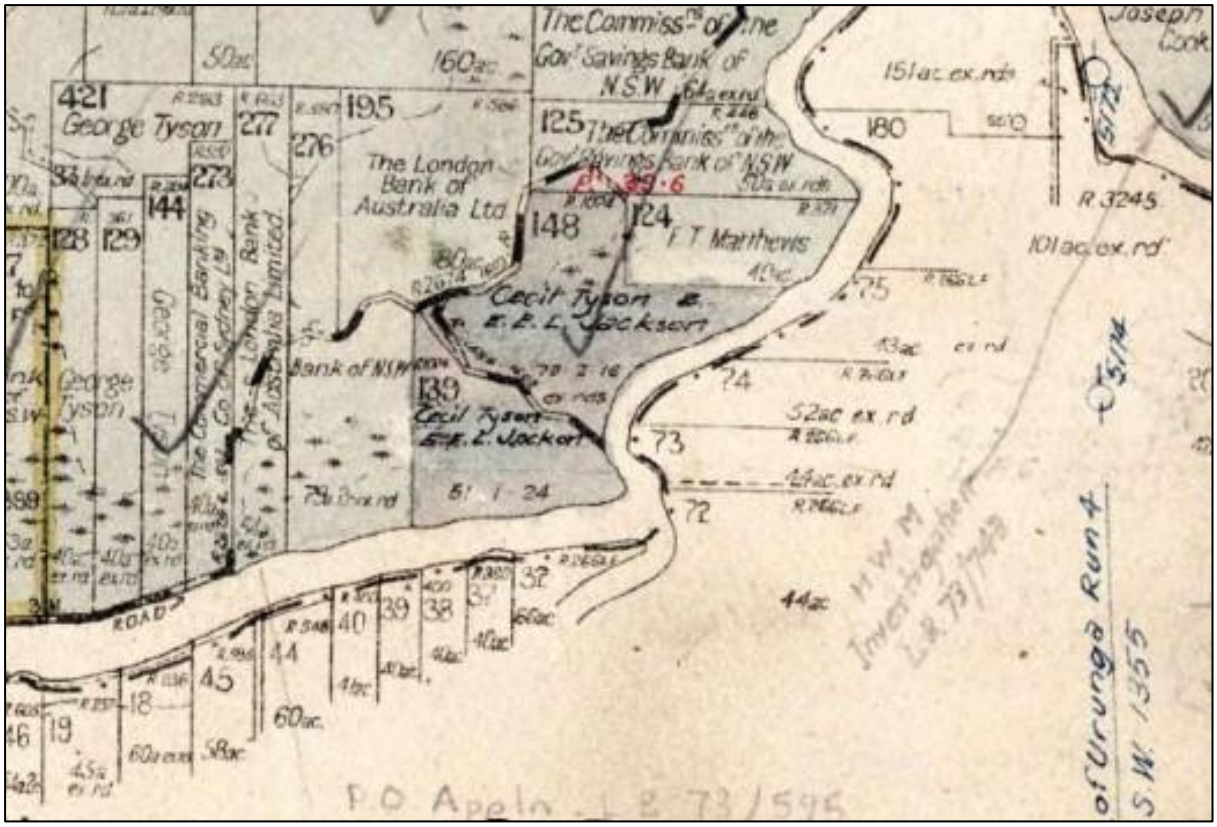

Figure 8: 1959 Parish map.

The Project Area is noted to comprise the Charlmont, Raleigh and Pine Creek soil landscapes (Milford 2001). Details for these soil landscapes are provided below (Millford 2001; see Table 1 and Figure 9). The majority of the Project Area which will be impacted by the proposal is in the

Pine Creek soil landscape. The Charlmont soil landscape corresponds with the swamp / wetland's location inside the Project Area and sections of the minor drainage lines which drain into the swamp / wetlands.

Table 1: Summary of soil landscape descriptions.

Soil landscape	Description	Vegetation model
Charlmont (Millford 2001:149)	Landscape—broad, flat to gently inclined, occasionally elongated swampy floodplains and backplains along lower intertidal reaches of the Bellinger and Kalang rivers. Local relief <10 m, slopes <2%, elevation <10 m. Almost completely cleared closed-scrub, open-scrub and herbland. Soils— deep (>200 cm), poorly drained Yellow Podzolic Soils (Dy5.11), structured plastic clays (Gn3.90; Uf6.61) and Gleyed Podzolic Soils (Dg4.11).	Almost completely cleared closed-scrub, open-scrub and herbland. The original closed-forest is strongly dominated by broad-leaved paperbark (*Melaleuca quinquenervia*) along with very occasional swamp oak (*Casuarina glauca*) and swamp mahogany (*Eucalyptus robusta*). Ground cover is dominated by blady grass (*Imperata cylindrica*) and spiny-headed mat-rush (*Lomandra longifolia*). In more open, partially grazed areas, other species such as couch grass (*Cynodon dactylon*) and buffalo grass (*Stenotaphrum secundatum*) are found, with various species of rush, e.g., Juncus planifolius, growing along the edges of standing water. Cleared and drained areas have mainly been replanted with improved pastures
Raleigh (Millford 2001:121)	Landscape—long, narrow, curved fluvial levees and scrolls on the meander plain of the tidal Bellinger and Kalang Rivers. Local relief 1–5 m, elevation <10 m. Slopes are generally <2% on upper surfaces and up to 33% on side slopes Soils—deep (>150 cm), moderately well-drained to poorly drained Earthy Sands, alluvial loams, alluvial clays, Yellow Podzolic Soils and Gleyed Podzolic Soils.	The original open-forest has been almost completely cleared and replaced with improved pastures. Narrow tree belts are commonly found growing along present levees and include species such as river oak (*Casuarina cunninghamii*) and broad-leaved paperbark (*Melaleuca quinquenervia*), plus the introduced camphor laurel (*Cinnamomum camphora*).
Pine Creek (Milford 2001:114)	Landscape—rolling low hills to hills on Permian metasediments in the Gleniffer Hills, and as lower slopes in valleys draining the Horseshoe Ranges. Local relief up to 130 m, slopes 10–33%, elevation 10–140 m in the hills around and to the east of Bellingen, and 20–300 m in the Horseshoe Ranges. Soils—deep (>150 cm), moderately well-drained structured Brown Earths (Gn3.21) and Yellow Earths (Gn3.71) on crests and slopes, with deep (>150 cm), moderately well-	Partially cleared tall open-forest grading to tall closed forest in more sheltered positions. Blackbutt (*Eucalyptus pilularis*) dominates the ridges, with narrow-leaved white mahogany (*E. acmenoides*), red mahogany (*E. resinifera*), grey ironbark (*E. paniculata*) and grey gum (*E. propinqua*) on the more exposed north-facing ridges and upper slopes. Downslope, tallowwood (*E. microcorys*) and Sydney blue gum (*E. saligna*) dominate a tall, closed forest (wet sclerophyll forest), with flooded gum (*E.*

Soil landscape	Description	Vegetation model
	drained Brown Podzolic Soils (Db1.11) and Yellow Podzolic Soils (Dy2.11) on steeper slopes.	*grandis*) occupying a lower slope position along the valleys. In the more sheltered valley floors are found patches of viney scrub, which has often been extensively colonised by exotic weeds such as lantana (*Lantana camara*).

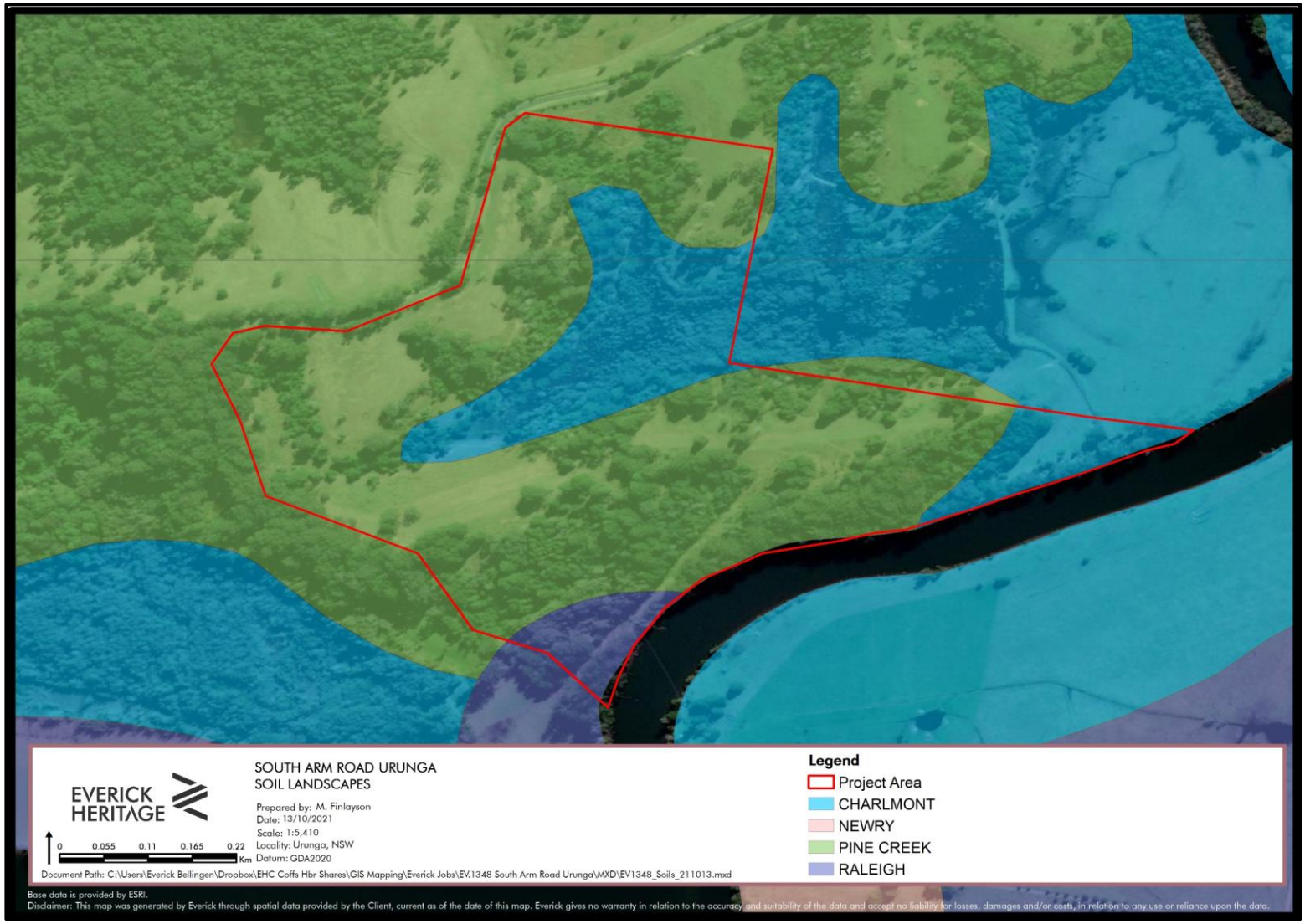

Figure 9: Project Area soil landscape mapping.

4.2. The Aboriginal Heritage Information Management System (AHIMS)

An 'Extensive' search was undertaken of the AHIMS database (Reference #630375) for Lot 148 DP 755557 with a 1000 m buffer on 14 October 2021 (Table 2 and Appendix A). Eight (8) Aboriginal sites were returned by the AHIMS search, none of which have information restrictions applied. Of the sites, three (3) are recorded as Potential Archaeological Deposits ('PADs'), two (2) are recorded as 'artefact', and three (3) are designated 'not a site'. Most of the sites are inferred to have been recorded in association with Pacific Highway upgrades (see Figure 10). The closest sites are 21-6-0301 (South Rrm Road Artefact 1), located 730 metres to the southwest of the Project Area and 21-3-0175 (KRB-1 (Coffs Harbour)) 350 metres to the northeast of the Project Area on South Arm Road. Three of the PADs which were recorded in relation to the bypass (21-3-0173, 21-6-321 and 21-6-322) have been investigated using subsurface testing during which no Aboriginal objects or features were identified and have since been updated on AHIMS to 'not a site'.

Table 2: AHIMS search results (AHIMS ID 630375).

Site ID	Site Name	Datum	Easting	Northing	Site Feature
21-6-0301	south arm road artefact 1	GDA	497804	6625526	Artefacts
21-6-0322	WC-U-PAD 4	GDA	497817	6625970	Not a site. Was recorded as a Potential Archaeological Deposit (PAD)
21-6-0321	WC-U-PAD 3	GDA	497898	6625880	Not a site. Was recorded as a Potential Archaeological Deposit (PAD)
21-6-0384	Kalang Flat PAD 3	GDA	497943	6624971	Potential Archaeological Deposit (PAD)
21-6-0386	Kalang River Bank PAD 2	GDA	497948	6625088	Potential Archaeological Deposit (PAD)
21-3-0173	WC-U-PAD 5	GDA	498146	6626649	Not a site. Was recorded as a Potential Archaeological Deposit (PAD)

21-3-0175	KRB-1 (Coffs Harbour)	GDA	499200	6626400	Artefacts
21-6-0383	Kalang Flat PAD 2	GDA	497883	6624917	Potential Archaeological Deposit (PAD)

Figure 10: AHIMS search results (Search ID 630375).

4.3. Other Heritage Registers

The following heritage registers were accessed on 14 October 2021:

- **The National Heritage List (Australian Heritage Council):** Contains no Aboriginal heritage listings within or in proximity to the Project Area.
- **Commonwealth Heritage List (Australian Heritage Council):** Contains no Aboriginal heritage listings within or in proximity to the Project Area.
- **The State Heritage Register**:
    a) contains no Aboriginal heritage listings in Section 1 (Items listed under the NSW Act as Aboriginal Places) within in proximity to the Project Area
    b) contains no Aboriginal heritage listings in Section 2 (Items listed under the NSW Heritage Act) within in proximity to the Project Area
    c) contains no Aboriginal heritage listings in Section 3 (Items listed by Local Government and State Agencies) within or in proximity to the Project Area.
- **Bellingen LEP (2010):** Contains no listings in proximity to the Project Area.

5. SELECTED ARCHAEOLOGICAL SYNTHESIS AND PREDICTIONS

5.1. Ethnohistory

The township of Urunga is located within the Gumbayngirr Language area, which is generally mapped south to the Nambucca River and west to the escarpment of the upper Kalang River (see Godwin 1990 for a regional overview of language areas). In general, Aboriginal groups in the Gumbayngirr and adjoining areas formed relatively discrete 'clans' (earlier known as 'hordes'). However, movement of individuals between these groups was common (see Calley 1959 for a detailed analysis of the neighbouring Bandjalang social organisation). The Aboriginal population of the Bellinger River was estimated to be 500-600, with a specific reference by Hodgkinson in the 1840's of an Aboriginal group between the Kalang and Bellinger Rivers (Collins 2008: 9–10; Figure 11)). The observation of 1700 people for a tribal fight on North Beach in the 1880's is indicative of the potential capacity and productivity of the area (Braithewaite and Beard 1978). Hodgkinson makes the following comment on the tribes of the Nambucca Valley;

> Each of them contains on an average from eighty to a hundred men and women, exclusive of children, but the whole body of a tribe is never united on the same spot, unless on some important occasion, such as to deliberate on making war with some adjacent tribe, to dance a Corroberree, perform the Cawarra ceremonies, or join in a fight. They are more generally divided into small parties of eight or ten men, with their women and children, for the greater convenience of hunting, and these detached companies roam over any part of the country within the prescribed limits of the main tribe to which they belong (Hodgkinson 1845 Vol IV)

Ethnohistorical observations (see Godwin 1990 and Belshaw 1978) generally describe a regional material culture and economy which includes a general dependence on coastal and estuarine resources with less intensive use of forest resources (see Figure 11 for Hendersons 1845 drawing of fishing on the Bellinger). Rainforests and wet sclerophyll forests were observed to be highly utilised by small hunting and foraging groups which in effect had a very small archaeological footprint. The main technological adaptations relevant to archaeological assessments are the use of wooden implements such as spears, bowls and clubs which were

produced using locally available beach stones. Whilst numerous observations of these implements are available there are few ethnographic observations of knapping from the NSW North Coast. Other technologies included canoes and nets/ fibres for fishing. However, shell species and carbohydrate rich plants provided the main source of food and required no intensive production.

Hodgkinson also described the Gumbainggirr as utilising such animal resources as kangaroo (Hodgkinson 1845:28), snake (described as "carpet-serpent"), opossum, goanna (described as "a large dew-lizard") and honey from native bees. According to Hodgkinson there were numerous floral resources in the inland areas that were utilised, with it being "grassy forest land, thickly timbered with gigantic black-butt gums, and other eucalypti" (Hodgkinson1845:28) as well as swamp oak, cedar, ferns and rosewood (ibid:37). He described the Gumbainggirr eating fruit from the native fig-tree (ibid:33). He also described the inland areas as well resourced in terms of water, with numerous creeks and permanent chains of water holes (Hodgkinson 1845:27-28).

An Aboriginal Reserve was established on Urunga Island in 1882 and later at Yellow Rock (to the west of Mylestom; see Figure 12). The Urunga Island Reserve was relocated to Hungry Head in 1921 after a large flood. This Reserve operated until 1937 when residents were resettled at Kempsey and Yellow Rock (see Ahoy and Murphy 1996; Braithewaite and Beard 1978).

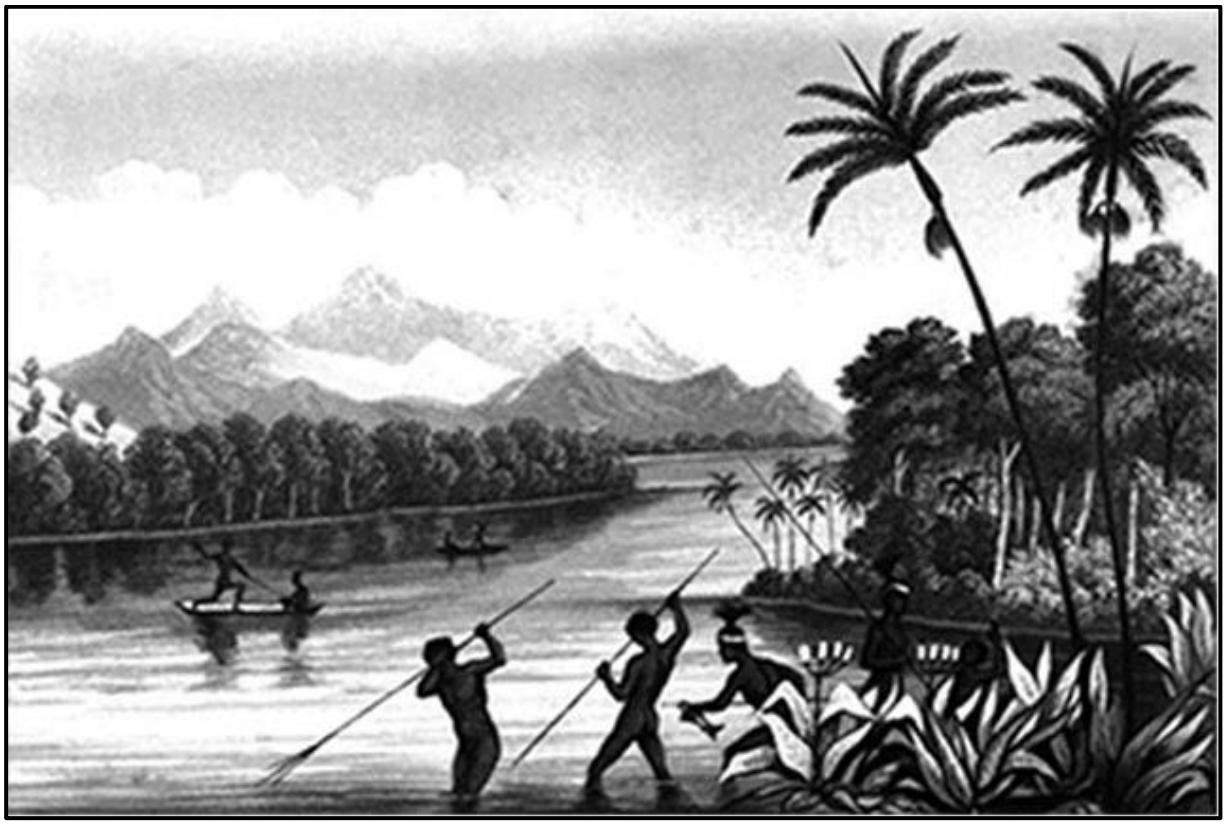

Figure 11: 'Aboriginals spearing fish on the Bellinger' (Hodgkinson 1845 source Bellingen Historical Society).

Figure 12: 'Yellow Rock Mission' (source gumbayngirr.weebly.com).

5.2. Previous Archaeological Research

5.2.1. Coffs Harbour–Urunga Forestry Management Areas (Davies and Stewart Zerba 1995)

The Coffs Harbour–Urunga Forestry Management study provides the most comprehensive regional assessment of the archaeological values and potential of the Coffs Coast hinterland. Whilst it is acknowledged that the sub-coastal zone which comprises the Project Area is not included within the Davies study, some of its findings have practical application as the study was structured around 'land systems' (Davies and Stewart-Zerba 2005). Overall, the sampling strategy employed by the study was biased towards the location of open campsites, stone artefact scatters and isolated finds. However, the study found a strong correlation between archaeological sites; the degree of slope and the sandiness of soils and concluded that most archaeological sites occurred on the crests of spurs in areas which would have been dry sclerophyll or open forest. Regionally, most archaeological sites in the study area were associated with the dissected escarpment and ranges with relatively few sites found on near coastal low hills and rises. However, the study found that whilst 'site density' was greater in the escarpment area the number of artefacts per site was much lower when compared to coastal and sub-coastal sites. This finding supports a model of greater mobility through the escarpment and a relative absence of permanent camps when compared resource rich marine and estuarine areas of the coastline.

5.2.2. Repton to Bayldon Pacific Highway Upgrade (Officer and Navin 1998)

Officer and Navin completed an archaeological assessment for the duplication of the Pacific Highway between Repton and Lyons Road Sawtell (Officer and Navin 1998). This alignment included numerous landscapes analogous with the Project Area, however, is typically much closer to the coastline. The study identified a single artefact on a spur line at Reedy Creek (BH1) which was described as a river pebble.

5.2.3. Gundamain Caravan Park (Collins 2008)

Collins (2008) undertook an archaeological assessment for a proposed residential subdivision at South Urunga (Lot 130 DP755552) at the Gundamain Caravan Park which is in a similar landscape to the Project Area. This survey comprised the area of alluvial flats below the hillslope

and immediately adjacent to the southern bank of the Kalang River. The study identified one (1) Aboriginal stone (siltstone) artefact (RL-1 2210128). The study concluded that the artefact had most likely moved downslope from the ridgeline of the Pacific Highway (Collins 2008:17).

5.2.4. Pacific Highway Upgrade: Warrell Creek to Urunga (SKM 2010)

The Warrell Creek to Urunga Pacific Highway Upgrade was a major infrastructure development which terminated to the east of the Project Area. However, the assessment area for the upgrade traversed several landforms similar in topography and vegetation to the Project Area. This study proposed a model whereby landscapes analogous to the Project Area (gently sloping crests and spur lines with slope <10%) were predicted as having the highest potential to contain Aboriginal sites. However, the model noted that this potential reduced significantly with distance from water (SKM 2010:353).

The Warrell Creek to Urunga survey identified eight (8) archaeological sites and mapped an additional 29 Potential Archaeological Deposits ('PADs'). The location of these sites typically supported the model for use of spur lines and ridge crests. A major site was located on the 'Kalang Spur' comprising:

> *…76 surface artefacts located on the crest of north-east to south-west trending spur. The spur led towards the Kalang River in the north-east. The artefacts consist of fine, medium and coarse-grained sandstone flaked artefacts, with a small amount of other materials such as chert. The artefacts were scattered along an access track in a forested area on private property. During subsurface testing, a further 19 artefacts were discovered on the crest and upper slope of the spur, this included some ochre and artefacts with ochre residue.* (SKM 2010: 355)

The Kalang Spur is the main ridge south of the Kalang River. Of note is that the archaeological testing program sampled 25 of a total 34 identified PADs, of which only five contained Aboriginal objects. The five PADs where artefacts were recorded were already known to contain Aboriginal sites (SKM 2010:353–355).

5.2.5. 107 Yellow Rock Road residential subdivision (Saad 2014; Hill 2015)

107 Yellow Rock Road required the survey of a large area of land to the north of the Kalang River, approximately 3 kilometres (km) northeast of the Project Area. The assessment was conducted by Umwelt in 2014 and Everick in 2015. The results of the Umwelt survey concluded

that two Aboriginal sites and a PAD were present within the assessment area. The first aboriginal site was noted to be an isolated find (22-1-0470) and the second (22-1-0048) a midden to the west of the highway (Saad 2014:3). The PAD was identified due to its proximity to water, identification of an Aboriginal object within the same landform, the undisturbed nature of the landform, and the sites proximity to shelter and resource rich landforms. Umwelt recommended proceeding with caution, and further archaeological research to be conducted on the PAD (Saad 2014:4).

The survey conducted in the following year by Everick assessed the works conducted by Umwelt and found them lacking substance. The PAD was discounted due to the high disturbance in the area, with probe investigations finding the PAD to be likely the result of historical dredging of the Kalang River (Hill 2015:3). The isolated find (22-1-0470) was noted to be underneath an existing residential dwelling and so, works were deemed not to impact the site (Hill 2015:4). Similarly, the Yellow Rock midden was concluded to fall outside of the assessment area, and therefore would also not be impacted by the proposed works. Finally, the Everick survey found a lack of statements specifically addressing the due diligence code in relation to Aboriginal cultural heritage requirements (Hill 2015:1).

5.2.6. Urunga Heights (McCardle 2013)

Penny McCardle was commissioned to undertake a cultural heritage assessment of the proposed Urunga Heights residential development south of Urunga. The assessment included consultation in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010); an archaeological survey; and production of an archaeological assessment report (2013).

The archaeological assessment included surface inspection of eroded trails, clearings, and creek lines with a focus on ridge crests and spurs. The report identified a single Aboriginal site (SU1) within the assessment area which was described as a 'core' located on Antinomy Trail. The study did not recommend additional investigations or map additional Potential Archaeological Deposits ('PADs'). The SU1 site was not registered on AHIMS by the author.

5.2.7. Urunga Heights (Everick 2018)

Everick (Hill et al. 2018) completed additional archaeological investigations of the residential zone of the Urunga Heights residential development. The investigation identified eight (8) sites,

which occur both on the ground surface and within the topsoil deposits to a maximum depth of approximately 140 mm. The density of stone artefacts was no greater than 5 per m^2 and isolated artefacts made up 50% of the site types.

Based on the sample surveys undertaken and consultation with RAPs the study concluded that additional stone artefact sites would be located within the assessment area. Based on the absence of a developed topsoil these artefacts would likely be located within the upper 150 mm of topsoil along the ridge crest in areas where there was not a history of significant soil disturbance. The study found that the impact of disturbance from historic forest clearing, and tomato horticulture is significant in some sections of the assessment area. Most of the artefacts located were broken or damaged, likely because of these disturbance activities.

5.2.8. Yarrahapinni and Way Way State Forest (Morwood and Collins 1991)

Morwood and Collins (1991) completed a study in the State Forest in the vicinity of Warrell Creek. They undertook a 20 % random sample of the dry sclerophyll forest and a similar non-random sample of exposed areas in the wet sclerophyll/rainforest. Visibility was a major problem in this survey and the authors state that "the predictive capacity of this methodology has been greatly reduced by the fact that all sites located occurred on tracks or other cleared areas. No sites were located in undisturbed vegetated areas" (Morwood and Collins 1991:42). This survey recorded 26 open artefact scatters at 13 locations. They noted that all finds were located within 6km of the coast and the frequency of these finds diminished in density from east to west. All artefacts were located on gradients below 10 degrees in both wet/dry/rainforest areas. However, variation in location of sites was noted. Sites in dry sclerophyll forests were located on ridge lines, saddles, along spur lines and spines of ridges whereas sites in wet sclerophyll/rainforest forest areas were concentrated on lower slopes or flats, close to permanent creeks (Morwood and Collins 1991:43).

5.2.9. Coffs Harbour to Kempsey transmission Line (Mills 1997, 1999)

Mills (1997b) conducted a heritage assessment of the potential impact upon heritage objects of the proposed upgrade of the 66kV power line from Coffs Harbour to Kempsey to a 132 kV transmission line. This survey identified four registered indigenous sites in the vicinity of the 66kV power line easement and 38 areas of potential archaeological sensitivity (PAS) based on an assessment of landform sensitivity and limited fieldwork. These 38 PAS areas included 7 areas

identified by the LALC as having high cultural significance for Aboriginal Communities. Mills (1999) conducted a full survey of all pole site locations and areas of track upgrade to determine the potential impact to heritage items from the power line upgrade. Pole locations were characterised as being within areas of high, moderate or low archaeological sensitivity. A total of 509 pole sites were surveyed. Of these 57 were identified as located in potentially highly sensitive landform units; 23 were in areas identified as highly culturally sensitive to the Aboriginal Community and 94 were located in moderately sensitive landform units. 334 pole locations were within areas of low archaeological sensitivity. Mills (2000) carried out a sub-surface testing program at sensitive pole sites along the proposed route of the 132kV transmission line from Kempsey to Coffs Harbour. A total of 159 pole sites were tested. Five sites were identified by the sub-surface investigation. These included four isolated finds and one midden site. It was concluded that the midden site contained midden material, but that the material had been relocated for use in stabilising concrete footings and flooring at a property in the area.

5.2.10. Giinagay Way, Urunga (Everick 2019)

In 2019, Everick (Hill et al. 2019) conducted an archaeological assessment of 3982 Giinagay Way, Urunga, for a proposed residential subdivision which is adjacent to the Urunga Heights

assessment area as undertaken by McCardle (2013) and Everick (Hill et al. 2018). As a ridge line containing a PAD identified by Everick (2018) extended into the Giinagay Way assessment area, test excavation was undertaken to understand the nature and extent of archaeological deposits. The test excavation programme consisted of 14 excavation pits, each measuring 1 m^2. No Aboriginal sites or objects were identified during the assessment, however, based on the proximity of previously recorded sites and the sensitive landform a ridge line between the coast and the Kalang River, the assessment concluded that there is a likelihood for low density stone artefact scatters to be present in the upper 150 mm of topsoil (Hill et al. 2019:49).

5.2.11. River Street Footpath (Everick 2020)

Everick (Hill and Finlayson 2020) completed archaeological investigation for the River Street Footpath on the north bank of the Bellinger River at Mylestom, NSW adjacent to the north of the Mylestom to Yellow Rock Road alignment of the assessment area. Survey of the area identified no Aboriginal objects or sites and it was determined that original topsoils on the north bank of the Bellinger River at Mylestom had been significantly disturbed by historic land use and that the area did not have a high potential to contain Aboriginal sites.

5.3. Aboriginal Site Predictive Model

The Project Area has the potential to contain Aboriginal archaeological sites, though, at a lower density compared to locations along the coast. The ridgeline on which South Arm Road is positioned and the northwest boundary of the Project Area is a potential location for archaeological sites such as artefact scatters, as is the southern ridgeline that runs parallel to the Kalang River. However, as the main Aboriginal campsites are known to occur closer to the coastline and estuary it is expected that artefacts scatters, should they exist would have low densities or comprise isolates artefacts. The steep slopes descending towards the wetlands are unlikely to contain any intact archaeological deposits due to the steepness of slope which is not condusive to occupation or travel and the history of ground disturbance resulting in topsoil erosion. The proximity of the Project Area to the Kalang River, increases the potential for Aboriginal sites to be identified in the Project Area.

6. FIELD SURVEY: ABORIGINAL CULTURAL HERITAGE

6.1. Constraints to Site Detection

An assessment of the constraints to site detection is made to assist in formulating a view as to the effectiveness of the field inspection to find Aboriginal sites and cultural heritage materials. It also assists in the forming of a view of the likelihood of concealed sites, keeping in mind a site-specific knowledge of the disturbance impacts that European land uses and natural processes may have had on the 'survivability' of Aboriginal sites in a Project Area.

The constraints to site detection are almost always most influenced by post European settlement land uses and seldom by natural erosion processes. The area of surface exposure and the degree of surface visibility within exposed surfaces are usually the product of 'recent' land uses for example land clearing, ploughing, road construction, natural erosion and accelerated (manmade) erosion (McDonald et al. 1990:92). In this case the major 'manmade' constraints to Aboriginal site survivability and detection are the former vegetation removal and use of the area for low intensity cattle grazing.

6.2. Site Inspection

A site inspection of the Project Area was undertaken on 22 October 2021 with Uncle Ian Brown and Aunty Launa Ferguson from Coffs Harbour and District LALC and Everick Staff Tim Hill (Principal Northern NSW), Alyce Cameron (Senior Archaeologist) and Matt Finlayson (Archaeologist).

The site inspection aimed to identify the potential for the proposed works to impact on Aboriginal objects (Table 3), and primarily focused on areas where the future residential buildings would be located. This consisted of the flatter elevated spurs adjacent to South Arm Road (Figure 13 and Figure 14), as well as the low lying ridgeline of Lot 8 parallel to the Kalang River (Figure 15 to Figure 17). The spurs were intersected with minor drainage lines and gullies which run into the wetlands at the base of the spurs and north of the southern ridgeline (Figure 18 and Figure 19).

Ground Surface Visibility (GSV) is a measure of how much ground surface can be seen at the time of an archaeological survey. It is typically worked out as a percentage of the overall

survey area, although it can also be worked out as a range when GSV changes dramatically. Table 3 present information on the extent to which survey data provides sufficient evidence for an evaluation of the distribution of archaeological materials across the Project Area. The evaluation of survey coverage provides a measure of the potential for each of the landform elements to reveal archaeological evidence. The calculations do not provide an exact percentage of area but a reasonable estimate of ground available for sampling. This procedure is accordance with the Due Diligence Code.

Surface visibility was partly limited due to grass coverage, though GSV was typically moderate to high (average of 30% for both landforms) for the region. As such, exposures were targeted that might have the potential to contain visible Aboriginal objects. Ground surface soil exposures consisted generally of mid brown loam, with the occasional small quartz gravels present on the ground surface. Larger amounts of pebble sized quartz were identified in exposures on the northern side of the Project Area. Disturbances across the Project Area include cattle grazing, an Essential Energy electricity transmission line, and vegetation clearance. The electricity transmission line intersects through the southeast corner of the Project Area.

No evidence of Aboriginal objects or middens were identified on the ground surface during the site inspection.

Table 3: Survey coverage.

Survey Unit	Landform	Survey Unit Area (m^2)	Visibility (%)	Exposure (%)	Effective Coverage Area (m^2)	Effective Coverage (%)
1. South Ridge (Lot 8)	Ridgeline	4936	30%	20%	296	6%
2. South Arm Road	Ridgeline & spurs	10784	30%	20%	647	6%

Figure 13: View northwest towards South Arm Road along spur line.

Figure 14: Typical ground surface visibility at spur lines.

Figure 15: View southeast from South Arm Road towards southern ridgeline.

Figure 16: Ground surface visibility at southern ridgeline.

Figure 17: View southeast towards Kalang River.

Figure 18: View of minor drainage lines and gullies into wetlands.

Figure 19: View towards northern section of Project Area from the southern ridgeline.

7. RESULTS OF ABORIGINAL CULTURAL HERITAGE ASSESSMENT

As a result of the desktop study, field inspection and consultation with Coffs Harbour and District LALC, the following can be concluded:

a) No Aboriginal sites or sites of cultural significance, including archaeological sites, are known to occur within the Project Area.

b) The archaeological inspection was not significantly constrained by ground cover or vegetation. Only short grass covered the Project Area on the northern and southern ridgeline, and there were exposures present on the flat elevated areas and gentle top of slopes.

c) The majority of the Project Area is comprised of either small spurs, slopes, or wetlands. The landform with the most potential for archaeological deposits is the southern ridgeline that overlooks the Kalang River (Lot 8).

d) Having consideration for the predictive model it is considered that the Project Area does not have a high potential to contain Aboriginal sites. It is considered likely that sites in the area would be low density artefact scatters or isolated finds from groups using the ridgeline to traverse between the mountains and the coast.

Based on the desktop assessment, site inspection and consultation with Coffs Harbour and District LALC, it is considered that the proposed works, being the rezoning of the Project Area, will not have an impact on Aboriginal objects. As such, additional community consultation and investigation is not required to comply with the National Parks and Wildlife Act (1974) and Regulations (2019).

8. RECOMMENDATIONS

The assessment has concluded that the proposed rezoning of the Project Area is unlikely to impact on Aboriginal objects and will not impact on any known places or sites of cultural significance to the Aboriginal community. As such additional consultation and archaeological investigation is not required. However, the following recommendations are provided for the as a precautionary measure to mitigate impacts to potential Aboriginal heritage values.

Recommendation 1: Aboriginal Objects Find Procedure

It is recommended that Aboriginal sites officers from the Coffs Harbour and District LALC are engaged as "spotters" during the topsoil removal on Proposed Lot 8 on the southern ridgeline to assist the Proponent to implement the Aboriginal Objects find procedure.

It is recommended that if suspected Aboriginal material has been uncovered because of development activities within the Project Area:

a) Work in the surrounding area is to stop immediately.

b) A temporary fence is to be erected around the site, with a buffer zone of at least 10 metres (m)around the known edge of the site.

c) An appropriately qualified archaeological consultant is to be engaged to identify the material.

d) Should the works be deemed to have harmed the Aboriginal objects the DPI&E should be notified immediately via the EPA Enviro Hotline.

Recommendation 2: Aboriginal Human Remains

Although it is unlikely that Aboriginal Human Remains will be located at any stage during earthworks within the Project Area, should this event arise it is recommended that all works must halt in the immediate area to prevent any further impacts to the remains. The site should be cordoned off and the remains themselves should be left untouched. The nearest Police Station (Bellingen), the Coffs Harbour and District LALC and the DPI&E Regional Office (Coffs Harbour) are all to be notified as soon as possible. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the Site for criminal activities, the Aboriginal community and Heritage NSW should be consulted as to how the remains should be dealt with. Work may

only resume after agreement is reached between all notified parties, provided it is in accordance with all parties' statutory obligations.

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APPENDIX A: AHIMS EXTENSIVE SEARCH RESULTS

AHIMS Web Services (AWS)
Extensive search - Site list report

Your Ref/PO Number : EV1348
Client Service ID : 630375

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
21-6-0301	south arm road artefact 1	GDA	56	497804	6625526	Open site	Valid	Artefact : -		
	Contact	Recorders	Ms.Vanessa Edmonds					Permits	3469	
21-6-0322	WC-U-PAD 4	GDA	56	497817	6625970	Open site	Not a Site	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Ms.Rose Reid,Ms.Rose Reid					Permits		
21-6-0321	WC-U-PAD 3	GDA	56	497898	6625880	Open site	Not a Site	Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Ms.Rose Reid,Ms.Rose Reid					Permits		
21-6-0384	Kalang Flat PAD 3	GDA	56	497943	6624971	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Jacobs Group (Australia) Pty Ltd - Darwin,Doctor.David Collard					Permits		
21-6-0386	Kalang River Bank PAD 2	GDA	56	497948	6625088	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Doctor.David Collard					Permits		
21-3-0173	WC-U-PAD 5	GDA	56	498146	6626649	Open site	Not a Site	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Ms.Rose Reid,Ms.Rose Reid					Permits		
21-3-0175	KRB-1 (Coffs Harbour)	GDA	56	499200	6626400	Open site	Valid	Artefact : -		4266
	Contact	Recorders	Mrs.Robynne Mills					Permits		
21-6-0383	Kalang Flat PAD 2	GDA	56	497883	6624917	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Jacobs Group (Australia) Pty Ltd - Darwin,Doctor.David Collard					Permits		

** Site Status
Valid - The site has been recorded and accepted onto the system as valid
Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.
Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground
Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

Report generated by AHIMS Web Service on 14/10/2021 for Matthew Finlayson for the following area at Lot : 148, DP:DP755557, Section : - with a Buffer of 1000 meters.. Number of Aboriginal sites and Aboriginal objects found is 8

This information is not guaranteed to be free from error omission. Heritage NSW and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

Page 1 of 1

APPENDIX B: CORRESPONDANCE WITH COFFS HARBOUR AND DISTRICT LALC

Email to Coffs Harbour & District LALC (15 October 2021)

From: Matthew Finlayson <m.finlayson@everick.net.au>

Sent: Friday, October 15, 2021 2:04 PM

To: Matthew Smith <programs@coffsharbourlalc.com.au>

Cc: Alyce Cameron <a.cameron@everick.net.au>; Tim Hill <t.hill@everick.net.au>

Subject: Site Inspection Request - South Arm Road, Urunga Development

Good Afternoon Matt,

Everick Heritage is conducting an Aboriginal Cultural Heritage Assessment for a proposal at Lot 148 DP 75557, South Arm Road, Urunga. The proposal includes a boundary adjustment and rezoning of Lot 148 to provide for eight (8) residential lots.

An Extensive Search of the AHIMS for Lot 148 with a 1000 m buffer returned eight (8) previously recorded sites, most of which are related to the nearby Pacific Highway upgrade. One site is however noted to be approximately 300 m to the northeast on South Arm Road.

We're looking at conducting our site inspection late next week with Uncle Ian Brown and Luana Ferguson. Could you please advise if Uncle Brownie and Luana will be available late next week to attend a site inspection?

If you have any questions, feel free to contact Tim Hill through usual channels on 0422 309 822 or by email at t.hill@everick.net.au

Kind Regards,

Matt Finlayson

BA, MA Heritage Management

Archaeologist (North Coast NSW)

Bellingen Ph: (02) 6655 0225

Brisbane Ph: (07) 3211 4478

Mobile: 0401 743 617

Email Response from Coffs Harbour & District LALC CEO (19 October 2021)

From: Matthew Smith <programs@coffsharbourlalc.com.au>

Sent: Tuesday, 19 October 2021 11:44 AM

To: Matthew Finlayson <m.finlayson@everick.net.au>

Cc: Alyce Cameron <a.cameron@everick.net.au>; Tim Hill <t.hill@everick.net.au>; Chris Spencer <ceo@coffsharbourlalc.com.au>

Subject: RE: Site Inspection Request - South Arm Road, Urunga Development

Hi Matthew,

Confirming Uncle Ian Brown and Aunty Launa Ferguson can be available for this Friday 22nd October 2021 for the below mentioned Site Inpection.

Could you please confirm Commencement Time?

Cheers,

Yaarri Yarraang

Matthew Smith

Working Days – Monday to Friday

ECOLOGICAL ASSESSMENT

LOT 148 DP 755557 SOUTH ARM RD URUNGA

Brendan Maher
BJM ENVIRONMENTAL
18/01/2022

Contents

Document ID	Version	Date	Checked By
ECO 2124	Final Draft	18/01/22	B Maher
ECO2229	Amended	21/08/2022	B Maher
ECO2302	HEV Amended	25/01/2023	B Maher
ECO2420	HEV Addendum	12/12/2024	B Maher

1. SUMMARY

The aim of this Ecological Assessment is to support a planning proposal rezoning of Lot 148 DP 755557 on South Arm Road at Urunga. Lot 148 is split zoned with RU4, C3 and C2 zoning. There is a small section of RU1 land to the southeast extent of the property and W2 zoned land at the Kalang River frontage. The proposed rezoning is for the RU4 land adjacent to South Arm Rd to be rezoned to R5. The current landuse is rural with cattle grazing being undertaken on the block. The lot has coastal wetlands mapped and the coastal wetland mapping polygon is also represented on the Biodiversity Values map.

The existing block is irregular in shape and at 26 Ha in area is limited in its viability for the carrying out of rural enterprises. There are substantial areas of wetland that have been created by earlier attempts to create a dam in low lying areas of the block. The dam wall and overflow structure can be seen at the south eastern extent of the wetland. The original attempt to dam the drainage lines resulted in a shallow dam that has allowed the intrusion of wetland vegetation.

The wetland vegetation is mapped as Coastal Wetland under the Coastal Management SEPP. Under the North Coast Regional Plan 2041, mapped Coastal Wetlands are considered to be High Environmental Value lands that require further protection and there is a requirement to address biodiversity assessment when a planning proposal has the potential to impact on the wetland area. The requirements for biodiversity assessment for planning proposals is provided within Section 6 of this report.

There are stands of native hardwoods scattered across the lot. These stands are regrowth and do not represent functioning vegetation communities. The age class of the stands is approximately 40yrs. The regrowth is predominantly in areas that are difficult to access and maintain such as the sides of gullies. There is limited development of a ground layer stratum due to the constant disturbance by grazing livestock and farm maintenance.

2. PLANNING PROPOSAL

The Planning Proposal aims to rezone certain lands on the subject site from RU4 Primary Production to R5 Large Lot Residential. The objective is for the proponent to be able to subdivide the R5 land into 1 ha residential lots. The land is currently being used for small scale cattle production and the venture is not viable due to the small area available for cattle grazing.

There is a mapped Coastal Wetland that is currently being impacted by the intrusion of cattle into the wetland area. The change of use will see the discontinuation of the cattle enterprise having positive effects on the wetland area. The proposal will not reduce the existing C2 zoning of the wetland and the new R5 zone will provide a 6m buffer to the wetland that will be incorporated into the existing C3 lands (Fig 1).

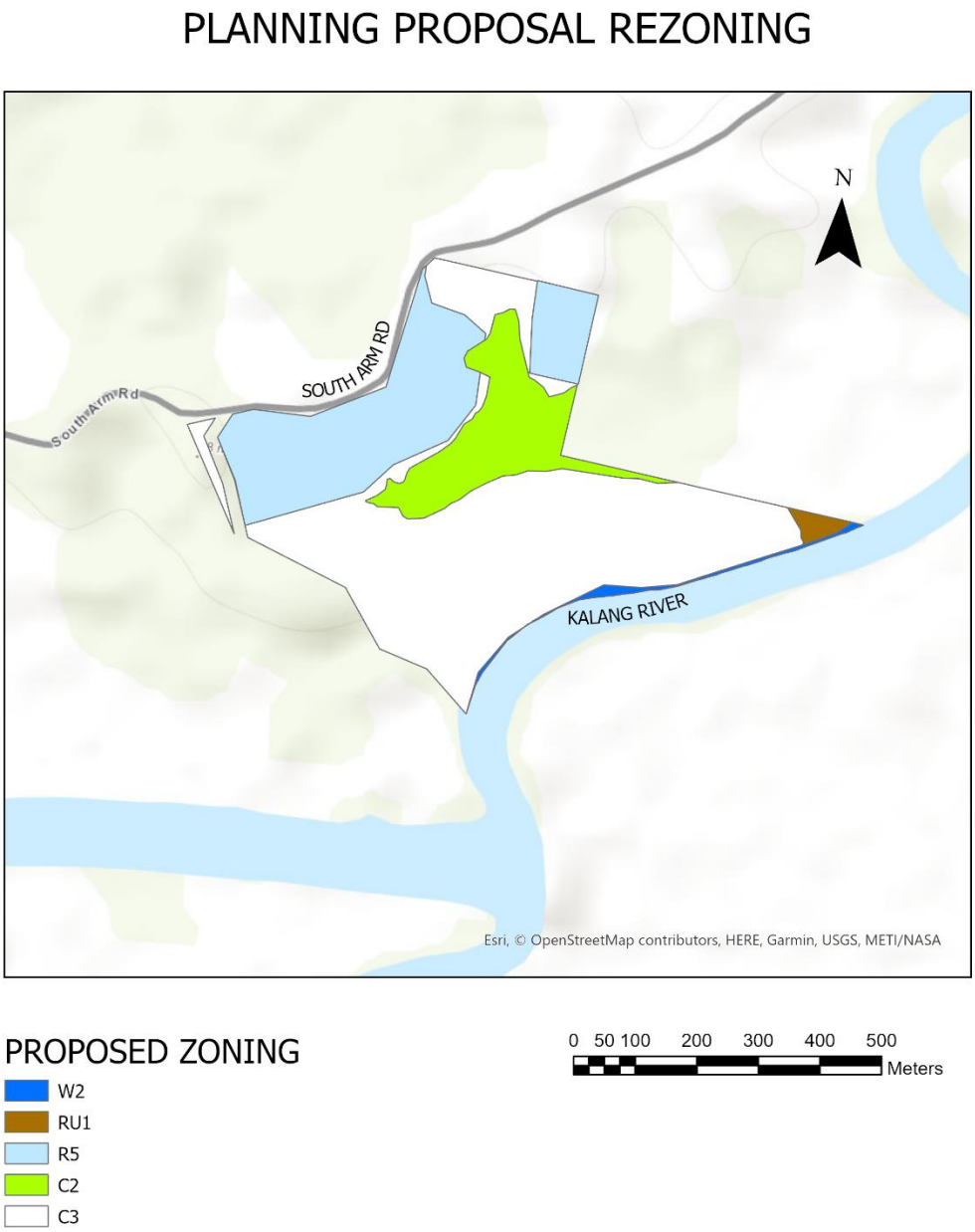

Figure 1. Proposed rezoning

3. LEGISLATIVE CONTEXT

In order to rezone land in NSW, a Planning Proposal is required to be submitted under the provisions of *Part 5 Section 45* of the *Environmental Planning and Assessment Regulation 2000.* Part 1 Section 1.7 of the *Environmental Planning and Assessment Act 1979*, requires the determining authority to consider the provisions of Part 7 of the *Biodiversity Conservation Act 2016* and Part 7A of the *Fisheries Management Act 1994* for development that may impact on the "terrestrial and aquatic environment".

The subject site is located in the Coastal Zone and any proposed development is subject to the provisions of the *Coastal Management Act 2016.* The State Environmental Planning Policy (Coastal Management) 2018, informs determining authorities on how to assess proposed development that is located within one of the four coastal management areas identified in Part 2 Section 5 of the *Coastal Management Act*.

The *Coastal Management SEPP* requires development consent for any activity in areas mapped as Coastal Wetland or Littoral Rainforest. Areas that are mapped as Coastal Wetland or Littoral Rainforest are also included on the Biodiversity Values Map. The clearing of coastal wetlands or littoral rainforest will also require assessment under the *Biodiversity Conservation Act 2016.*

3.1 NORTH COAST REGIONAL PLAN

The subject site is within lands covered by the North Coast Regional Plan 2041. Objective 3 of the Regional Plan is to protect regional biodiversity and areas of high environmental value within the region.

The Minister for Planning issued a list of Local Planning Directions to planning authorities under Section 9.1(2) of the *Environmental Planning and Assessment Act 1979.* The directions apply to planning proposals lodged with the Dept of Planning and Environment. The objective of the directions is to give legal effect to the goals, objectives and strategies of Regional Plans.

The Local Planning Directions outlines 9 focus areas with targeted directions to achieve the objectives and application of each focus area. This assessment addresses Direction 3.1 of Focus area 3 Biodiversity and Conservation and Direction 4.2 of Focus Area 4 Resilience and Hazards.

The North East branch of the Biodiversity Conservation Division of the Dept of Planning and Environment has issued guidelines for Biodiversity Assessment for Planning Proposals for the North Coast Region. This assessment addresses the objectives of Direction 3.1 and Direction 4.2 using the Guidelines for Biodiversity Assessment for Planning Proposals in section 6 of this report.

4. SITE DESCRIPTION

Figure 2. Site location

4.1 BIOREGIONALISATION

The site is in the NSW North Coast Bioregion, region code NNC, under the classification system of the Interim Biogeographic Regionalisation for Australia (IBRA). The current version of the IBRA is version 7. Under IBRA 7, the northern boundary of the NNC has been contracted to just south of Grafton and a new IBRA subregion added being the Coffs Coast and Escarpment subregion, code NNC06.

4.2 CADASTRE

The subject site is identified as Lot 148 DP 755557. It is located at South Arm Rd, Urunga, in the Bellingen LGA (Fig 2). The lot is 26.8 Ha in area. The zoning is split with RU4 zoned land running adjacent to South Arm Rd at the north western extent, C3 land adjacent to the

Kalang River at the southern extent and C2 land representing tracts of wetlands in the lower contours below 4m AHD. There is a small area of RU1 land at the south eastern extent of the site and W2 foreshore land at the Kalang River frontage.

4.3 TOPOGRAPHY

The site is located within the lower Kalang River floodplain. Topography varies from low foothills of the Fernmount Range down to the Kalang River floodplain. Elevation ranges from below 1m AHD to the 29m AHD contour. The lot has frontage to the Kalang River to the south and is within the lands of the upper estuary of the Kalang River in the Coastal Environment Area.

A low elevation drainage depression through the centre of the lot has been dammed in the past and the dam has been populated with wetland vegetation. The wetlands are constructed wetlands and is not a naturally occurring floodplain backswamp basin. The wetland does qualify floristically and hydrologically as Coastal Wetland as defined in the *SEPP Coastal Management 2018.*

4.4 GEOLOGY

The predominant stratigraphic unit at the site is classified as Bellingen slate derived from Permian metasediments known as the Nambucca Beds geological unit. The Bellingen slate comprises the footslopes of the Fernmount Range. The floodplain landscape consists of Quaternary alluvial sediments of varying origins. The wetland basin is composed of tidal estuarine deposits from the Holocene period. The remainder of the floodplain area is Quaternary alluvial deposits.

4.5 SOIL

The soil landscape for soils derived from the Bellingen slate unit are typically known as Pine Creek 9436pn from the Macksville Nambucca 1:100,000 soil landscape map sheet(Eddie 2000). Pine Creek soils are described as moderately well drained, gravelly silty clay brown or red Dermasols. Topsoils are moderately fertile where higher organic content is maintained. Sub soils have a low cation exchange capacity and a low pH (Eddie 2000).

The wetland and remaining floodplain soil landscape is described as Charlmont 9436ch from the Macksville soil landscape sheet. The landscape is defined as level alluvial deltaic backswamp and flood basins with elevation from <1m to <5m. Soils are poorly drained Sulfidic Hydrosols and Sulfidic Organosols(Eddie 2000). High acid sulfate risk when drained.

4.6 VEGETATION

The site has stands of scattered native hardwoods throughout with pockets of dense vegetation in the gullies and within the wetlands. The remaining land is pasture grasses.

5. SURVEY METHODOLOGY

5.1 DESKTOP REVIEW

A desktop review was carried out to identify any environmental constraints that may impact the site and the legislative requirements pertaining to the subject site in regard to allowable activities and environmental planning constraints that were directly associated with any proposed development.

The desktop assessment also looked at available data on threatened species that were known to have existed at the site. Available mapping overlays were obtained and projected in Arcgis Pro to illustrate any environmental management areas that were relevant to the site.

5.2 VEGETATION ASSESSMENT

The site was stratified for assessment using existing environmental management mapping overlays and land zoning maps (Fig 3). The site has an extensive area of wetland that is mapped as Coastal Wetland on the *Coastal Wetland and Littoral Rainforest Map.* There is also an area of Secondary B Preferred Koala Habitat mapped that is located adjacent to the Kalang River at the southern extent of the property.

The remainder of the property is semi cleared to grazing with scattered native hardwoods as solitary paddock trees or small woodlots. In some areas of the site where access by machinery is difficult or unachievable there are patches of dense vegetation that consists of pioneer native species and invasive exotic weed species. There are distinct differences in the floristic assemblage of native species that exist in the RU4 zoned area and the C3 zoned land. The remainder of the property was further stratified for assessment using the zone boundaries.

Four compartments were therefore established for assessment. The four compartments consisted of the wetland area, as mapped in the *Coastal Wetland and Littoral Rainforest Map*, the secondary B koala habitat that is adjacent to the Kalang River bank, as well as the land that is zoned C3 and the RU4 zoned land adjacent to South Arm Rd.

Each compartment was surveyed using random traverses through the most floristically diverse areas of the compartment. The vegetation compartments were assessed for structural attributes, floristic assemblage, vitality and habitat potential.

This report follows the standard National Vegetation Information System (NVIS) classification hierarchy that is used in NSW. The NSW system utilises a three tier system whereby plant communities are classified first as vegetation formations, of which there are 16 formations in NSW. The 16 vegetation formations are further divided into 99 vegetation classes in NSW. Each of the vegetation formations and classes are classified according to Keith from his book *Desert Dunes to Ocean Shores* (Keith 2004). The 99 vegetation classes are divided into >1500 plant community types (PCT) determined by the structural attributes, floristic diversity and topographic attributes that are exhibited at the site.

Plant communities were categorised as upper stratum, mid stratum and ground stratum. The most floristically abundant species forming the canopy were classed as dominant.

Typically in Australian native plant communities, dominant hardwoods are often found growing in association with other hardwood species. This relationship is called association and identification of those associations is key to accurately identifying plant community types.

The *Vegetation Map of the Bellingen Local Government Area; 2013. VIS_ ID 4188* was added as an overlay to the assessment compartments for comparison and confirmation of the field survey results. This assessment does not describe the vegetation in the compartments to as fine a scale as the Bellingen floristic mapping. Each compartment is described as per the existing structural attributes and floristic diversity and allocated the most likely community name as per the descriptions given in the National Vegetation Information System (NVIS).

5.3 FAUNA SURVEYS

A search of the Bionet Atlas database records for known sightings of threatened fauna within a ten year period and a minimum 10 kilometre bounding box from the site was carried out. That search established a list of potential fauna occurring at the site. Several opportunistic surveys of the site were carried out over the spring season of 2021. Surveys were conducted during fine weather between breaks in heavy rainfall events.

Survey effort included 4 nights spotlighting, wildlife camera traps were setup in likely locations where native wildlife would traverse. Bird surveys were undertaken during early mornings on three occasions during the spring season. A search of each of the compartments was performed to identify any potential habitat structures such as hollow logs, fallen timber, tree hollows, rock outcrops or dreys or intermittent camps.

Figure 3. Site stratification using environmental protection overlays and land zoning.

6. FLORA ASSESSMENT

Descriptions of the species present in each compartment are provided below. A full list of species diversity for each compartment is provided in Table 1. Each compartment has particular attributes that influence slight differences in floristic diversity on a small scale. On a landscape scale those differences would be considered normal variations in a plant community's floristic diversity due to soil, topography and aspect. For this assessment each compartment is described as separate units.

6.1 C3 ZONE

The C3 zoned lands have scattered stands of Tallowwood as small woodlots or isolated solitary trees. In this area the Tallowwood is the dominant species. The main associate of the Tallowwood is *Eucalyptus pilularis* (Blackbutt). Across the compartment there occurs sporadically patches of *Callistemon salignus* (Willow Bottlebrush) in small woodlots or in isolation as single individuals. There are also sporadic occurrences of *Alphitonia excelsa* (Red Ash).

The C3 zoned land shows structural and floristic variation across the compartment (Fig 4). There are steep slopes to the south above the river floodplain that are vegetated with endemic pioneer species and invasive exotic weed species. In these areas the undergrowth is thick and vines are common. The ground layer predominantly consists of vine growth and invasive weeds such as *Lantana camara,* (Lantana) and ferns.

Figure 4. Current drone image of the C3 zone looking South-west.

The ground layer beneath the Tallowwood consists of pasture grasses with limited recruitment of natural ground stratum species. Consistent grazing by cattle and maintenance activities such as slashing have kept the ground layer clear of native species recruitment. The pasture condition in this compartment is good with 100% cover across most of the area. This indicates a good depth of topsoil and a higher nutrient value.

The age class of the vegetation across the whole site is estimated to be approximately 40 years based on historical aerial imagery from July 1980, sourced from the NSW government Spatial Services website (Fig 5). No hollows were observed as the trees are not of an age class that would facilitate the formation of suitable hollows for wildlife utilisation (Gibbons & Lindenmayer 2002).

Table 1. Species list from the C3 zoned land.

Botanic Name	Common Name	Threatened Species Act
C3 ZONE		
Small fruited Grey Gum – Turpentine - Tallowwood moist open forest on foothills of the lower North Coast. PCT ID 1550 ; Not a TEC		
CANOPY		
Eucalyptus pilularis	Blackbutt	No
E. microcorys	Tallowwood	No
E.propinqua	Small Fruited Grey Gum	No
Corymbia intermedia	Pink Bloodwood	No
E. siderophloia	Grey Ironbark	No
E.acmeniodes	White Mahogany	No
Syncarpia glomulifera	Turpentine	No
MID STRATUM		
Glochidion ferdinandii	Cheese Tree	No
Alphitonia excelsa	Red Ash	No
Cryptocarya glaucescens	Jackwood	No
Jagera pseudorhus	Foambark	No
Guioa semiglauca	Guioa	No
GROUND LAYER		
Blechnum cartilagineum	Gristle fern	No
Hibbertia scandens	Guinea Vine	No

Figure5. Historical imagery from July 1980.

6.2 SECONDARY B PREFERRED KOALA HABITAT

The canopy stratum of the compartment in which the Secondary Koala habitat is mapped is dominated by *E. pilularis* (Blackbutt) and *Corymbia intermedia* (Pink Bloodwood) of varying age classes. Diameter at breast height over bark (DBHOB) ranges from 200mm to > 600mm. This compartment is located on south sloping land adjacent to the riverbank that appears to have shallow gravelly soils.

Growing in association with the dominant species are *Syncarpia glomulifera* (Turpentine) and *E. siderophloeia* (Grey Ironbark). Mid storey species include *Alphitonia excelsa* (Red Ash), *Allocasuarina torolosa* (Black Sheoak) and *Callistemon salignus* (Willow Bottlebrush).

This compartment has a sparse ground layer consisting of leaf litter and gravel (Fig 6). Soil landscape mapping shows the majority of this compartment is located on Pine Creek soils derived from the Nambucca Beds metasediments. In this location the top soil appears to be shallow and the soil is free draining leading to drier soil conditions. There are conspicuously no Tallowwood or White Mahogany growing in this compartment despite the fact that the Tallowwood is dominant in the adjacent compartment.

This compartment has a total area of approximately 4 hectares. No signs of Koala activity were detected during the site survey and subsequent fauna surveys. There are no hollows or suitable habitat trees within this compartment. There are no large woody debris or

hollow logs on the ground or suitable habitat for native fauna to occupy. There are no rock outcrops or obvious shelter or nest sites anywhere in this compartment.

Figure 6. Secondary B Koala habitat. Shows a sparse ground layer.

Table 2. Secondary B Koala Habitat species list.

Botanic Name	Common Name	Threatened Species Act
Secondary B Koala Habitat		
Blackbutt _ Pink bloodwood shrubby open forest of the coastal lowlands of the NSW North Coast bioregion _PCT 686		
CANOPY		
Eucalyptus pilularis	Blackbutt	No
Corymbia intermedia	Pink Bloodwood	No
Syncarpia glomulifera	Turpentine	No
MID STRATUM		
E. siderophloia	Grey Ironbark	No
Syncarpia glomulifera	Turpentine	No
Glochidion ferdinandii	Cheese Tree	No
Allocasuarina torulosa	Forest Oak	No
E. robusta	Swamp Mahogany	No
Jagera pseudorhus	Foambark	No
Callistemon salignus	Willow Bottlebrush	No
GROUND LAYER		
Cordyline stricta	Slender Palm Lily	No
Parsonsia straminea	Milky Silkpod	No

6.3 COASTAL WETLANDS

The wetland compartment is subject to alternating hydrological regimes dependent on the prevailing climatic conditions. Water levels fluctuate over extended time periods allowing drying of the edges and shallower reaches. In periods of low water levels invasive species have opportunities to encroach and cattle venture further into the wetland area for opportunistic browsing. Seasonal hydrological fluctuation has determined the characteristics of the wetland compartment.

Under the Keith Vegetation Formation classification the wetland formation is Forested Wetland. The vegetation class is Coastal Swamp Forest. The entire wetland ecosystem is composed of several different plant community assemblages. The character of the wetland exhibits areas at the deeper downstream extent that qualify as a lacustrine wetland as there are large areas where there is open water with less than 30% foliage cover. The lacustrine areas give way to fringing palustrine wetland areas that have trees as the dominant canopy and grade into grass and sedge swamps meadows.

The wetland is the most floristically diverse compartment within the subject site. The character of the lands within the Coastal Wetland mapping polygon exhibits several different structural and floristic units. The mapping includes steep gulley heads and land that is not subject to hydrological influences but act as a filter at the upstream extents of the wetland catchment.

At the lower end of the wetland the character is typically lacustrine, the environment here has standing open water, depth was not determined but the presence of *Nymphae capensis* would indicate a minimum depth of 500mm (Fig 7). The standing water is surrounded by a typical palustrine environment with an upper stratum dominated by *Melaleuca quinquinervia* (Broad Leaved Paperbark) (Fig 8). There are *Eucalyptus robusta* (Swamp Mahogany) and *Melaleuca linarifolia* (Flax Leaved Paperbark) growing as associates with the Broad Leaved paperbarks. The average DBH of the trees in this environment was approximately 300mm.

At the upper end of the wetland toward the catchment head, the community consists of sedge and rush meadows (Fig 9). The water level at this end is shallow and the area can be seasonally dry. There are strong indicators of disturbance by cattle in this area. The soil is pocked and compacted by deep penetrations where hooves sink up 300mm in depth. New recruits of dominant canopy species have been browsed and inhibited from establishing.

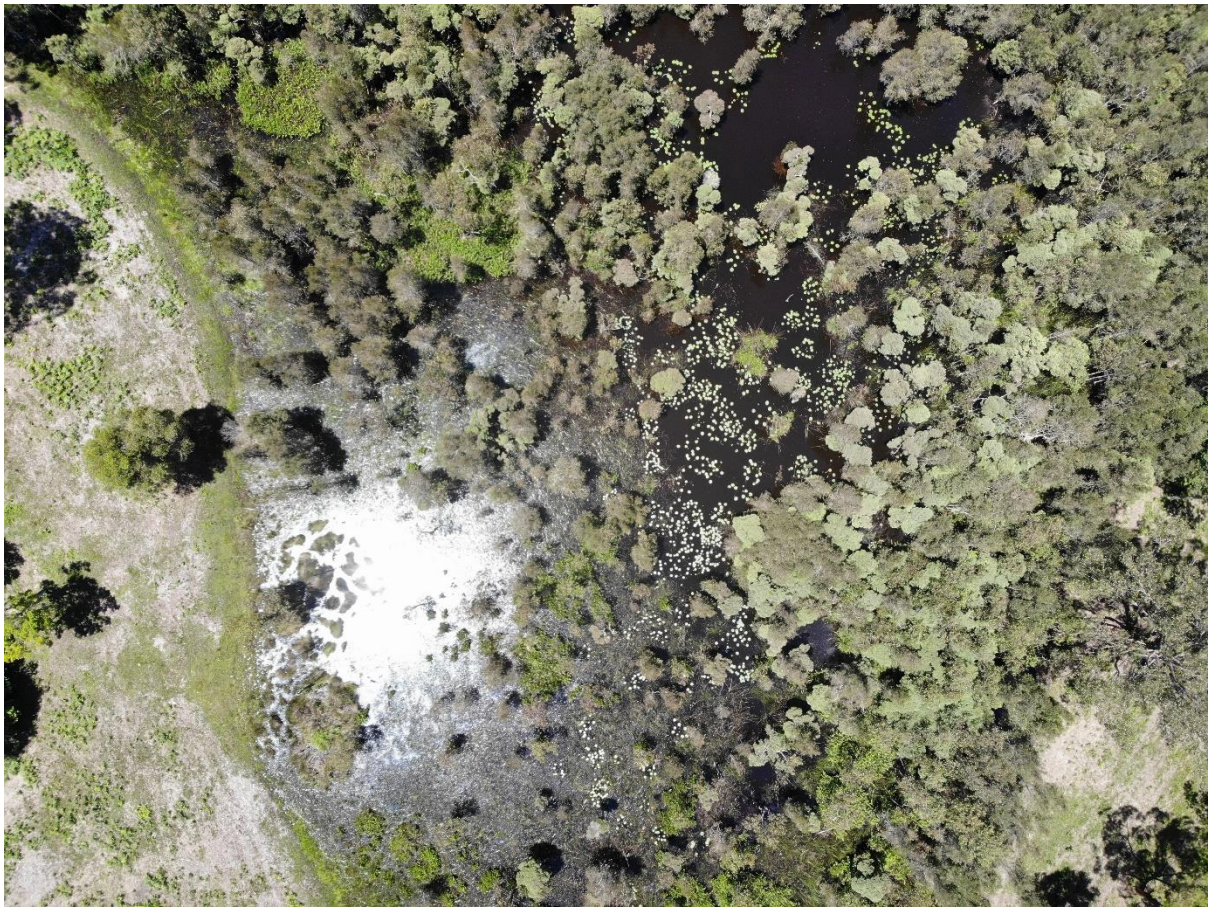

Figure 7. Drone imagery showing hydraulic character of the Coastal Wetland area.

Figure 8. Looking toward the lacustrine wetland. Broadleaf paperbark is the dominant canopy species.

Figure 9. Sedge meadow with sporadic recruitment of canopy species inhibited by grazing cattle.

There is an extensive gulley head at the North East extent of the mapped wetland. This section shows the highest diversity of species across the four stratified units. Many of the species that were encountered in this area were of a similar age class. There appears to have been some disturbance previously and recruitment has been spontaneous for many species. The dominant pioneer species across this section of the compartment is the Red Ash.

The gulley head has a shrub stratum up to 2m in height and consists of species such as *Ozothamnus diosmifolius* (Rice Flower), *Melastoma affine* (Native Lasiandra), *Androcalva fraseri* (Brush Kurrajong) and *Acacia floribunda* (Gossamer Wattle). A full list of the species encountered in the wetland polygon is provided in Table 3.

Table 3. Wetland observed plant list

Botanic Name	Common Name	Threatened Species Act
Coastal Swamp Forest		
Broad leaved Paperbark – Swamp Oak- Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast PCT 1724		
CANOPY		
Melaleuca quinquinervia	Broad-leaved Paperbark	No
Eucalyptus robusta	Swamp Mahogany	No
Melaleuca linarifolia	Narrow-leaved Paperbark	No
Alphitonia excelsa	Red Ash	No
Callistemon salignus	Willow Bottlebrush	No
MID STRATUM		
Androcalva fraseri	Brush Kurrajong	No
Guioa semiglauca	Guioa	No
Glochidion ferdinandii	Cheese Tree	No
Allocasuarina torulosa	Forest Oak	No
Eleocarpus reticulatis	Blueberry Ash	No
Jagera pseudorhus	Foambark	No
Melastoma affine	Native Lasiandra	No
Duboisia myoporoides	Corkwood	No
Archirhodomyrtus beckleri	Rose Myrtle	No
Acacia floribunda	Gossamer Wattle	No
Ozothamnus diosmifolius	Rice Flower	No
Smilax australis	Lawyer Vine	No
Parsonsia straminea	Milky Silkpod	No
GROUND LAYER		
Pteridian esculentum	Bracken Fern	No
Blechnum camfieldii	Water Fern	No
B. indicum	Swamp Water Fern	No
B. cartilagineum	Gristle Fern	No
Calochlaena dubia	Bracken Fern	No
Gahnia clarkei	Tall Saw Sedge	No
Baumea juncea	Bare Twig Rush	No
Carex appressa	Tall Sedge	No
Baloskion tetraphylum	Tassel Cord Rush	No
Lepironia articulata	Grey Sedge	No
Phylidrum lanuginosum	Frogsmouth	No

6.4 RURAL LANDS RU4

The vegetation in the RU4 zoned land also shows variation to structure and floristic diversity across the entire compartment. There is a small woodlot located at the existing access from South Arm Rd that is dominated by *Eucalyptus pilularis* (Blackbutt) and *E. microcorys* (Tallowwood). This area also contains *E. propinqua* (Small Fruited Grey Gum) and *E. carnea* (Thick Leaved Mahogany) as associates in this stand. This stand is connected to a larger compartment of native vegetation in the adjoining property.

The vegetation over the remaining RU4 lands consists of scattered stands and solitary individuals of *Corymbia intermedia* (Pink Bloodwood) and *E. siderophloia* (Grey Ironbark) as the dominant species with Tallowwood, *E. acmeniodes* (White Mahogany), Turpentine and *Lophostemon confertus* (Brushbox) as associates (Fig 10). There are also opportunistic Red Ash and *Acacia floribunda* (Gosamer Wattle) occurring on the gulley sides and steeper slopes.

Cattle grazing and mechanical slashing for weed maintenance has limited the development of a mid-storey and ground layer in this area. The ground layer is currently dominated by pasture grasses. Recent weed management activities has cleared the area down to the perimeter of the Coastal Wetland boundary.

Figure 10. Looking North over the RU4 zoned land

There is a belt of native regrowth vegetation along the roadside boundary fence at South Arm Road. This section of roadside vegetation is floristically diverse. There are pioneer native species as well as some juvenile propagules of rainforest species. Frugivorous birds would account for the distribution of seed in the fence line vegetation.

Table 4. RU4 zone species list

Botanic Name	Common Name	Threatened Species Act
RU4		
Small fruited Grey Gum – Turpentine - Tallowwood moist open forest on foothills of the lower North Coast. PCT ID 1550 ; Not a TEC		
CANOPY		
Corymbia intermedia	Pink Bloodwood	No
E. siderophloia	Grey Ironbark	No
E. microcorys	Tallowwood	No
E. propinqua	Grey Gum	No
E.acmeniodes	White Mahogany	No
E.carnea	Thick Leaved Mahogany	No
Syncarpia glomulifera	Turpentine	No
Lophostemon confertus	Brushbox	No
MID STRATUM		
Alphitonia excelsa	Red Ash	No
Allocasuarina torolosa	Forest Oak	No
Cryptocarya glaucescens	Jackwood	No
Jagera pseudorhus	Foambark	No
Persoonia media	Geebung	No
Eleocarpus reticulatis	Blueberry Ash	No
Duboisia myoporoides	Corkwood	No
GROUND LAYER		
Cordyline stricta	Slender Palm Lily	No
Smilax australis	Lawyer Vine	No
Lomandra longifolia	Mat Rush	No
Entolasia marginata	Bordered panic	No
Pteridium esculentum	Bracken Fern	No

7. FAUNA ASSESSMENT.

Fauna assessment effort consisted of random traverses at early morning for birds and macrofauna. Spotlighting was carried out over three nights when weather conditions were fine with no wind and no precipitation. Spotlighting consisted of 2hrs each night carried out on transects chosen for the most likelihood of arboreal marsupial activity. The Secondary B Koala habitat was surveyed using the Spot Assessment Technique (SAT) for scats and Koala activity and observations for scratch trees. Due to the size of the Koala compartment the SAT was not grid based but used a random selection of suitable Koala use trees for assessment. Fauna survey effort is illustrated in Figure 11.

Each compartment was surveyed for wildlife habitat potential. The age class of the dominant trees is <40yrs and as such there has been no formation of suitable hollows for wildlife exploitation. No nests were observed during field surveys. There are no scratch trees present on the site and there were no signs of dreys or stick nests. There are no habitat structures such as fallen logs or rock outcrops.

A search of the bionet wildlife atlas was undertaken for threatened fauna records back to 2010. The bionet search identified 182 records for 26 species. The 10 kilometre search bounding box included the shoreline and associated species. The majority of sightings were of avian species.

Several of the bird records were sightings of Brolgas and the Black necked stork. Both of the species are known to frequent the wetlands that are located along the Bellinger and Kalang river floodplains. There are reports that both of these iconic Australian waterbirds use the local wetlands for courtship and breeding.

There were no sightings of these two species when the bird surveys were undertaken. There were surprisingly no sightings of any waterbirds in the wetland area. It is unusual for there to be no waterhen or wading birds present. The only species encountered were Magpies, Kookaburra and soaring raptors such as Wedge Tail Eagle and a Little Eagle. One individual Tawny Frogmouth was spotted in the Secondary B Koala compartment.

Spotlighting was undertaken over three nights and there were no sightings of any arboreal marsupials or owls. Camera traps did not detect any wildlife activity over the three nights trapping. There were no scratch trees identified in any of the compartments within the subject site.

The spot assessment technique for koala activity was undertaken in the Secondary B Koala habitat. No scats were detected there were no signs of koala activity.

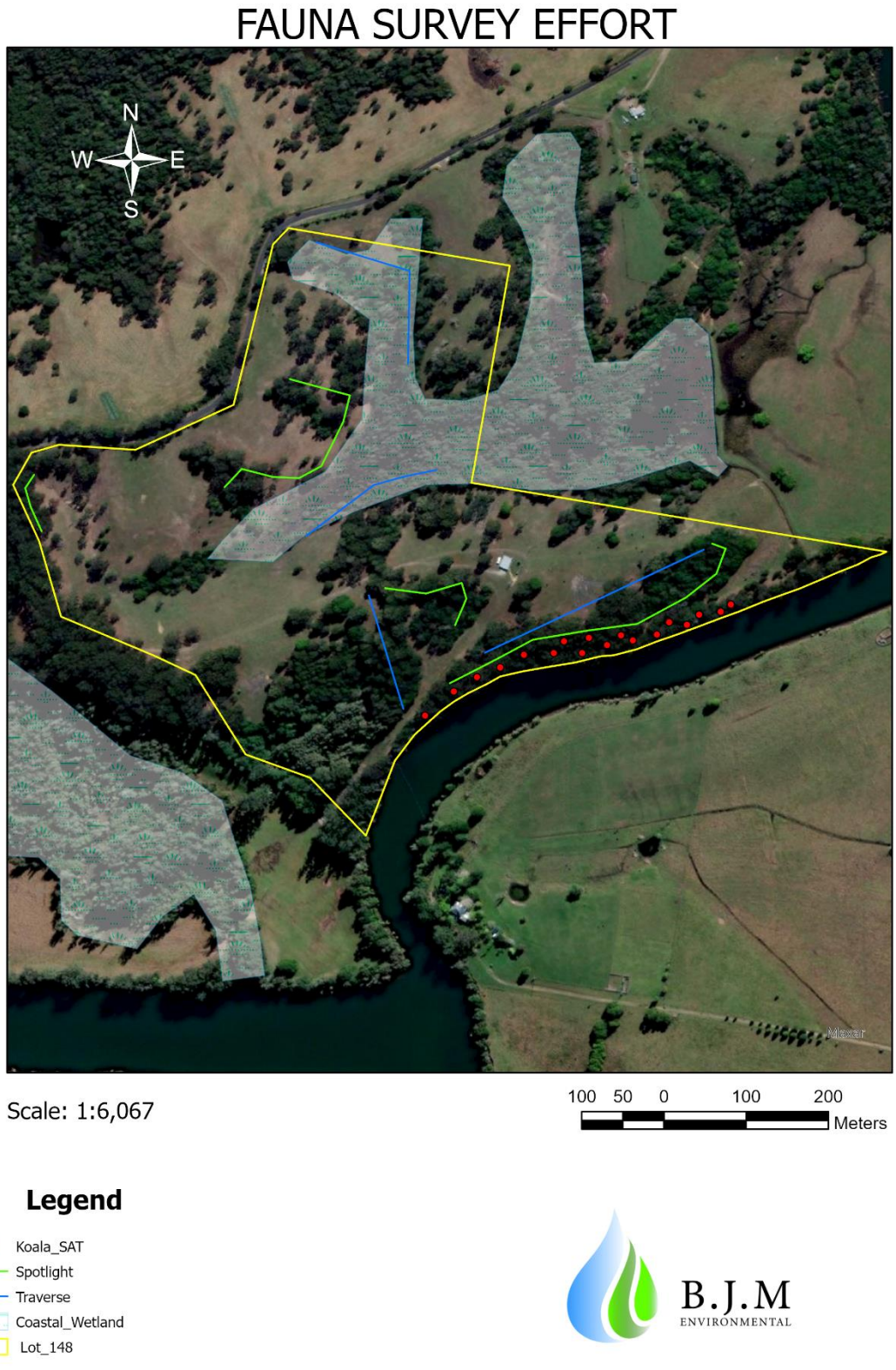

Figure 11. Fauna survey effort

The Bionet Atlas search returned 182 records for 26 species. There were no records of threatened species within the subject site boundary. Many of the records were associated with Newry State Forest that is located across the Kalang River from the subject property. The site has limited connection to good quality functioning habitat. There exist several major impediments to landscape scale migration of native fauna into the study area.

The Kalang River to the south is a major inhibiter for migration of new individuals. The Old Pacific Hwy now called Ginnagay Way also creates a barrier to migration and recruitment of new breeding individuals. There was some connection to an extensive tract of native vegetation and functioning ecological communities to the west in the Tarkeeth State Forest, but this connection has been severely impacted by the Nambucca to Urunga M1 motorway.

The resulting precinct that is formed within the boundaries of the barriers to migration is 465 hectares in area. Approximately 200ha of the precinct is native vegetation that is in reasonable condition. A large portion of the vegetated area is wetland located at the lower contours below 2m AHD. The remaining lands are for the most part rural landuse with some large lot residential development to the north of the precinct.

It would be expected that almost all of the avian species on the Bionet Wildlife Atlas search list could be expected to utilise the vegetation at the subject site at varying times of the year, depending on the current hydrological regime and the flowering and fruiting of the plant species. None of the *Petaurids*, (gliders) were recorded in the precinct area and subsequent reintroduction to the compartments would be limited. There were also no suitable hollows for either of the species listed. The larger Petaurids have particular requirements for tree hollows by way of size and suitable location (Gibbons & Lindenmayer 2002).

8. HIGH ENVIRONMENTAL LAND ASSESSMENT

8.1 APPENDIX 1 GUIDELINES FOR BIODIVERSITY ASSESSMENT

To address the requirements of Appendix 1 of the guidelines for Biodiversity Assessment for Planning Proposals, the following responses are provided. In response to Criterion 1, the mapped Coastal Wetland is mapped as Biodiversity Value land on the Biodiversity Values map and is therefore considered High Environmental Land. The Coastal Wetland mapping has an associated 100m Proximity Area buffer that is also included in the Coastal Management SEPP mapping (Fig 12). Proximity area mapping is addressed in Criterion 2.4 of Appendix 1.

Criterion 2 pertains to native vegetation of high conservation value. The newly adopted NSW State Vegetation Type mapping identifies 12 different Plant Community Types, (PCTs), within the subject property. This ecological assessment identified three PCTs and classified them for a best fit for PCTs included in the previous VIS vegetation classification.

In addressing the new PCT mapping for the subject site the author has misgivings about some of the PCTs that are mapped at the site. There are obvious issues with the ground scale interpretation of the floristic composition of the plant communities present and the spatial dedication of the vegetation mapping.

Never the less, there are three PCTs that are classed as >70% cleared. Those PCTs are; PCT 3967 Northern lower floodplain Eleocharis wetland; PCT 4001 Northern floodplain fern swamp forest and PCT 4026 Estuarine sea rush swamp oak forest. In accordance with the guidelines for biodiversity assessment these communities should be included in the High Environmental Value land map. These communities are associated with low elevations within the lower floodplains.

There are also two PCTs that are mapped at the subject site that are associated with the Endangered Ecological Community (EEC), Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. Those PCTs are PCT 4000 Northern estuarine paperbark sedge forest and PCT 4004 Northern Melaleuca quinquinervia swamp forest. The overcleared PCTs above are also associated the EEC.

All of the above PCTs are almost totally within the Coastal Wetland polygon and its associated 100m Proximity Area polygon (Fig 13). Any of the PCTs listed that extend beyond the proximity area boundary cannot be associated with the EEC as the elevations outside of the proximity area are too high for wetland vegetation.

Figure 12. High Environmental Value land mapping.

HIGH ENVIRONMENTAL VALUE LAND MAPPING

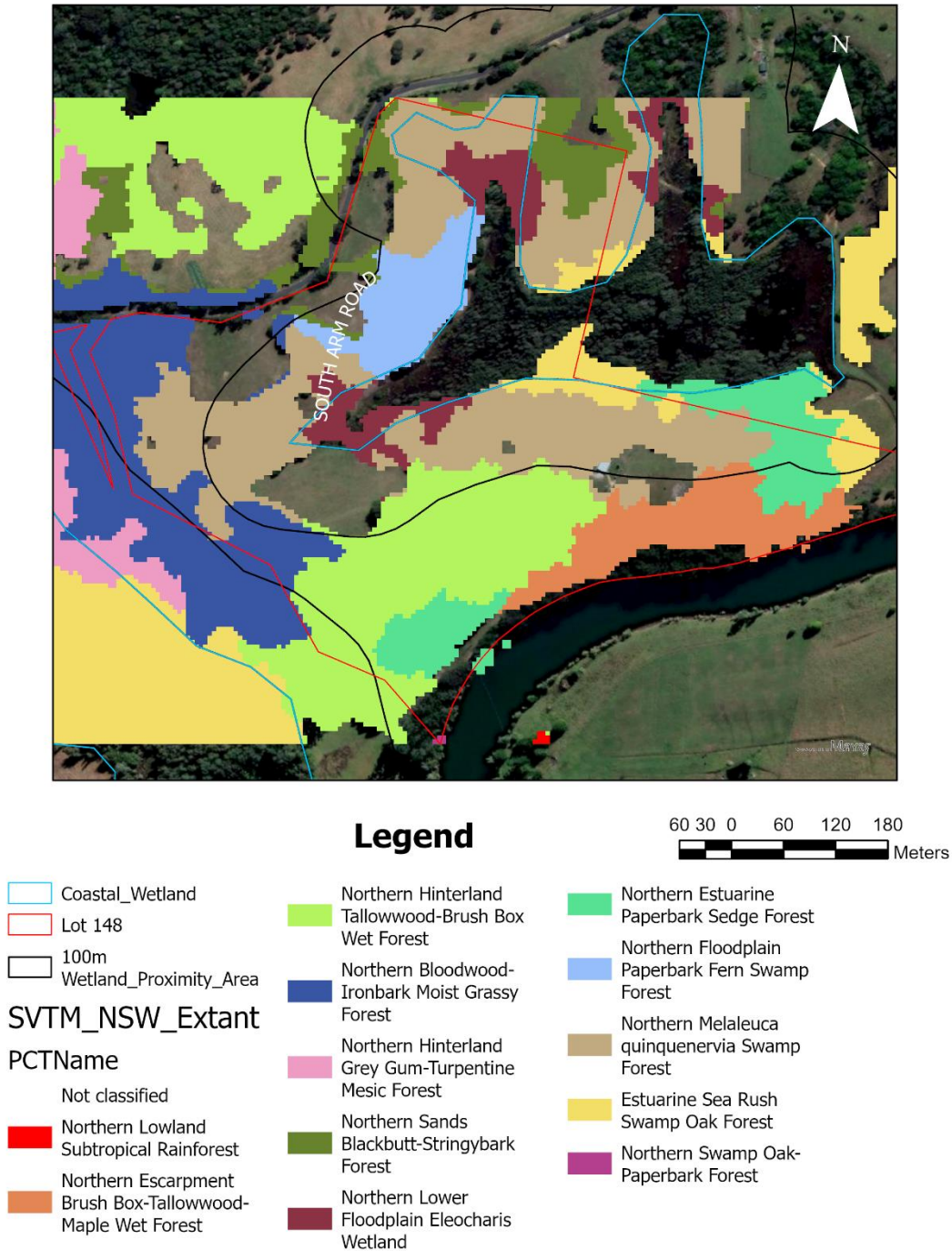

Figure13. PCT mapping within the 100m Wetland Proximity area.

In addressing Criterion 3 for Threatened species, the ecological assessment did not identify any records for threatened flora and fauna species within the subject site. The Brolga and the Black necked Stork are known to nest in wetlands within the lower Kalang floodplain, however there were no sightings of nest activity or the presence of any of these species during the site survey.

There were no significant breeding habitats for avian or arboreal fauna identified at the site such as suitable hollows, rock outcrops, standing stags or large woody debris on the ground. The wetland was devoid of waterfowl and other wetland species. The wetland was regularly grazed by cattle trampling the sedges and rush beds and presenting a threat to ground nesting species.

There is no Core Koala Habitat mapped at the site and the site assessment did not find the existence of Core Koala habitat as defined in SEPP 44. There are stands of native hardwoods that fit the definition of Secondary B Koala habitat, but these lands are excluded from the HEV assessment.

The ecological assessment found that the block has been disturbed for the purpose of agricultural pursuits and that a reduction of the agricultural activity due to subdivision of an original farm has led to the regrowth and establishment of new plant communities. These plant communities are in the initial stages of secondary succession and if allowed will eventually coalesce in to a compartment of diverse native forest.

At this stage the vegetation is regrowth and does not represent high environmental value as there are no threatened species present and no suitable habitat for threatened species. The limited disturbance that the property still receives due to a smaller scale cattle enterprise does still impact on the desirability of the site for breeding by threatened species. Any potential breeding habitat for threatened species is encompassed within the Coastal Wetland polygon which requires consideration under the guidelines for Biodiversity Assessment for Planning Proposals.

Criterion 4 addresses the presence of wetlands, rivers, estuaries & coastal features of high environmental value. There are no listed wetlands of national significance present at the site. Dalhousie Creek is within 5km of the site and is mapped as an Intermittently Closed and Open Lake or Lagoon (ICOLL). The planning proposal will have no impact on Dalhousie Creek as the Dalhousie catchment is separate from the catchment that drains the subject site.

In addressing Criterion 5, there are no significant geological structures at or near the subject site.

8.2 APPENDIX 2 GUIDELINES FOR BIODIVERSITY ASSESSMENT

In addressing the recommendations made in Appendix 2 of the Guidelines for Biodiversity Assessment for Planning Proposals, the following comments are provided. The proposed rezoning of the RU4 land is not considered to impose any further intensification of impacts on the HEV land.

The Planning Proposal has been initiated to rezone the RU4 land to R5 Large Lot Residential. The intent is to eventually subdivide the R5 land into 7 x 1 hectare lots for residential use, with the residual land comprising split zoning including C2 and C3 and a small portion of RU1 land in the southeast corner of the block.

The existing RU4 land is currently being utilised for a small scale cattle rearing operation. The lands within the RU4 zoning are predominantly cleared with scattered stands of native hardwoods. The ongoing cattle operations at the site provide a constant disturbance to the wetland fringing edge and cattle are able to penetrate deeper into the wetland during low hydrological flows. The change of use to large lot residential will eliminate the impacts of the cattle intrusion and subsequent degradation of the wetland extremities leading to a positive outcome for the wetland community as a whole.

Without the cattle intrusion the natural recruitment of species can continue unhindered and the wetland community will benefit on several levels. The establishment of canopy cover aids in the reduction of weed incursion through light exclusion and competition for space and soil resources. The resulting canopy and vegetation structure provides cover from predators and habitat features that can be utilised for breeding by native fauna.

There are stands of native hardwoods scattered across the RU4 zoned land that do not constitute functioning plant communities. The ground layer is cleared to pasture and the surrounding lands are frequently slashed. These stands are not considered high environmental value vegetation and do not require removal for any future development of the newly created R5 zone.

The proposal has been designed to provide a 6m zone between the R5 boundary and the C2 zoned wetland. This buffer is to be included in the residual C3 zone providing protection from any further development in the future. The 6m buffer will also help to allow the development of an ecotone edge to the wetland providing a barrier to light and weed species intrusion. The buffer will also help to filter any contaminants from the residential developments entering the wetland.

The rezoning proposal has been designed to capitalise on the existing South Arm Rd for direct access. This eliminates excess road construction and associated contaminated urban street runoff entering the wetland.

The lands encompassed within the development area have existing protection instruments in place that are required to be considered at the Development Application stage. The wetland has several environmental protection instruments associated with it. It is protected under the provisions of the Coastal Management SEPP and the Biodiversity Conservation Act.

The RU4 land is not mapped on the Transitional Native Vegetation Regulatory map and could be Category 1 Exempt land. Rural lands have provisions for land clearing for certain activities under the provisions of Part 5A of the *Local Land Services Act* 2013 and Part 4 Division 9 of the *Rural Fires Act* 1997.

9. DISCUSSION

The newly adopted NSW State Vegetation Type map identifies 12 different plant community types at the subject site. This ecological assessment identified 3 vegetation communities that were a best fit floristically with the now decommissioned PCT classification. The diversity of vegetation formations is due to the variations in topography and aspect as well as differences in soil depth and quality across the block. The fine scale floristic vegetation mapping for the Bellingen LGA, Figure 14, illustrates the diversity of vegetation types that exist at the site.

The different compartments stratified for the purpose of this ecological assessment, showed different dominant canopy species, indicating a different plant community type in each of the compartments. The structure of the vegetation is sporadic with tall trees scattered as small woodlots or isolated individuals with an age class of 40 ± years.

The plant communities that are represented at the site are undergoing secondary succession. Secondary succession is the sequence of changes that occur in a community after a disturbance event that does not totally strip bare the soil and vegetation (Camp & Arms 1979). Previous disturbance due to rural farm management activities has contributed to the fragmentation of the vegetation community that would have been existing prior to clearing for agricultural purposes. If the block was allowed to revegetate, overtime a dominant single vegetation formation would develop into a dry sclerophyll forest with a shrubby understorey.

The wetland area also undergoes periodic disturbance events that impact on the functionality and viability of that community. Examples of periodic disturbance include low hydrological regimes in the wetland area due to extended periods of low rainfall such as occurs with an El Nino event.

The current land use of agricultural enterprise is not conducive to the recovery of the site to native forest. Farm management such as slashing and herbicide treatment for weed infestation is a major impediment to natural recruitment of species and the reestablishment of a functional plant community. Constant impacts by cattle grazing will inhibit the recruitment of native species and contribute to soil compaction and damage to the wetland area.

Cattle accessing the wetland area during periods of low hydrological regimes will impact on nest sites of wading bird species and further hinder the recruitment of canopy species impacting on the functionality of the wetland. By changing the land use for the RU4 zoned land, the viability of the current cattle enterprise will be greatly reduced and that will help facilitate the cessation of cattle grazing. The removal of the cattle grazing activities will greatly benefit the long-term viability of the native vegetation at the site.

The lack of any sightings of wildlife is most likely a consequence of the isolation of the surrounding precinct to viable populations beyond the barriers created by main roads and the river. South Urunga is known to have a healthy population of grey kangaroos and the red necked wallaby and swamp wallaby are common in the Bellingen area. There were no scats of any macropods encountered on the field assessment. Due to the isolation of the precinct, road fatalities, predation by dogs and habitat range stress are likely contributors to the reduction in populations in the surrounding area.

The lack of water birds and waders within the wetland is unusual and the cause is beyond the scope of this assessment. The development of a La Nina Southern Oscillation event and high rainfall in the spring has seen all wetland areas on the north east NSW coast full to capacity. This will facilitate a boom in wetland resources for any fauna that rely on wetlands for their existence. There is a possibility that there are other more productive wetlands nearby and it is those areas that are being exploited.

Wetlands perform particular roles in ecosystems and how well each wetland performs that role depends on its functionality and its ability to satisfactorily fulfil that role. The wetland at the subject site was once an intermittent wetland that drained in the Kalang River when precipitation was high. During low hydrological regimes the lands within the wetland would have been scalded from the effects of potential acid sulfate soil.

Historical aerial imagery shows the wetland in its natural form up to 1969. The manmade retention structure can be seen in the next available image from 1979. It is presumed the wetland was dammed to withhold water after high rainfall events for farm use. This has changed the functionality and role of the wetland from one of filtering runoff and flood retention to use as a water storage and the subsequent habitat value that is created. Use of the wetland by native fauna will be dependent on the abundance of invertebrates and crustaceans as a food source.

The landuse intensification proposed in the Planning Proposal is not expected to significantly increase impacts on High Environmental Lands. The proposal is in line with the objectives of the Growth Management Strategy 2006 – 2026. The change of use from rural to residential should eliminate damage to the wetland area from cattle intrusion and will have a beneficial outcome over time for the wetland community as a whole. The entire wetland will be fenced off from cattle on all sides including the residual Lot 8.

An extra buffer between the residential development and the wetland has been included in the design and layout of the proposal, giving an extra layer of protection to the wetland. The design of the proposal utilises existing disturbed lands and capitalises the existing road access from South Arm Rd, eliminating potential contamination from subdivision road construction and use.

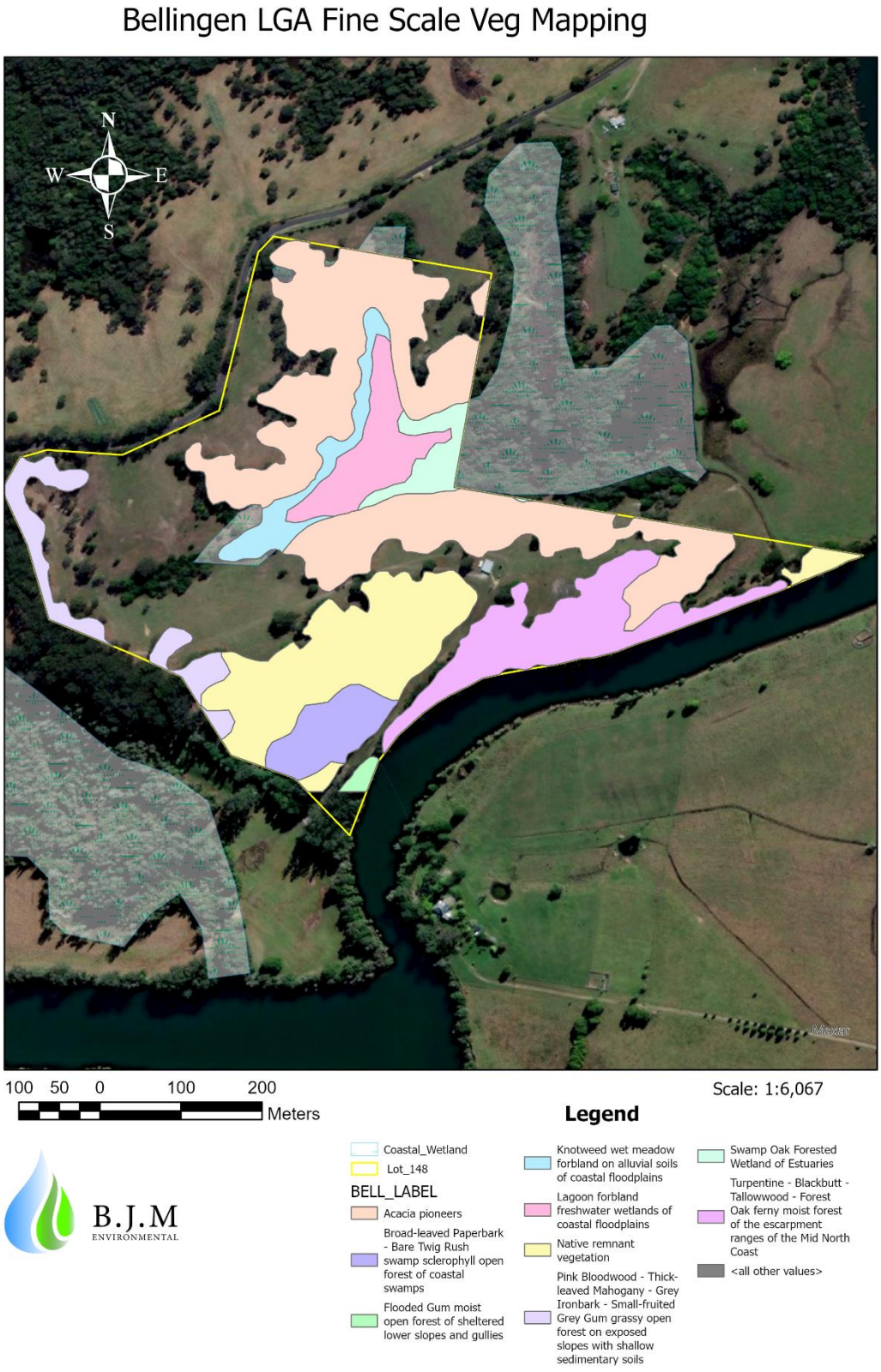

Figure 14. Bellingen Fine scale Vegetation Mapping.

10. CONCLUSION

This ecological assessment did not identify any threatened flora or fauna species at the subject site. The most significant vegetation compartment is the wetland. The wetland community vegetation class is Coastal Swamp Forest and could be classified as Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions. This plant community type is listed in NSW as an Endangered Ecological Community.

The wetland is mapped under the Coastal Management SEPP and the Biodiversity Values Map. Any proposed works within the wetland polygon will require assessment under the provisions of the Biodiversity Offsets Scheme. The Coastal Management SEPP does not prohibit development in the Coastal Wetland as long as the "*consent authority is satisfied that sufficient measures have been, or will be made, to protect, and where possible enhance the biophysical, hydrological and ecological integrity of the coastal wetland or littoral rainforest on which the development is proposed before granting consent" (DPIE 2018)*.

The proposed change of zoning does not require any impacts on the wetland by way of land clearing or intrusion by roads or other mechanical action. The rezoning of the RU4 land from rural to residential will help to facilitate the termination of cattle grazing on the property and will lead to an improved outcome for the wetland environment. A change of use to residential development will not necessarily inflict any long term impacts on the wetland.

A wetlands primary function is to capture and treat contaminants in incoming flows and improve water quality. Secondary functions include providing habitat for plants and animals. They also have a social role to play in the built environment by providing aesthetically pleasing refuges where people can interact with their natural environment. By facilitating residential development adjacent to the wetland, opportunities for wetland enrichment by the new residents can be realised and as a result provide practical benefit to local ecosystems.

Native wildlife have been known to benefit from human development in a variety of ways. Houses and infrastructure can provide shelter for birds, arboreal marsupials and bats. Many native animals find added and consistent food and resources from domestic human habitation (Hunter 2007). Lights from homes attract insects which in turn provide a reliable food source for micro bats, dasyurids like the antechinus and small carnivorous gliders such as the feather tailed glider and sugar glider.

In some circumstances residential development can lead to higher population densities of wildlife populations due to the development creating more den options and food resources through domestic fruit and vegetable production and the attraction of pests that in turn become a food resource for native fauna (Lowry, Lill & Wong 2013). Development can also help to improve connectivity of fragmented habitats by creating corridors for wildlife migration.

Determining authorities should consider the phenomenon of "Synurbization"(Luniak 2004), defined as the ability of species to adapt and thrive in urban environments, in assessing development proposals to help to address the issues of native diversity loss, whilst providing much needed housing for increasing human populations.

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B.J.M ENVIRONMENTAL

ADDENDUM

This Addendum to the Ecological Assessment has been prepared in response to a request for further information by the North East Biodiversity Conservation and Science division of the Dept of Climate Change, Energy, Environment and Water (DCCEEW). BCS did not feel that this Ecological Assessment adequately addressed the North Coast Regional Plan and the Guidelines for Biodiversity Assessment for Planning Proposals issued by NE BCS.

In order to address the issues raised by that request I offer the following response.

"***While Sections 3.1 and 8.1 of the EA state the report has been prepared to align with the principles contained in BCS's guidelines, our review of the document indicates the EA does not accord with the abovementioned guidelines and hence does not accord with the NCRP.***
For instance, Criterion 2.4b of the guidelines states:
"Map any parts of the land shown as proximity areas for Coastal Wetlands and Littoral Rainforest as HEV".
Whilst Figure 12 of the EA (refer to Plate 1 below) indicates native vegetation is located within the proximity area of the coastal wetland listed under State Environmental Planning Policy (SEPP) Resilience and Hazards 2021, the EA has not accurately mapped this vegetation as HEV land and/or considered applying a conservation ("C") zone to the vegetation."

The title of the map at Figure 12 is High Environmental Value Land. The map illustrates the coastal wetland and the proximity area as HEV land, based on the addition of the Coastal Wetland polygon to the Biodiversity Values Map and Criterion 2.4 of Appendix 1 of the Guidelines for Biodiversity Assessment for Planning Proposals. The R5 lots depicted in Figure 12 are indicative of where the proposed rezoning is to be located on the property.

"***Similarly, while the guidelines require Plant Community Types (PCTs) to be verified through field work, Section 8 of the EA confirms the State Vegetation Type Map was used to identify the PCTs and HEV entities in the planning area***."

The current accepted assessment methodology requires an assessment of the current PCT mapping which was undertaken and provided in Figure 13.

I questioned the validity of the current PCT mapping as there is no escarpment near the study area and there is Northern Escarpment Brush Box-Tallowwood-Maple Wet Forest mapped as being at the site. Similarly there are no Northern Sands at the site but the mapping shows Northern Sands Blackbutt-Stringy Bark Forest. Also, none of the vegetation types within the wetland polygon are mapped despite there being remnant EECs within the polygon.

The current NSW State Vegetation Type map identifies vegetation several meters in height above the wetland, on steep slopes as Northern Melaleuca quinquinervia Swamp Forest. The ecological assessment has identified this vegetation as *Small fruited Grey Gum – Turpentine - Tallowwood moist open forest on foothills of the lower North Coast*, PCT ID 1550.

The Bellingen Fine Scale Vegetation Mapping provided at Figure 14 more accurately describes the vegetation structure and plant community diversity that exists at the study

site. Interestingly the Bellingen Fine Scale Vegetation Mapping published in 2013 maps the vegetation within the RU4 land as "Acacia Pioneers" indicating regrowth and not native remnant. In the years prior to the publishing of the Bellingen vegetation mapping in 2013, the vegetation within the RU4 lands would have been dominated by wattle and Red Ash pioneers, and have subsequently been cleared or died out, as is their role.

In regard to relying solely on the State Vegetation Type PCT mapping, Section 5 of this report provides the methodology used in the assessment of the vegetation at the study site. Section 6 details the findings of the field assessment. The assessment of the vegetation that exists in the proposed R5 lands is addressed in Section 5.2 and 6.4 of this report. Figure 10 shows the vegetation within the proposed R5 lands. From the imagery it can be seen that the ground layer of the vegetation compartments is highly disturbed and modified. This report in Section 6.4 states that the vegetation is subject to routine maintenance and impacts from cattle grazing, allowable activities under the current zoning.

Table 4 of this report lists all the species located in the stratified RU4 compartment including roadside and fenceline vegetation. Taking into account the variety of micro topography exhibited at the site, the subsequent species diversity could be considered to be high. In reality, the vegetation is fragmented and consists of one main woodlot consisting of Pink Bloodwood and Grey Ironbark with the rest of the species spread over the remaining land including the road verge and fenceline.

Table 4 allocates a nominal PCT based on a best fit for species composition, but the vegetation combined does not in my view constitute a viable functioning plant community. There is no developed ground layer and the area is subjected to regular disturbance by farm maintenance and cattle grazing. Recruitment is limited to species that are unpalatable to stock or in areas where farm machinery cannot access.

The vegetation in the RU4 compartment is regrowth with an age class of >40years. The vegetation is limited to the fencelines and steep gulleys. There is no developed ground layer limiting a soil mychorizal – floristic symbiosis and associated feed back to other interactions of a functioning community. There is no cover for ground dwellers and there is no habitat structure. The trees are an age class that do not exhibit hollow formation and there are no vine tangles or other habitat structure for wildlife to breed and shelter in.

What constitutes HEV land is not clearly defined anywhere within the legislation. The NCRP 2041 defines Potential High Environmental Value Land as;

"Potential HEV assets are shown at the regional scale on the Potential High Environmental Values map and include:

- land with high biodiversity value that is particularly sensitive to impacts from development and clearing (as shown on the NSW Government's Biodiversity Values map)
- native vegetation of high conservation value, including vegetation types that have been over cleared or occur within over cleared landscapes, threatened ecological communities, old growth forest and rainforest
- key habitat of threatened species
- important wetlands, estuaries and lakes
- areas of geological significance. "

In regard to the above definition the following response is provided.

- The vegetation within the RU4 land is not mapped as Biodiversity Value Land.
- The vegetation within the RU4 land is not within an overcleared landscape, is not a threatened ecological community, old growth forest or Rainforest.
- There is no habitat structure and as such the vegetation does not provide key habitat for threatened species, there are no rock outcrops and there is no large woody debris.
- The wetland is mapped under the SEPP Resilience and Hazards and the Biodiversity Values Map. The proximity area is not included in the BV map.
- There are no areas of geological significance near the study area.

The vegetation within the proximity area is fragmented and highly disturbed. The condition of the vegetation in respect of community structure is low. The vegetation does not provide connectivity to the wetland from any significant vegetation. The wetland does have strong connectivity to the native vegetation in the remaining C3 lands to the south.

The RU4 land was discussed in Section 8.1 of this report and was addressed for Criterions 3, 4 and 5 of Appendix 1 of the BCS guidelines. This report found that the vegetation within the RU4 lands was highly degraded and disturbed from a natural state and does not constitute High Value Land in accordance with the definition provided above, and as such it was not designated for C2 zoning.

"***Further complicating this matter, is that Section 6 of the EA confirms the occurrence of three alternative PCTs in the planning area however, the locations and extents of these PCTs is unknown as the EA does not map them."***

Section 5 shows the stratification of the subject site for assessment purposes. The Coastal wetland mapping and the councils Secondary Koala Habitat mapping was used as individual stratified units, with the remainder of the property stratified according to the existing land zonings. Each of the remaining patches of vegetation within these two zone compartments were not mapped as polygons as the vegetation was visible on the map.

The vegetation assessment included a determination of the best fit floristically for each of the stratified units as current PCTs, drawn from the existing VIS database. In regard to the proposed RU4 land, this report identified the vegetation as a best fit PCT, but asserted that the vegetation was fragmented and consisted of fenceline vegetation and regrowth and did not act as a functioning plant community and for that reason was not mapped as polygons.

Drone imagery from the site assessment show the land within the proposed R5 land as fragmented with regular ongoing disturbance to the ground layer (fig 15). Similarly, figure 16 shows the land at proposed lot 1 as scattered regrowth with a disturbed ground layer adjacent to the gulley heads that are included in the C2 lands.

It was not the intention of the report to provide accurate mapping for inclusion on any vegetation maps or databases. The author is aware of the protocols and conventions applicable to the georeferencing and data attribute publishing for GIS data, and thought that it was outside of the scope of this report. The information provided in this report is

informative only and its intent was to inform determining authorities of the prevailing attributes of the site and the existence of any listed threatened entities.

Figure 15 Disturbed vegetation in proposed RU4 lands

Figure 16. Proposed Lot 1 mostly cleared for agricultural pursuits.

In order to clarify and illustrate the findings of the field assessments for each stratified unit, the Plant Community Types that were identified, based on a best fit floristically, are mapped and presented in figure 17.

There are two small compartments of native hardwoods within the RU4 lands affected by the planning proposal. To allow for continuity, the vegetation in the RU4 lands is grouped into the PCT 1550 classification. The dominant species in both of these compartments are Pink Bloodwood and Grey Ironbark. These trees species are associates in PCT 1550 but not the dominant.

The ground layer in the two compartments is highly disturbed and there is no shrub or mid stratum developing. There is no habitat structure, shelter, rock outcrops or large woody debris. None of the trees are old enough for hollow formation. The compartments score low for habitat suitability and structural integrity and are not considered to qualify as High Environmental Value land.

Any future development of the proposed R5 lots does not require the removal of any significant area of native vegetation. Bushfire APZs can be achieved without the need for significant vegetation impacts. The proposed development utilises previously disturbed lands that are extensively cleared. The rezoning of the land from rural to residential will provide further protection from ongoing agricultural impacts.

BJM ENVIRONMENTAL VEGETATION TYPE MAP

Figure 17. PCTs identified in field. Vegetation not mapped is invasive or senescing pioneers.

CONCLUSION

Objective 3 of the NCRP concerns protecting regional biodiversity and potential high environmental value land. HEV land is defined as land that exhibits particular attributes that qualify it for protection. The vegetation within the planning area has been shown to be highly disturbed and fragmented. There are no habitat features to support populations of any threatened entities and the land is currently subjected to ongoing disturbance through agricultural pursuits. The land is not high environmental value land as defined in the NCRP.

The change of use to residential is expected to provide a higher level of protection as it is expected that any future purchasers will prefer to maintain the rural aesthetic of the vegetation rather than clear it. Currently under the Local Land Services Act as rural land some of the vegetation can be removed under the Routine Agricultural Management Activities available to farmers under the LLS Act.

The bushfire strategic study has shown that each lot can achieve the required asset protection zones without the clearing of extensive areas of vegetation. The proposal utilises existing disturbed land with access off South Arm Rd and is designed to minimise impacts to sensitive areas. Development is not prohibited in the Proximity Area of the Coastal Wetland provided there are no significant impacts to the wetland. The proposed rezoning is expected to reduce the impacts to the wetland by limiting the impacts of cattle grazing.

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BUSHFIRE STRATEGIC STUDY

REPORT PREPARED IN RELATION TO:	**PLANNING PROPOSAL AND 7-LOT RURAL SUBDIVISION**
PROPERTY DESCRIPTION:	**LOT 148 in DP 755557, 261 SOUTH ARM ROAD, URUNGA.**
REPORT COMMISSIONED BY: (my Client)	**Mr C. and Mr S. Wood.**

VERSION	REVISION
1	Original.
2	Amended – altered lot layout.
3	Amended lot layout (delete proposed lot 8), and concerns raised in NSW Rural Fire Service letter of 10/2/2023 addressed.

Date saved: 12/02/2024
Date printed: 29/07/2021

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IMPORTANT NOTICE

Site inspections, and the results found herein, are carried out in accordance with the methodology as set out in the documents Planning for Bushfire Protection 2006 & 2019.

The results of the site inspections and their correlation with PBP are based on information provided by the "Reference Documents" and information provided by the Client (or his/her agents).

HCBS 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 qualifications which include Graduate Diploma in Design for Bushfire Prone Areas (UWS) and Certificate 2 & 3 in Firefighting Operations and Certificate 4 in Firefighting Supervision.

This Report is not an application for a Bushfire Safety Authority, but rather forms part of such application. It is the proponent's responsibility to provide the Consent Authority with an assessment of the matters set out in Clause 45 of the Rural Fires Regulation 2022. It is the Consent Authority's responsibility to provide the application for a Bushfire Safety Authority to the NSW Rural Fire Service, in its entirety.

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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 45 of the *Rural Fires Regulation 2022*.
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. 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. 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. FRAMEWORK

Below are relevant extracts of the document "Planning for Bushfire Protection 2019" (*PBP-2019*). 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-2019 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-2019* 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-2019*. Some types of development on BPL can be undertaken as Complying Development and must also comply with *PBP-2019*.

A Bushfire Safety Authority (BSA) is required from the NSW RFS for residential and rural residential subdivision and *Special Fire Protection Purpose* (*SFPP*) developments on BPL. An application for a BSA must address the extent to which the development complies with *PBP-2019*.

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 of PBP-2019. 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 Bellingen Shire Council's BPL map, an extract of which is provided below.

Figure 1: extract of BSC'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 *PBP-2019* 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-2019*. The ability of proposed land uses

and associated future developments to comply with *PBP-2019* will be assessed at the strategic planning stage. The expectation will be that the development will be able to comply with *PBP-2019* at the DA stage.

1.4. Development assessment

The provisions of *PBP-2019* apply to all development on land which is bushfire prone (see section 2.2 of *PBP-2019*). *PBP-2019* 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 *PBP-2019* is proposed on BPL, the development must meet the Aim and Objectives of *PBP-2019* 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 Bushfire Safety Authority

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

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

The BSA 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 BSA and are not required to be assessed under *EP&A Act* s4.14.

Given the scale of SSI and SSD projects, the requirements of *PBP-2019* 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 2021* cl.272 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 *PBP-2019* 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-2019*; 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-2019*, 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 *PBP-2019* 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 *PBP-2019*.

The aim of *PBP-2019* 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-2019*. All applications must meet the Aim and Objectives of *PBP-2019*.

PBP-2019 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 *PBP-2019*. *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 of *PBP-2019* 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 of *PBP-2019* and supported in accordance with the submission requirements in Appendix 2 of *PBP-2019*.

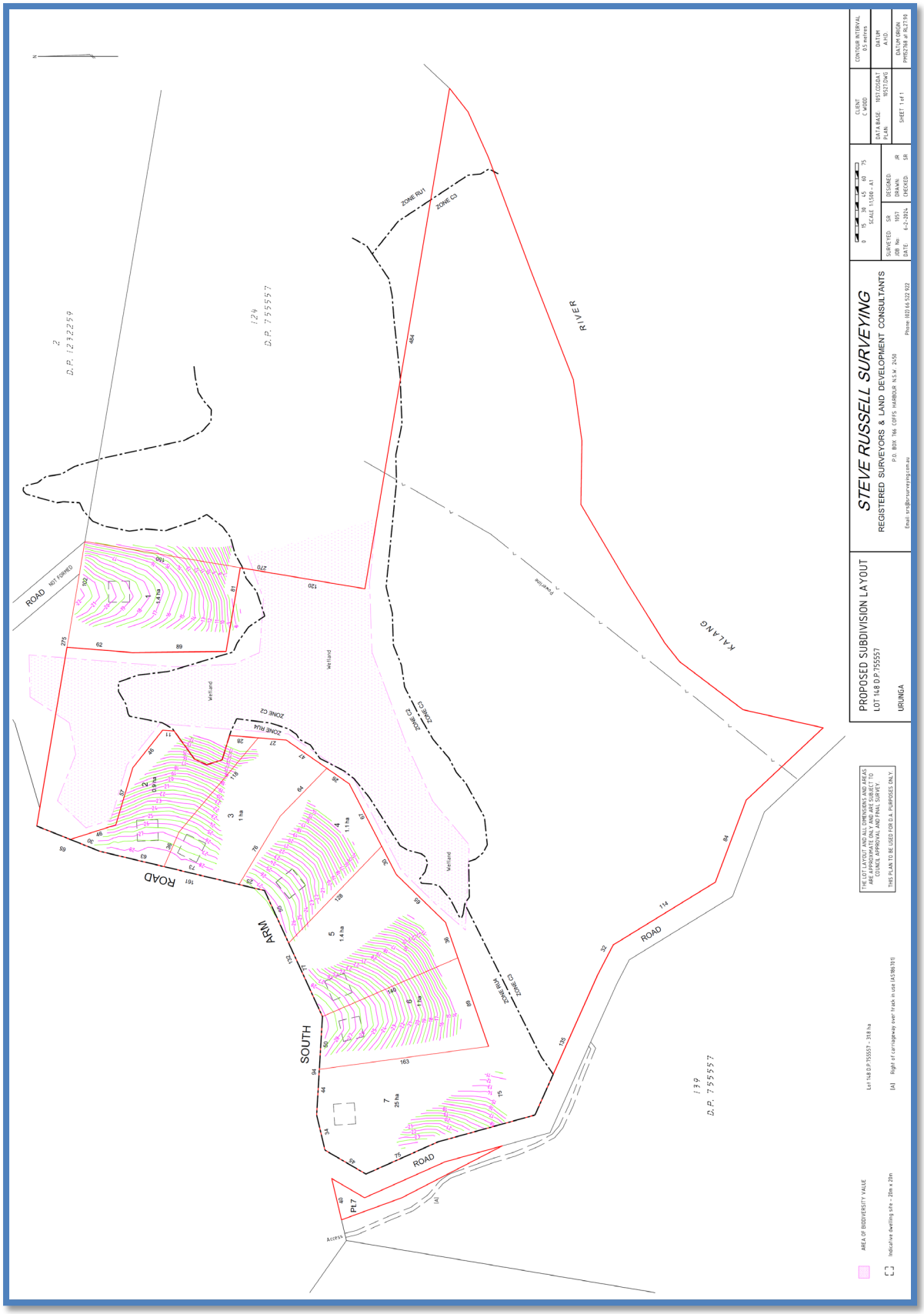

Figure 2: revised subdivision plan (Steve Russell Surveying, 6/2/2024, Ref: 1057)

2. 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 on the Bellinger and Kalang River flood plain, with the Kalang River forming the eastern boundary of the property. The site is partially cleared of woody vegetation and has a history of agricultural use with grazing being the predominant landuse. The remnant vegetation on the site consists of regrowth native forest vegetation (predominantly on the steeper slopes) and *forested wetland* occupying the centrally-

located flood plain within the site. This vegetation occurrence is consistent with the neighbouring properties within the vicinity of the property.

The development footprint of the proposal does not impact on the remnant vegetation or the *forested wetland*.

The Tarkeeth State Forest is located approximately 1.5 km to the west of the site, separated by open farmland, forest and the Pacific Motorway corridor. The forest vegetation within the Tarkeeth SF is continuous with forest as far west as the New England National Park, and encroaches to within approximately 150 m of the property. From a general perspective in landscape terms, the site is constrained from the west by forest, and from the north, east and south by a mosaic of farmland and residential development.

The predominant slope to the west is 'downslope' (downhill running fires) so the majority of the land to the west of the site would support milder bushfire behaviours (notwithstanding the upslopes from gullies-to-ridges). Embers and fire brands from forest fires to the west of the site have the potential to travel long distances, causing spotting well ahead of the main fire front. Fires occurring in grasslands tend to result in less ember attack.

The Tarkeeth and Newry State Forests have been identified as an "Economic Infrastructure" in the MNC BRMP. Plantation harvesting occurs within these SFs 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 mild, with only the short gullies exhibiting slopes in the vicinity of 18°. Flood plains are primarily flat, as would be expected, with the neighbouring lands rarely exceeding 15°.

Fires occurring in the locality around the property have the potential to be moderate intensity fire events on the upslopes, however the subsequent downslope-running intensities would be much lower.

The nature of the local topography is unlikely to cause any significant erratic wildfire behaviour, and prevailing wind conditions would have most influence over wildfire behaviours in the locality of the property.

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[1].

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 records and provides wildfire history for areas within a Rural Fire District. No information has been requested for the completion of this Study.

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:

[1] Mid North Coast Bushfire Risk Management Plan, page 22.

- 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 south-west to north-east, towards the south-western boundary of the property. This area of forest has an area of approximately 20 Ha and a fire run distance towards the property of about 400 m.

This area of forest incorporates forested wetland on the Kalang River flats at its south-western extremity. The eastern fringe of the forest is generally along the boundary of the property where slopes to the south-west are generally 15° – 20° downslope. A wildfire occurring in this area under extreme conditions (those modelled by *PBP-2019* for the Bellingen LGA) would exhibit flame lengths of between approximately 40 m – 50 m.

The proposed new lots along South Arm Road are not directly impacted by these slopes, where slopes to the south-west at the South Arm Road frontage are more gentle.

Whilst there are areas of forest at other aspects around the property, they are not continuous to the boundaries of the site, and are separated by either managed farmland or occupied small holdings.

Wildfires from the west pose the biggest threat and risk from a landscape perspective, due to the vegetation formations and frequency of poor wildfire weather conditions. The potential fire run directly to the subject site from the west and north-west is through managed farmland, separating the site from the forest by at least 100 m in most instances.

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 forest vegetation to the south-west of the site is most easily accessed from the road reserve located at the south-western boundary of the site. This road reserve extends south-east past the neighbouring lot and terminates at the Kalang River.

Access to the southern and western perimeter of this forest is accessible during dry times from within the private properties. Access to the north-eastern perimeter of this forest would only be attempted under mild weather conditions. The modelled extreme wildfire behaviour would place firefighting crews in an unsafe position along this perimeter during high fire-danger days.

South Arm Road provides an opportunity to establish a control line from any wildfire from the west. With the forest generally >100 m west of the road, intensities through the grassland environment would be low enough to allow direct and indirect attacks on the fire front. Likewise for the north-east through the neighbouring occupied properties.

The Pacific Motorway corridor provides a substantial control line opportunity to the west of the site, however carrying out firefighting activities along the motorway poses safety issues for crews and should probably only be undertaken with traffic diversions in place.

The Tarkeeth and Newry State Forests further west of the property have a well established road and trail network. These would provide access for fire suppression under mild conditions. Access into the State Forests 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 saver 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 as 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.

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

This *Bushfire Strategic Study* forms Appendix G of the Planning Proposal prepared by M.J. Hutchings, Land Use Planning Consultant. The Planning Proposal discusses the landuse planning context of the property against strategic planning controls. This *Bushfire Strategic Study* should be read in conjunction with the Planning Proposal.

The following comments are extracted from the project Planner's Report (October 2022, Version 1 Pre-lodgement).

> The proponent is ultimately seeking to subdivide the land to create seven (7) large lot residential allotments and a residue lot in line with Council's adopted *Growth Management Strategy*. To further this objective and Council's delivery of rural residential housing within the 'South Arm Road Investigation Area' of the *Growth Management Strategy*, a planning proposal is required.

> Council has adopted the GHD Growth Management Strategy (GMS), August 2007, to guide and inform its planning decisions up to 2026, inclusive of planning decisions for rural-residential land releases. The GMS recommends that part of the land be 'Maintained as Large Lot Residential' and part of the land 'be Backzoned to Environmental Protection'. It identifies the northwest extent of the land as an area proximate to existing rural residential development and suitable for that purpose, inclusive of subdivision to a one (1) hectare minimum subdivision lot size. This area is characterised as the 'South Arm Road Investigation Area' and is recommended by the GMS to be the subject of a Local Environmental Study to ascertain the extent of the area to be developed.

> The intended future development of the land is a subdivision to achieve seven (7) large lot residential allotments in the northwest and a residue allotment, each with frontage to South Arm Road or the Crown road (see Appendix C and Image 4.1). The residue allotment is proposed to contain the existing shed, access track and powerlines and incorporates the wetland plus the full frontage of the land to the Kalang River. Each resulting lot is proposed to contain a dwelling entitlement by virtue of the Zone or minimum subdivision lot size.

> The nomination of Zone R5 Large Lot Residential permits a limited range of development that is characterised as residential accommodation. When coupled with the proposed one (1) hectare minimum subdivision lot size, potential residential densities that can be achieved on the bush fire prone land are limited, and therefore associated risk is likewise reduced.

The plan attached as Figure 2 above shows the development footprints, or indicative dwelling envelopes, in relation to boundaries. The bushfire attack level (BAL) for each proposed new lot has been provided at Tables 15 – 22 of this Report. The indicative DEs are shown to be located within either BAL-29, BAL-19, or BAL-12.5 areas.

2.2.2. The proposed land use zones and permitted uses

Refer to section 2.2.1 above, and the Planning Proposal.

From the Bellingen LEP 2010 (17/10/2022):

Zone R5 Large Lot Residential

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.
- To ensure that large residential lots are appropriately linked to the nearest urban centre.

2 Permitted without consent

Environmental protection works; Home-based child care; Home occupations

3 Permitted with consent

Building identification signs; Business identification signs; Cellar door premises; Dual occupancies (attached); Dwelling houses; Home industries; Neighbourhood shops; Oyster aquaculture; Pond-based aquaculture; Restaurants or cafes; Roads; Roadside stalls; Secondary dwellings; Sewage reticulation systems; Tank-based aquaculture; Water recycling facilities; Any other development not specified in item 2 or 4

4 Prohibited

Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Boarding houses; Boat building and repair facilities; Car parks; Cemeteries; Centre-based child care facilities; Commercial premises; Correctional centres; Crematoria; Depots; Eco-tourist facilities; Electricity generating works; Entertainment facilities; Freight transport facilities; Function centres; Heavy industrial storage establishments; Helipads; Highway service centres; Home occupations (sex services); Industrial retail outlets; Industrial training facilities; Industries; Information and education facilities; Intensive livestock agriculture; Local distribution premises; Marinas; Mooring pens; Mortuaries; Passenger transport facilities; Places of public worship; Public administration buildings; Recreation facilities (indoor); Recreation facilities (major); Registered clubs; Residential accommodation; Respite day care centres; Restricted premises; Rural industries; Service stations; Sewerage systems; Sex services premises; Signage; Storage premises; Transport depots; Truck depots; Turf farming; Vehicle body repair workshops; Vehicle repair stations; Veterinary hospitals; Warehouse or distribution centres; Waste or resource management facilities; Wharf or boating facilities; Wholesale supplies

The *Bushfire Protection Measures* 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 bushfire attack level (BAL) for each proposed new lot has been provided at Tables 15 – 22 of this Report. The indicative DEs are shown to be located within either BAL-29, BAL-19, or BAL-12.5 areas.

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 seven (7) proposed DEs for the site have been located adjacent to the public road.

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

As a rural-residential (large lot residential) subdivision, only residential-sized APZs will be provided between the proposed dwelling envelopes (DE) and the bushfire hazards. The plan provided above as Figure 2 and Tables 15 – 22 demonstrate that that this D-t-S provision of *PBP-2019* has been satisfied. This is discussed in further detail in Section 3.1.1 of this Report.

It would not be unreasonable to expect that all of the existing cleared and managed areas within proposed new lots 1 – 7 are 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 to outer protection area (OPA) standards.

The creation and maintenance of the proposed APZs does not require the removal of any woody native vegetation. All of the proposed APZs are proposed to be created and maintained over areas of the site that have already been cleared and have a history of agricultural use.

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

No new public roads are proposed as part of this development. Proposed lots 1 – 7 will gain access directly off South Arm Road.

The proposed internal property access roads will comply with all of the relevant D-t-S provisions (*Acceptable Solutions*) of *PBP-2019*.

There has been no traffic study undertaken as part of the Planning Proposal. As discussed at section 2.2 above, the property has been identified as being located within the Growth Management Strategy area. It would not be unreasonable to expect that supporting an increase in traffic would be a major consideration of the Consent Authorities at the strategic level.

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

Primary access to the site is currently from the north-east via South Arm Road and Short Cut Road. From Short Cut Road intersection, travel to either the west or east can be undertaken. In the event of a wildfire emergency triggering and evacuation, travel to the east would be the expected route.

It is not anticipated that any fire to the north of the site would trigger an evacuation from the site in a westerly direction along South Arm Road. This is based on 2 reasons:

- Firstly, the hazard vegetation to the north and north-east of the site is not of a high enough hazard class to warrant an evacuation from a resilient development; and
- Secondly, travel to the west would be in the direction of forest where the road could likely be cut by fire and / or smoke. Almost the entire length of South Arm Road from the site to Bowraville Road is one large 'pinch-point'.

There would be an expectation that traffic from the west along South Arm Road could increase in the event of a bushfire emergency in the area. This length of road is approximately 2.5 km. It is a further 1 km east to the Giinagay Way (the old Pacific Highway).

It should be remembered that the future homes on the proposed new lots will be considered resilient to bushfire attack mechanisms (smoke, embers, radiant heat). Where appropriated *Bushfire Protection Measures* have been implemented and maintained as part

of the development assessment pathway for those future homes, evacuation by those residents would not be encouraged in the first instance. Therefore a large-scale evacuation from the proposed new lots would not be anticipated.

In response to NSW Rural Fire Service concerns (refer to section 4 of this Study):
An audit was conducted by both Josh Eagleton (20/3/2023) and Denis Atkinson (undated but issued on 20/3/2023) on the section of South Arm Road between the subject sites and Short Cut Road to the north. Both of these audits are presented in the BSC document dated 3/5/2023, "Addendum to Planning Proposal 21 (PP-2022-2442) South Arm Rd, Urunga".

The audits have identified that road widths along the section of South Arm Road between the sites and Short Cut Road are at least 5.5 m wide, and are generally wider than 6 m (page 3 of Eagleton audit, and pages 1-2 of Atkinson audit).

Where South Arm Road has managed areas on 1 side and hazard on the other, then the road would be acting as a perimeter road. Where South Arm Road has managed areas on both sides, then the road would be acting as a non-perimeter road. Where South Arm Road has hazard vegetation on both sides, then it would be considered a pinch-point. There is no mention of pinch-points in PBP-2019 in this context.

As South Arm Road does not form a perimeter road it is best classed as a non-perimeter road. Under the PBP-2019 provisions, non-perimeter roads need only be 5.5 m wide with parking areas outside of the road pavement (off-street parking addressed below).

The only pinch-point along the section of South Arm Road in question is where the road is bordered by wetland (images 3, 4, 5 and 11 of the Eagleton audit). To require South Arm Road to meet a higher standard fails to acknowledge that there would be no firefighting activities at the pinch-point, and how does the extra road width help to guarantee the road stays open in the event of a wildfire when 30m high trees line both sides of the road? Any woody vegetation within a distance of the road that is less than the height of the vegetation, potentially cuts-off the access/egress route.

The existing public road network in the vicinity of the subject sites is the responsibility of the BSC. It is the BSC that has identified the subject sites as suitable for rezoning, and supported the rezoning under its Growth Management Strategy 2007. An internal BSC email identifies the condition and proposed maintenance regime of the section of South Arm Road between Short Cut Road and the subject sites:

"Their proposal is between the intersection Short Cut and South Arm Roads (Chainage 0.00) and 354 South Arm Road (Chainage 3,500.00).
One section of South Arm Road within their scope will be resealed (spray seal treatment) as part of our FY2022 Reseal Program (Chainage 1,700 – 2,440).

The identified section for treatment has a road condition of 3 (Fair: due for reseal, minor crocodile cracking apparent, minor shape corrections, minor patching, re-establishment of table drains required).

The rest of the section are in condition 2 (Good: seal in good condition, normal road maintenance required, minor edge breaking, no indication of sub-base damages).

Between Chainage 0.00 and 160.00, the road has a guardrail on the right-hand side and a road width of 10.0m. Between Chainage 160.00 and 3,500.00 the road has an average width of 6.0m (2x3.0m lanes with 1.0m wide shoulders) and table drains on either side."

In relation to off-street parking for firefighting vehicles I will refer to the audits conducted by Josh Eagleton and Denis Atkinson, more specifically the images in those audits.

Image 1 of Eagleton audit	→	*Off-street parking limited to non-guardrail side of South Arm Road.*
Image 2 of Eagleton audit	→	*Off-street parking marginal due to table-drains and uneven surface.*
Image 3 of Eagleton audit	→	*No off-street parking due to narrow verges created by swamp forest vegetation.*
Image 4 of Eagleton audit	→	*No off-street parking due to narrow verges created by swamp forest vegetation.*
Image 5 of Eagleton audit	→	*No off-street parking due to narrow verges created by swamp forest vegetation.*
Image 6 of Eagleton audit	→	*Off-street parking available on both sides of road.*
Image 7 of Eagleton audit	→	*Off-street parking available on both sides of road.*
Image 8 of Eagleton audit	→	*Off-street parking marginal due to table-drains and uneven surface.*
Image 9 of Eagleton audit	→	*Off-street parking limited to eastern side of road due to table-drains and uneven surface on western side.*
Image 10 of Eagleton audit	→	*Off-street parking available on both sides of road.*
Photo 1 of Atkinson audit	→	*Off-street parking available on both sides of road.*
Photo 2 of Atkinson audit	→	*Off-street parking available on both sides of road.*
Photo 3 of Atkinson audit	→	*Off-street parking available on both sides of road.*

Not withstanding the off-street parking opportunities cited above, each new lot created as part of the rezoning proposal will be provided with a property access road, at construction stage of the future dwellings, that meets NSW Rural Fire Service standards.

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

Of the route to the north along South Arm Road, the first 1 km or so is bordered by either managed farmland or occupied small holding rural properties. It is unlikely that a traffic 'pinch-point' would be created along this section of road.

The next 1 km or so is bordered by forest, initially on the western side of the road, but eventually on both sides. There is the potential for a wildfire along this section of road to

affect safe travel. It must be remembered though, that a safe refuge exists at the subject site as the homes, APZs and water supplies would all be complying and meet RFS standards.

In response to NSW Rural Fire Service concerns (refer to section 4 of this Study):
The only pinch-point along the section of South Arm Road in question is where the road is bordered by wetland (images 3, 4, 5 and 11 of the Eagleton audit). To require South Arm Road to meet a higher standard fails to acknowledge that there would be no firefighting activities at the pinch-point, and how does the extra road width help to guarantee the road stays open in the event of a wildfire when 30m high trees line both sides of the road? Any woody vegetation within a distance of the road that is less than the height of the vegetation, potentially cuts-off the access/egress route.

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

Will the proposed development impose an increase in demand on firefighting services? The transition of large parts of the site from farmland to managed APZ reduces the amount of land able to support a wildfire.

Further, although residential assets (dwellings) will eventually be constructed on the proposed new lots, it does not automatically follow that this will create a higher demand for firefighting resources during a wildfire event. The fact that the dwellings will be resilient against the effects of a wildfire (construction, water supply, landscaping and APZ), it could be argued that this would free-up firefighting resources to concentrate their efforts on less resilient, more vulnerable developments.

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 effects of wildfires, and landscaping and APZs have been properly designed and maintained. The result of this is that the development site is more bushfire-resilient than the existing development on the same interface area, and therefore actually less reliant on the fire services.

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 Report, 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 around the development site will comply with the requirements of *PBP-2019*, as detailed in section 3.1.2 of this Report.

In response to NSW Rural Fire Service concerns (refer to section 4 of this Study):
The only pinch-point along the section of South Arm Road in question is where the road is bordered by wetland (images 3, 4, 5 and 11 of the Eagleton audit). To require South Arm Road to meet a higher standard fails to acknowledge that there would be no firefighting activities

at the pinch-point, and how does the extra road width help to guarantee the road stays open in the event of a wildfire when 30m high trees line both sides of the road? Any woody vegetation within a distance of the road that is less than the height of the vegetation, potentially cuts-off the access/egress route.

The existing public road network in the vicinity of the subject sites is the responsibility of the BSC. It is the BSC that has identified the subject sites as suitable for rezoning, and supported the rezoning under its Growth Management Strategy 2007.

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 South Arm Road properties. Firefighting water supplies for the development will be provided by on-site static water supplies.

The supply will most likely be individual water tanks on each proposed new lot (rather than an amalgam of supplies).

Section 3.1.3 of this Report 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.

An existing overhead electricity transmission line is located in the eastern portion of the site (refer to Figure 2). The transmission lines are provided with a managed APZ, created and maintained by the electricity authority.

Figure 3: view looking south-west along electricity easement (eastern portion of site)

The fact that there is an overhead transmission line traversing the eastern portion of the site poses no greater hazard to the occupants of the proposed development than the existing transmission lines along South Arm Road or Short Cut Road pose to the same occupants, or the occupants of the surrounding area. 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 pressure on surrounding lands, from a bushfire-perspective. To the contrary, the proposed development increases the level of bushfire-protection to the adjoining lands, particularly those further north-east of the subject site, as the suite of BPMs are provided within the development site.

All of the BPMs required to be provided for the proposed development will be provided within the boundaries of the property being developed.

3. 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. 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	
Step 1:	Determine vegetation formation in all directions around the building to a distance of 140 metres (refer to A1.2);
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);
Step 3:	Determine the relevant FFDI for the council area in which the development is to be undertaken (refer to A1.6); and
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).

3.1.1. Vegetation

3.1.1.1. Vegetation Description

A vegetation assessment was carried out to include a distance of 140 metres from the proposed new dwelling envelopes, in all directions. The following aerial images show the aspects that are referred to in the following Tables.

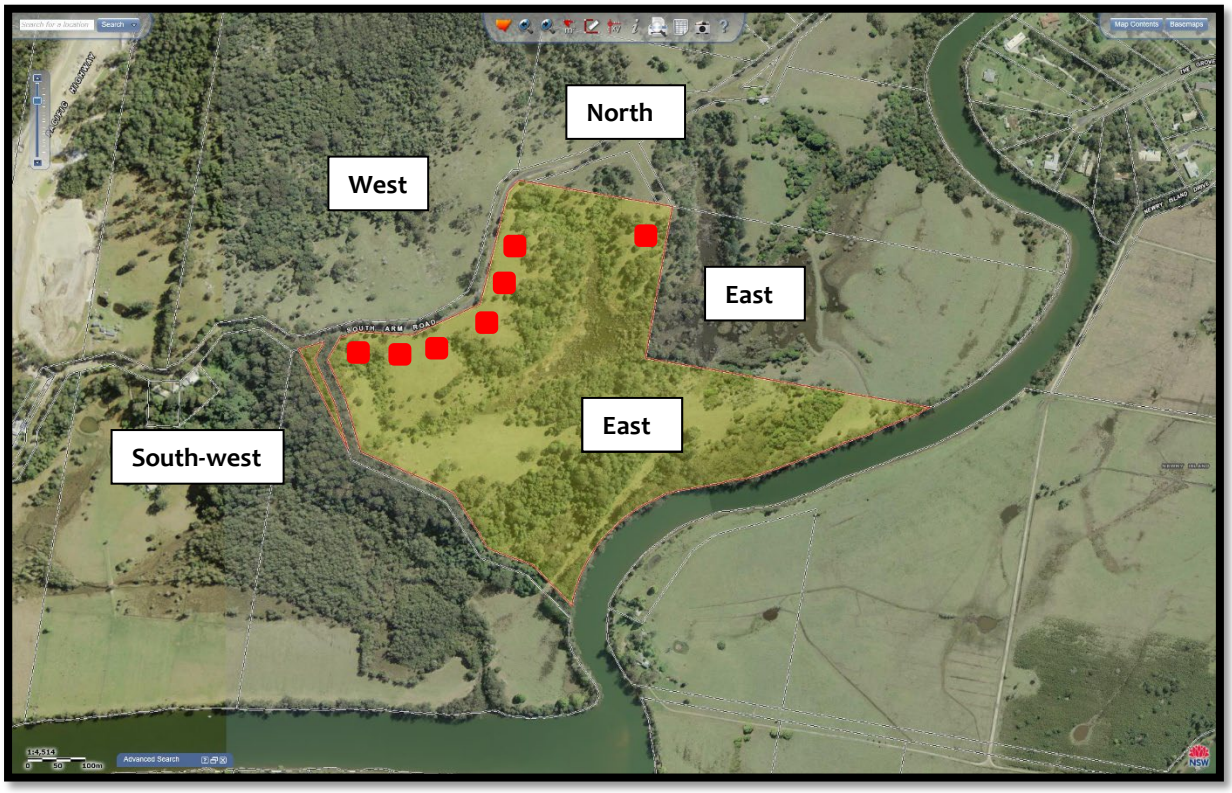

Figure 4: aerial image identifying aspects for vegetation and slope assessment for proposed lots 1 - 7

It is determined that the general vegetation description is summarised as follows:

Table 2: proposed lots 1 - 7

North	Generally all of the land within 100 m to the north-west of the proposed DEs is managed land by virtue of the grazed pasture paddocks. As a measure of conservatism, the vegetation across the paddocks will be classed as "grasslands" rather than managed land. A remnant of forest is located approximately 60 m to the north of proposed lot 1. This remnant is located at the head of a gully that drains to the south to a coastal flood plain.
East	Generally all of the land within 100 m to the south-east of the proposed DEs is coastal flood plain The wetland varies is width from several metres to about 400 m. Beyond the coastal flood plan is managed land by virtue of the grazed pasture paddocks. A portion of this land is burdened by an easement for APZ that benefits the neighbouring property to the south.
South-west	South-west of proposed lot 7 is forest on the neighbouring lot to the west.
West	Generally all of the land within 100 m to the north-west of the proposed DEs is managed land by virtue of the grazed pasture paddocks. As a measure of conservatism, the vegetation across the paddocks will be classed as "grasslands" rather than managed land. Beyond 100 m is forest.

3.1.1.2. Vegetation Classification

Table 3: vegetation classification for proposed lots 1 - 7

North	*Remnant* @ 90 m *Grasslands* @ 30 m
East	*Forested wetland* (coastal floodplain wetland)
South-west	*Forest* @ > 35 m.
West	*Grasslands* @ 30 m

3.1.1.3. Past or Future Disturbance Factors (including extenuating circumstances)

There are not considered to be any other past or future vegetation disturbance factors that are likely to significantly affect the current bushfire threat to the DEs.

3.1.2. 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 for each new lot as follows:

Table 4: effective slope for proposed lot 1

North	*Grasslands* @ 30 m	Upslope
East	*Forested wetland*	>15° – 20° downslope
South	*Forested wetland*	>10° – 15° downslope
West	*Forested wetland*	>15° – 20° downslope

Table 5: effective slope for proposed lot 2

North	*Remnant* @ 40 m	>5° – 10° downslope
East	*Forested wetland* @ 70 m	0° slope
South	*Remnant* @ 70 m	>5° – 10° downslope
West	*Grasslands* @ 40 m	>10° – 15° downslope

Table 6: effective slope for proposed lot 3

North	*Remnant* @ 80 m	>5° – 10° downslope
South-east	*Forested wetland* @ 100 m	0° slope
South	*Remnant* @ 30 m	>5° – 10° downslope
West	*Grasslands* @ 40 m	>10° – 15° downslope

Table 7: effective slope for proposed lot 4

North	*Remnant* @ 40 m	>5° – 10° downslope
South-east	*Forested wetland* @ 85 m	0° slope
South-west	*Remnant* @ 35 m	>5° – 10° downslope
West	*Grasslands* @ 40 m	>10° – 15° downslope

Table 8: effective slope for proposed lot 5

North	*Grasslands* @ 35 m	>10° – 15° downslope
East	*Remnant* @ 20 m	>5° – 10° downslope
South	*Forested wetland* @ +100 m	0° slope
West	*Forest* @ +100 m	Upslope

Table 9: effective slope for proposed lot 6

North	*Grasslands* @ 35 m	>10° – 15° downslope
East	*Remnant* @ 60 m	>5° – 10° downslope
South	*Forested wetland* @ +100 m	0° slope
West	*Forest* @ +100 m	Upslope

Table 10: effective slope for proposed lot 7

North	*Grasslands* @ 35 m	>10° – 15° downslope
East	*Remnant* @ +100 m	>5° – 10° downslope
South	*Forested wetland* @ +100 m	0° slope
West	*Forest* @ 50 m	Upslope

3.2. A planning proposal must have regard to Planning for Bushfire Protection 2019

The following subsections list the *Bushfire Protection Measures* provided in Chapter 5 of *PBP-2019* for residential and rural-residential subdivisions.

3.2.1. Asset Protection Zones

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 11

	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 **[5.2]** Fencing is constructed in accordance with section 7.6.	Complies Complies

In relation to *Acceptable Solution* [1.1], Table A1.12.3 of *PBP-2019* is provided below.

Table A1.12.3

Minimum distances for APZs – residential development, FFDI 80 areas (≤29kW/m², 1090K)

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	25
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	20	25	31	39	48
Grassy and Semi-Arid Woodland (including Mallee)	11	13	17	21	27
Forested Wetland (excluding Coastal Swamp Forest)	8	10	13	17	22
Tall Heath	16	18	20	22	25
Short Heath	9	10	12	13	15
Arid-Shrublands (acacia and chenopod)	6	7	8	9	10
Freshwater Wetlands	5	6	6	7	8
Grassland	10	11	12	14	16

Figure 5: Table A1.12.3 of *PBP-2019*

From Figure 5 above, Table 4 - Table 10 can be modified as follows.

Table 12: effective slope for proposed lot 1

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	MINIMUM APZ ACHIEVED?
North	*Grasslands* @ 30 m	Upslope	Complies
East	*Forested wetland* @ 30 m	>15° – 20° downslope	Complies
South	*Forested wetland* @ + 100 m	>10° – 15° downslope	Complies
West	*Forested wetland* @ 25 m	>15° – 20° downslope	Complies

Table 13: effective slope for proposed lot 2

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	MINIMUM APZ ACHIEVED?
North	*Remnant* @ 40 m	>5° – 10° downslope	Complies
East	*Forested wetland* @ 70 m	0° slope	Complies
South	*Remnant* @ 70 m	>5° – 10° downslope	Complies
West	*Grasslands* @ 40 m	>10° – 15° downslope	Complies

Table 14: effective slope for proposed lot 3

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	MINIMUM APZ ACHIEVED?
North	*Remnant* @ 80 m	>5° – 10° downslope	Complies
South-east	*Forested wetland* @ 100 m	0° slope	Complies
South	*Remnant* @ 30 m	>5° – 10° downslope	Complies
West	*Grasslands* @ 40 m	>10° – 15° downslope	Complies

Table 15: effective slope for proposed lot 4

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	MINIMUM APZ ACHIEVED?
North	*Remnant* @ 40 m	>5° – 10° downslope	Complies
South-east	*Forested wetland* @ 85 m	0° slope	Complies
South-west	*Remnant* @ 35 m	>5° – 10° downslope	Complies
West	*Grasslands* @ 40 m	>10° – 15° downslope	Complies

Table 16: effective slope for proposed lot 5

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	MINIMUM APZ ACHIEVED?
North	*Grasslands* @ 35 m	>10° – 15° downslope	Complies
East	*Remnant* @ 20 m	>5° – 10° downslope	Complies
South	*Forested wetland* @ +100 m	0° slope	Complies
West	*Forest* @ +100 m	Upslope	Complies

Table 17: effective slope for proposed lot 6

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	MINIMUM APZ ACHIEVED?
North	*Grasslands* @ 35 m	>10° – 15° downslope	Complies
East	*Remnant* @ 60 m	>5° – 10° downslope	Complies
South	*Forested wetland* @ +100 m	0° slope	Complies
West	*Forest* @ +100 m	Upslope	Complies

Table 18: effective slope for proposed lot 7

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	MINIMUM APZ ACHIEVED?
North	*Grasslands* @ 35 m	>10° – 15° downslope	Complies
East	*Remnant* @ +100 m	>5° – 10° downslope	Complies
South	*Forested wetland* @ +100 m	0° slope	Complies
West	*Forest* @ 50 m	Upslope	Complies

In relation to *Acceptable Solution* [2.1] & [5.1], the RFS document "*Standards for APZs*" is attached as Appendix A of this Study.

In relation to *Acceptable Solution* [5.2], *PBP-2019* states:

> 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.

Further to the minimum APZ requirements (addressing the BAL-29 setback), the following discussion addresses the actual BAL for each DE on the proposed new lots.

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				
ALL UPSLOPE AND FLAT LAND	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	< 15	15 -< 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)	< 6	6 -< 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 -< 9	9 -< 14	14 -< 100
	Freshwater Wetlands	< 4	4 -< 5	5 -< 7	7 -< 11	11 -< 100
	Grassland	< 7	7 -< 10	10 -< 14	14 -< 20	20 -< 50
> 0 > 5 DEGREES - DOWNSLOPE	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	< 19	19 -< 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	< 13	13 -< 18	18 -< 26	26 -< 36	36 -< 100
	Short Heath	< 8	8 -< 10	10 -< 15	15 -< 22	22 -< 100
	Arid-Shrublands (acacia and chenopod)	< 5	5 -< 7	7 -< 11	11 -< 16	16 -< 100
	Freshwater Wetlands	< 4	4 -< 6	6 -< 8	8 -< 12	12 -< 100
	Grassland	< 8	8 -< 11	11 -< 16	16 -< 23	23 -< 50
> 5 > 10 DEGREES - DOWNSLOPE	Rainforest	< 11	11 -< 15	15 -< 22	22 -< 32	32 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 24	24 -< 31	31 -< 43	43 -< 57	57 -< 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	< 9	9 -< 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	< 9	9 -< 12	12 -< 18	18 -< 26	26 -< 50
> 10 > 15 DEGREES - DOWNSLOPE	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 -< 25	25 -< 35	35 -< 100
	Tall Heath	< 17	17 -< 22	22 -< 32	32 -< 44	44 -< 100
	Short Heath	< 10	10 -< 13	13 -< 20	20 -< 29	29 -< 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
> 15 > 20 DEGREES - DOWNSLOPE	Rainforest	< 19	19 -< 25	25 -< 36	36 -< 49	49 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 38	38 -< 48	48 -< 63	63 -< 81	81 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 20	20 -< 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 -< 23	23 -< 32	32 -< 100
	Arid-Shrublands (acacia and chenopod)	< 7	7 -< 10	10 -< 16	16 -< 23	23 -< 100
	Freshwater Wetlands	< 6	6 -< 8	8 -< 13	13 -< 18	18 -< 100
	Grassland	< 12	12 -< 16	16 -< 24	24 -< 34	34 -< 50

Figure 6: Table A1.12.6 of *PBP-2019*

From Figure 6 above, Table 12 - Table 18 can be modified as follows.

Table 19: effective slope for proposed lot 1

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	BAL-29	BAL-19	BAL-12.5
North	*Grasslands* @ 30 m	Upslope	10m-<14m	14m-<20m	20m-<50m
East	*Forested wetland* @ 30 m	>15° – 20° downslope	22m-<32m	32m-<43m	43m-<100m
South	*Forested wetland* @ + 100 m	>10° – 15° downslope	17m-<25m	25m-<35m	35m-<100m
West	*Forested wetland* @ 25 m	>15° – 20° downslope	22m-<32m	32m-<43m	43m-<100m

Table 20: effective slope for proposed lot 2

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	BAL-29	BAL-19	BAL-12.5
North	*Remnant* @ 40 m	>5° – 10° downslope	15m-<22m	22m-<32m	32m-<100m
East	*Forested wetland* @ 70 m	0° slope	8m-<12m	12m-<18m	18m-<100m
South	*Remnant* @ 70 m	>5° – 10° downslope	15m-<22m	22m-<32m	32m-<100m
West	*Grasslands* @ 40 m	>10° – 15° downslope	20m-<29m	29m-<40m	40m-<100m

Table 21: effective slope for proposed lot 3

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	BAL-29	BAL-19	BAL-12.5
North	*Remnant* @ 80 m	>5° – 10° downslope	15m-<22m	22m-<32m	32m-<100m
South-east	*Forested wetland* @ 100 m	0° slope	8m-<12m	12m-<18m	18m-<100m
South	*Remnant* @ 30 m	>5° – 10° downslope	15m-<22m	22m-<32m	32m-<100m
West	*Grasslands* @ 40 m	>10° – 15° downslope	20m-<29m	29m-<40m	40m-<100m

Table 22: effective slope for proposed lot 4

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	BAL-29	BAL-19	BAL-12.5
North	*Remnant* @ 40 m	>5° – 10° downslope	15m-<22m	22m-<32m	32m-<100m
South-east	*Forested wetland* @ 85 m	0° slope	8m-<12m	12m-<18m	18m-<100m
South-west	*Remnant* @ 35 m	>5° – 10° downslope	15m-<22m	22m-<32m	32m-<100m
West	*Grasslands* @ 40 m	>10° – 15° downslope	20m-<29m	29m-<40m	40m-<100m

Table 23: effective slope for proposed lot 5

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	BAL-29	BAL-19	BAL-12.5
North	*Grasslands* @ 35 m	>10° – 15° downslope	14m-<21m	21m-<30m	30m-<50m
East	*Remnant* @ 20 m	>5° – 10° downslope	15m-<22m	22m-<32m	32m-<100m
South	*Forested wetland* @ +100 m	0° slope	8m-<12m	12m-<18m	18m-<100m
West	*Forest* @ +100 m	Upslope	20m-<29m	29m-<40m	40m-<100m

Table 24: effective slope for proposed lot 6

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	BAL-29	BAL-19	BAL-12.5
North	*Grasslands* @ 35 m	>10° – 15° downslope	14m-<21m	21m-<30m	30m-<50m
East	*Remnant* @ 60 m	>5° – 10° downslope	15m-<22m	22m-<32m	32m-<100m
South	*Forested wetland* @ +100 m	0° slope	8m-<12m	12m-<18m	18m-<100m
West	*Forest* @ +100 m	Upslope	20m-<29m	29m-<40m	40m-<100m

Table 25: effective slope for proposed lot 7

ASPECT	VEGETATION CLASSIFICATION	EFFECTIVE SLOPE	BAL-29	BAL-19	BAL-12.5
North	*Grasslands* @ 35 m	>10° – 15° downslope	14m-<21m	21m-<30m	30m-<50m
East	*Remnant* @ +100 m	>5° – 10° downslope	15m-<22m	22m-<32m	32m-<100m
South	*Forested wetland* @ +100 m	0° slope	8m-<12m	12m-<18m	18m-<100m
West	*Forest* @ 50 m	Upslope	20m-<29m	29m-<40m	40m-<100m

3.2.2. 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 26

	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;	Not applicable
		[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;	Not applicable
		[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;	Not applicable
		[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;	Not applicable

		[6.8] Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;	Not applicable
		[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.	Not applicable
	[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;	Not applicable
		[10.2] Parking is provided outside of the carriageway width;	Not applicable
		[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;	Not applicable
		[10.5] Curves of roads have a minimum inner radius of 6m;	Not applicable
		[10.6] The road crossfall does not exceed 3 degrees; and	Not applicable

		[10.7] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Not applicable
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. In circumstances where this cannot occur, the following requirements apply:	Not applicable
		[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;	Able to comply
		[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. 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 development property access roads in addition to the above.	Not applicable

In relation to *Acceptable Solution* [6.1], the property access roads for each new proposed lot will provide all-weather access to the on-site static firefighting water supply. In addition, each of the proposed new lots is to be provided with a property access road that complies with the relevant *Acceptable Solutions* within Chapter 5 and Appendix 3 of *PBP-2019*. This will be addressed as construction stage of the future dwellings.

In relation to *Acceptable Solution* [6.3] & [6.9] & [11.10], each of the proposed new lots 1 – 7 are provided with separate access to South Arm Road.

In relation to *Acceptable Solution* [6.6] & [6.7] & [6.8] & [7.1] & [9.1 - 10.7], no new roads are proposed for this development.

In relation to *Acceptable Solution* [8.1] & [8.2], no reticulated water supply is available to the site.

In relation to *Acceptable Solution* [8.3], each of the proposed new lots is to be provided with a property access road that complies with the relevant *Acceptable Solutions* within Chapter 5 and Appendix 3 of *PBP-2019*. This will be addressed as construction stage of the future dwellings.

In relation to *Acceptable Solution* [11.2 – 11.9], access complying with these *Acceptable Solutions* will only need to be provided onto proposed lots at construction stage of the future dwellings. The fire truck manoeuvring area for access to the on-site firefighting

water supply for each lot will need to comply with Appendix 3 of *PBP-2019* (Appendix B of this Report).

3.2.3. 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 27

	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	Able to comply
		[12.3] Static water supplies shall comply with Table 5.3d of *PBP-2019*.	Able to comply
	[13a] Water supplies are located at regular intervals; and **[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 main system for areas with perimeter roads.	Not applicable
	[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	Able to comply
		[15.2] Above-ground water storage tanks shall be of concrete or metal	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; Where overhead, electrical transmission lines are proposed as follows: * lines are installed with short pole spacing of 30m, unless crossing gullies, gorges or riparian areas; and * 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;	Able to comply
		[17.2] All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;	Able to comply
		[17.3] Connections to and from gas cylinders are metal;	Able to comply
		[17.4] Polymer-sheathed flexible gas supply lines are not used; and	Able to comply
		[17.5] Above-ground gas service pipes are metal, including and up to any outlets.	Able to comply

In relation to *Acceptable Solution* [12.3], *PBP-2019* requires 20,000 litres of firefighting water supply to be provided for each dwelling.

In relation to the other relevant *Acceptable Solutions*, these matters are able to be addressed via the conditions of consent.

3.3. A planning proposal must introduce controls that avoid placing inappropriate developments in hazardous areas

Although superseded, *PBP-2006* and *PBP-2001* provide lists of development types that are both suitable, and unsuitable, for bushfire-prone areas. The principles based on landuse hazards, threats and risks would still apply.

Table 28

Not Desirable	Desirable
• Camping grounds • Assembly buildings • Land sharing communities • Commercial and retail premises • Education premises • Prisons • Premises for people with mental or physical incapacities • Hospitals • Flammable material bulk storage • Stock / sale yards • Timber yards • Factories / warehouses • Plantations • Waste disposal / landfill depots • Power generating works • Sawmills • Junk yards • Liquid fuel depots • Offensive and hazardous industries • Chemical industries • Service stations • Ammunition storage/manufacture • Fireworks manufacture/storage	• Tennis courts • Golf courses • Swimming pools • Cemeteries • Airstrips • Cleared open space / recreation areas

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.

3.4. A planning proposal must ensure that bushfire hazard reduction is not prohibited within the APZ

This has been discussed in more detail at section 3.1 above. The existing managed areas of the proposed new lots should be managed as APZ. The minimum APZ required by *PBP-2019* (refer to Figure 5 and Tables 15 - 22) should be managed as Inner Protection Area (IPA). The remaining area of each lot should be managed as an Outer Protection Area (OPA). Appendix A of this Study sets out the standards for APZs.

3.5. 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

This has been discussed in more detail at section 3.1 above. The intent of the perimeter road requirement has been met by South Arm Road. The minimum required APZs have been provided.

3.6. 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

This has been discussed in more detail at section 3.1 above. The intent of the perimeter road requirement has been met by South Arm Road. The minimum required APZs have been provided.

3.7. 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

There is no existing infill-development on the property that requires an assessment against these provisions.

3.8. 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 at section 3.1 above. South Arm Road serves the intent of a non-perimeter road.

There are no new public roads proposed as part of this development.

There are no fire trails on the subject property, or on the adjoining properties.

3.9. Contain provisions for adequate water supply for firefighting purposes

This has been discussed in more detail at section 3.1 above. On-site static water supplies are to be provided on each of the proposed new lots, at construction stage of the future dwellings.

3.10. 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 subdivision development is significantly less than the overall perimeter of the property, so in that regard the interface area has been minimised. It is physically impossible to reduce the perimeter of the site.

The proposed lots 1 – 7 are all located fronting the existing public road, minimising the reliance on lengthy property access roads through hazard vegetation.

3.11. Introduce controls on the placement of combustible materials in the Inner Protection Area

This has been discussed in more detail at section 3.1 & 3.2 above.

4. NSW RURAL FIRE SERVICE CONCERNS

On Friday 10th February 2023 the NSW Rural Fire Service issued the following letter to the Bellingen Shire Council (BSC) in relation to Planning Proposal 21 (the neighbouring land to the north of the subject site).

NSW GOVERNMENT

NSW RURAL FIRE SERVICE

Bellingen Shire Council
PO Box 117
BELLINGEN NSW 2454

Your reference: (REF-1840) PP-2022-2442
Our reference: SPI20221124000151

ATTENTION: Daniel Bennett

Date: Friday 10 February 2023

Dear Sir/Madam,

Strategic Planning Instrument
Rezoning – Planning Proposal
Bellingen Local Environmental Plan 2010 - Rezone the land (in portion) to R5 – Large Lot Residential and C2 – Environmental Conservation

I refer to your correspondence dated 24/11/2022 inviting the NSW Rural Fire Service (NSW RFS) to comment on the above Strategic Planning document.

The NSW RFS has considered the information submitted and provides the following comments.

Council correspondences states:
The Planning Proposal seeks to undertake a review of the site's current land zoning, specifically, the portion of each of the sites that has a current land zoning of RU4 – Rural Landscape under the Bellingen Local Environmental Plan 2010. The Planning Proposal seeks to rezone the land (in portion) to R5 – Large Lot Residential and C2 – Environmental Conservation and subsequently amend the Minimum Lot Size to facilitate further land subdivision

Council has received a proponent initiated request to prepare a planning proposal that would act to rezone land at South Arm Road Urunga. The rezoning request proposes to rezone land currently zoned as RU4 - Primary Production Small Lots to a mix of land zoned R5 Large Lot Residential and C2 Environmental Conservation. The land that is proposed to be rezoned R5 would be subject to a 1ha minimum lot size and could potentially yield in the order of 17 lots if the rezoning proceeds and the land is subdivided.

The NSW RFS cannot support the Planning Proposal in its current form.
Council needs to provide a strategic study:

- for all lands suitable for residential (large lot) development fronting South Arm Road (east of the motorway);
- provide a rezoning map that does not rezone land for residential purposes but effectively is constrained by property boundary's and natural landscape features; and
- the APZ plan does not appear to reflect the SEPP Resilience and Hazards buffer zone requirements.

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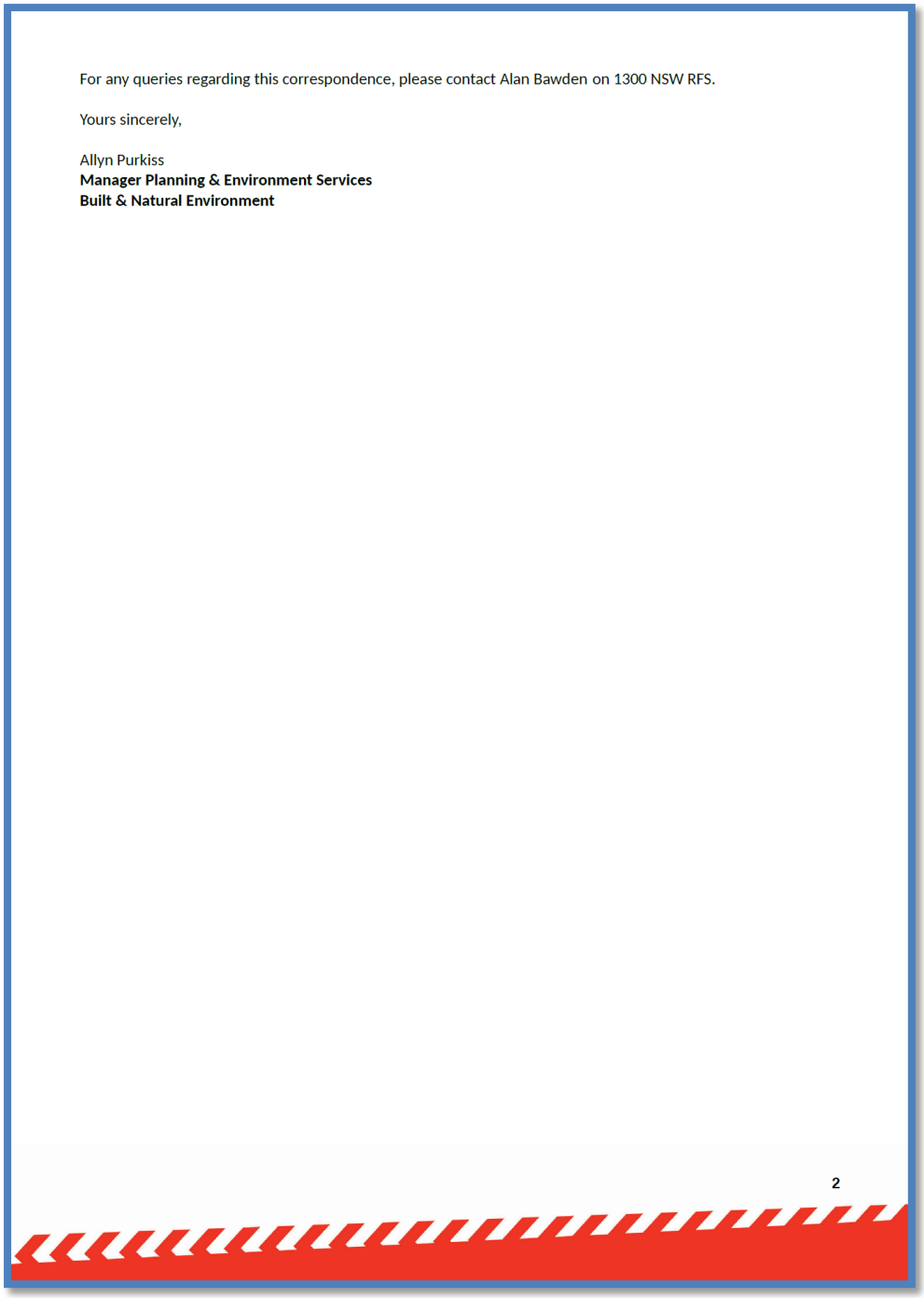
F (02) 8741 5550
www.rfs.nsw.gov.au



For any queries regarding this correspondence, please contact Alan Bawden on 1300 NSW RFS.

Yours sincerely,

Allyn Purkiss
Manager Planning & Environment Services
Built & Natural Environment

2

Consequently, on Friday 3rd March 2023 an on-line meeting was held with the following attendees:

- Daniel Bennett, BSC;
- Alan Bawden, NSW Rural Fire Service;
- Josh Eagleton, Barnson design, plan, manage (Planning Proposal 21);
- Denis Atkinson, DA Planning (Planning Proposal 23); and
- Myself (Planning Proposal 23).

The on-line meeting discussed the issues raised by the NSW Rural Fire Service in its earlier letter, and a summary of the matters discussed were conveyed to the attendees on Monday 13th March 2023, provided below. This information was also provided in a BSC document dated 3/5/2023, "*Addendum to Planning Proposal 21 (PP-2022-2442) South Arm Rd, Urunga*".

1. The RFS are concerned with potential for further R5 rezonings in the locality. Council will provide confirmation that there is no strategic support for extension of the R5 Zone beyond the current extent of the RU4 Zone in this locality.
2. Concerns are held by the RFS with any evacuation scenario proposing to travel further west along South Arm Rd. Increased strategic focus is therefore required on South Arm Rd leading back towards Short Cut Rd and its capability to accommodate evacuation scenarios and bushfire fighting vehicles.
3. Consultants are to jointly undertake audit of this section of South Arm Rd and demonstrate compliance with relevant PBP requirements.
4. Council to investigate whether any upgrades are proposed and whether any current condition data held that may assist in this investigation. (see email attached to this email).
5. Barnsons are to provide additional commentary around potential compliance scenarios involved with proposed lots that have long access handles to Sth Arm Rd and to address comments regarding potential inconsistencies with future clearing requirements and any buffer zone requirements stipulated in relevant SEPPS.
6. Council to co-ordinate production of Appendix document to be uploaded for both Planning proposals upon supply of requested information from Consultants that addresses concerns raised by RFS.
7. RFS to review upon supply and indicate acceptability or otherwise to allow for planning proposals to proceed to next stags.

Extract of email from Daniel Bennett, 13/3/23

The numbered items above will be individually addressed below, and where applicable to this Bushfire Strategic Study, a reference to the subsection of this Study will be provided.

1. BSC to address.
2. An audit was conducted by both Josh Eagleton (20/3/2023) and Denis Atkinson (undated but issued on 20/3/2023) on the section of South Arm Road between the subject sites and Short Cut Road to the north. Both of these audits are presented in the BSC document dated 3/5/2023, "*Addendum to Planning Proposal 21 (PP-2022-2442) South Arm Rd, Urunga*". This matter is discussed in further detail at section 2.3 of this Study.
3. As above.
4. BSC to address.
5. Not relative to PP-23.
6. This amended Bushfire Strategic Study will form part of the documentation portfolio.
7. NSW Rural Fire Service to address.

5. CONCLUSION AND RECOMMENDATIONS

This Report is provided in support of a rezoning and subdivision proposal of existing lot 148 in DP 755557, 261 South Arm Road, Urunga. The Report addresses the criteria set out in *PBP-2019* for a Bushfire Strategic Study, as well as Ministerial Directions 4.4 (section 9.1(2) of the *Environmental Planning and Assessment Act 1979*, incorporating an assessment against Chapter 5 of *PBP-2019*).

The site is constrained by bushfire hazard vegetation located both within and adjoining the site. Within the site there is a large *forested wetland*, as well as remnant native vegetation located along the south-eastern boundary of the site bordering the Bellinger River. To the south-west of the site is forest located on the adjoining property.

The existing South Arm Road serves as a non-perimeter road for the development. No new public roads are proposed as part of the development.

Concerning the ultimate use of the site and its land; if not rezoned to higher residential densities, it is most likely that agricultural pursuits would continue on the site, and wildfire fuel loads would not be maintained as low as required for APZ standards. On the other hand, allowing residential intensification with associated landscape management, will assist in mitigating potential fire risk hazards for this site and adjoining sites.

The NSW Rural Fire Service has raised concerns regarding access provisions along South Arm Road. These concerns have been addressed by additional audits (refer to section 4 of this Study). These concerns can be allayed by fact that off-street parking for emergency vehicles is available for a large portion of South Arm Road between the site and the forested wetland to the north, and all dwellings on the proposed lots will be provided with a property access road that meets NSW Rural Fire Service standards. The audit conducted along South Arm Road reveals that its width meets or exceeds the NSW Rural Fire Service standard for a non-perimeter road.

5.1. Limitation

4.1.1 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.

4.1.2 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.

4.1.3 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**)

Steve Ellis *12/02/2024*

Grad. Dip. Design in Bushfire Prone Areas (UWS)

6. REFERENCES

ABCB, *Building Code of Australia*, CanPrint Publications Pty Ltd, ACT.

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 2022*, http://www.legislation.nsw.gov.au

NSW Government Geospatial Portal (2020 – '22), *various images*, http://maps.six.nsw.gov.au/

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

7. APPENDICES

Appendix A - Standards for APZs (RFS 2005) and Appendix 4 of *PBP-2019*.

Appendix B - Appendix 3 of *PBP-2019* (access requirements for firefighting vehicles)

WOOD-2021-09 APPENDIX A

STANDARDS FOR ASSET PROTECTION ZONES

PLANNING PROPOSAL

SOUTH ARM ROAD, URUNGA.

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.

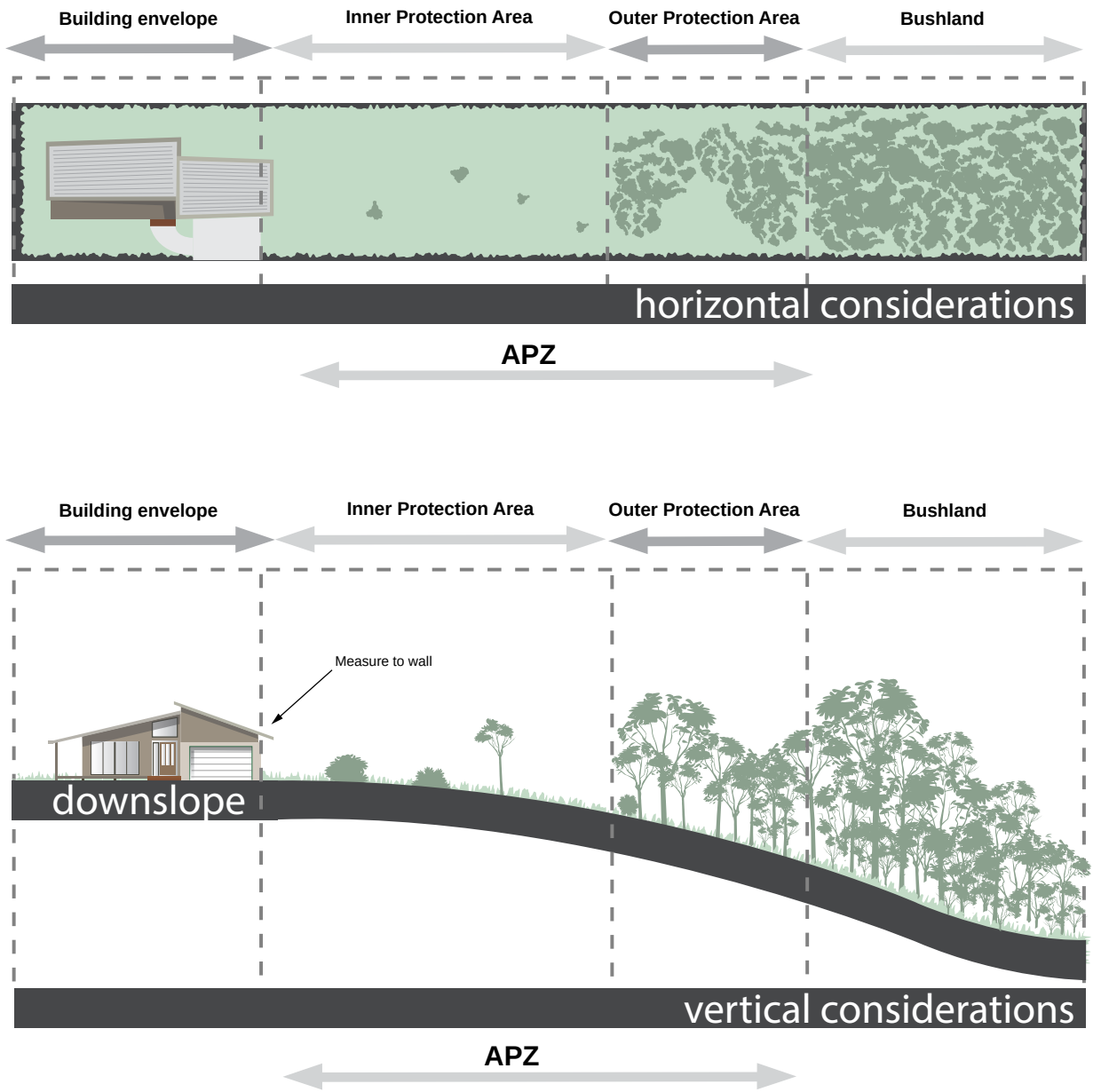
Grass

- 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.



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.

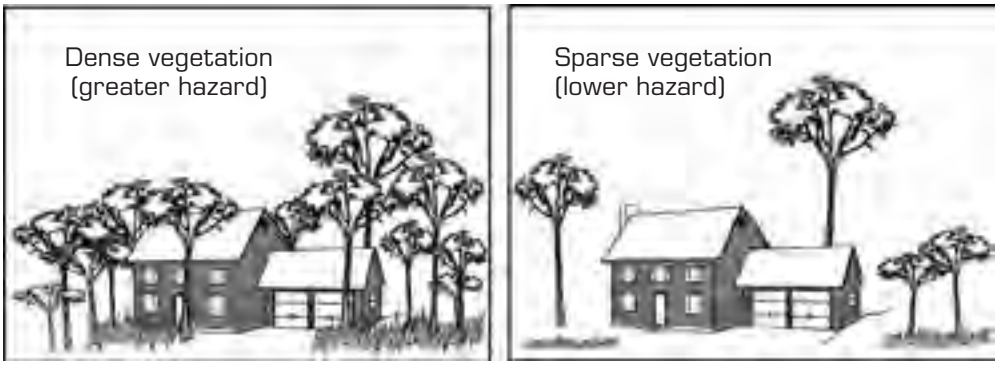
STEP 1. DETERMINE IF AN APZ IS REQUIRED

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.

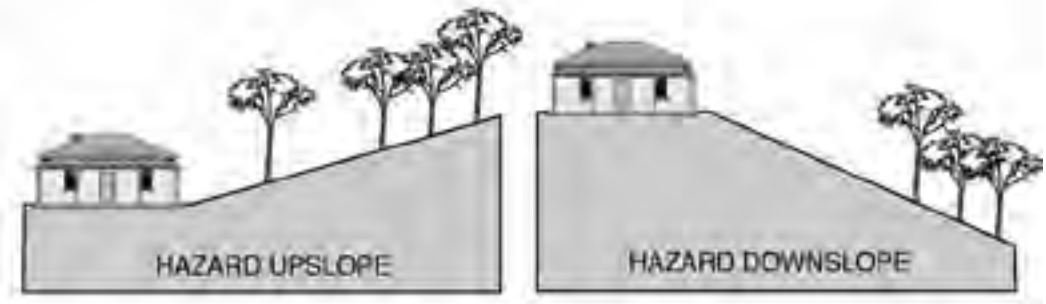
If you intend to burn off to reduce fuel levels on your property you may also need to obtain a Fire Permit through the RFS or NSW Fire Brigades. See the RFS document *Before You Light That Fire* for an explanation of when a permit is required.

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.

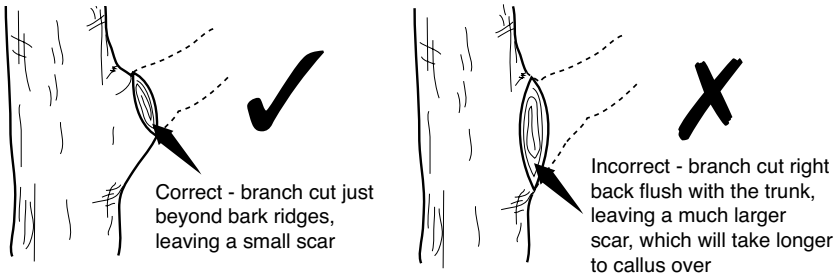
When choosing plants for removal, the following basic rules should be followed:

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

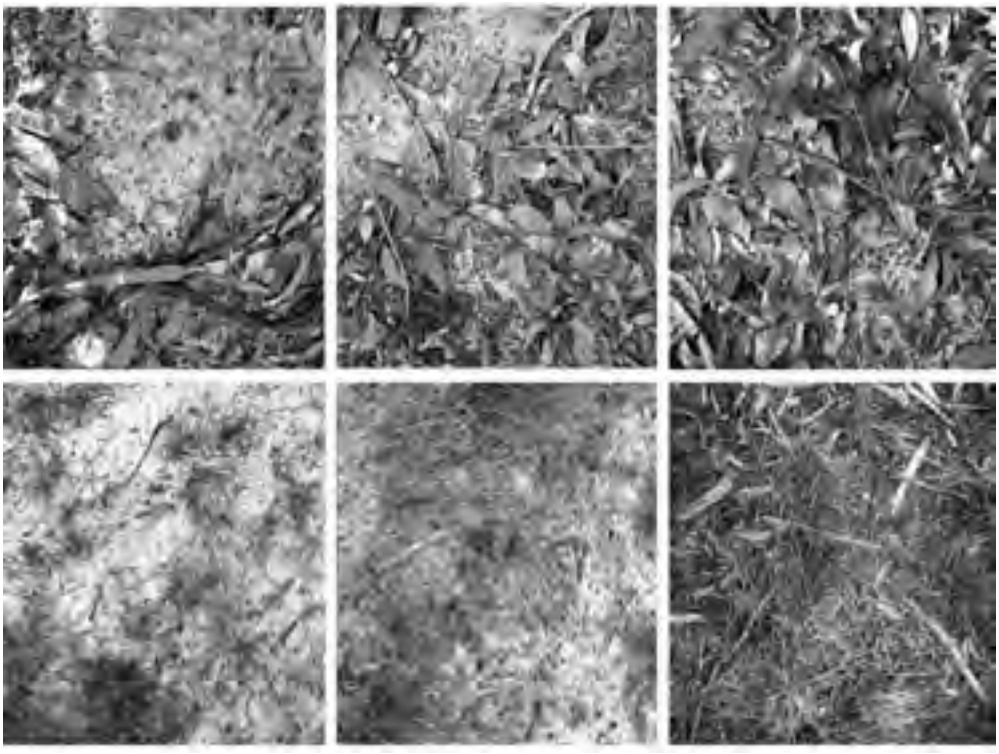
While the removal of fuel is necessary to reduce a bush fire hazard, you also need to consider soil stability, particularly on sloping areas.

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.

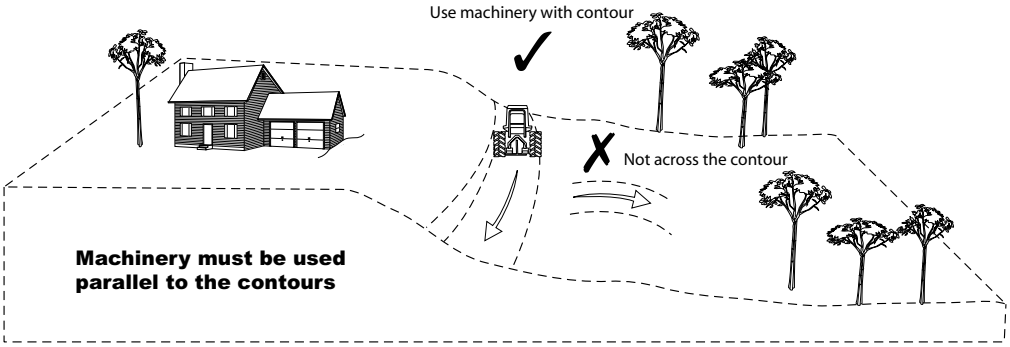
When using mechanical hazard reduction methods, you should retain a ground cover of at least 75% to prevent soil erosion. However, if your area is particularly susceptible to soil erosion, your Hazard Reduction Certificate may require that 90% ground cover be retained.



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.*

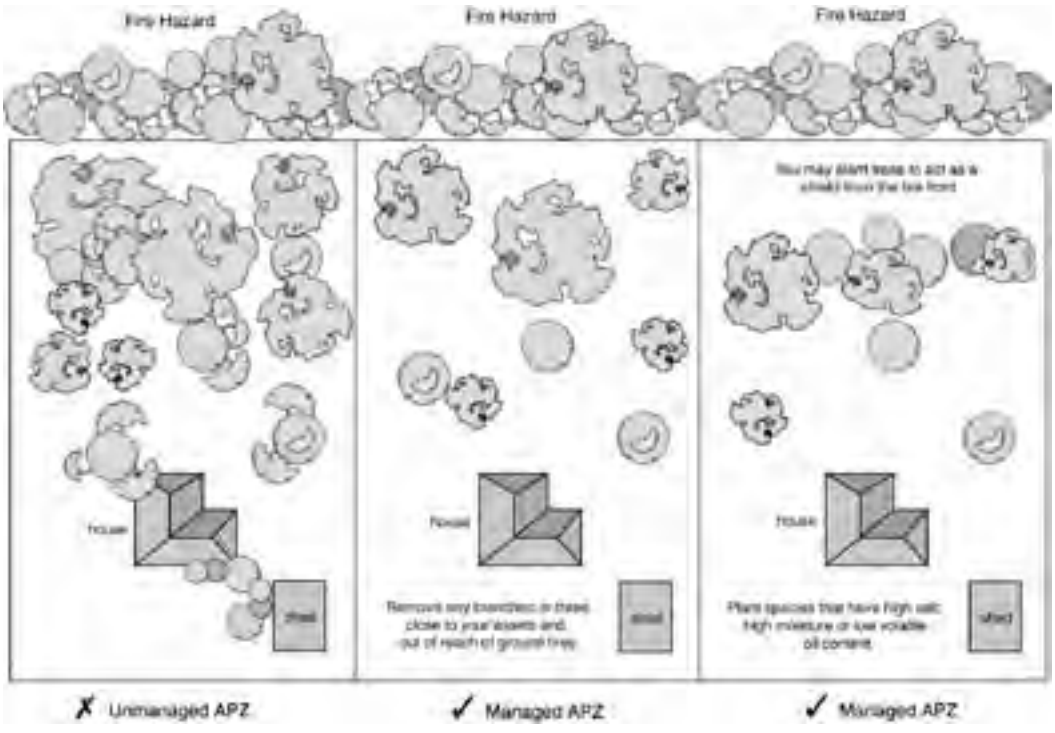
WIND BREAKS

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.**

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WOOD-2021-09 APPENDIX B

STANDARDS FOR VEHICLE ACCESS

PLANNING PROPOSAL

SOUTH ARM ROAD, URUNGA.

APPENDIX 3

ACCESS

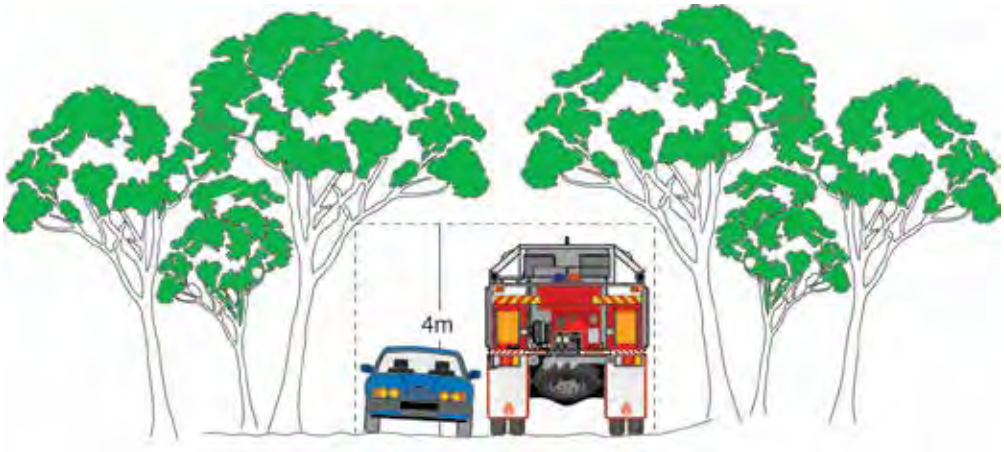
This appendix provides design principles for emergency service vehicle access.

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.

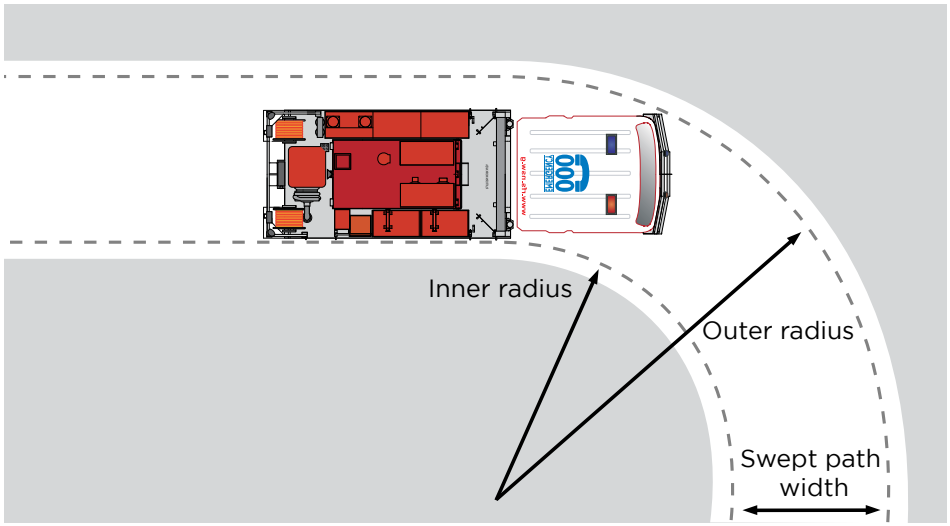
Table A3.2

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

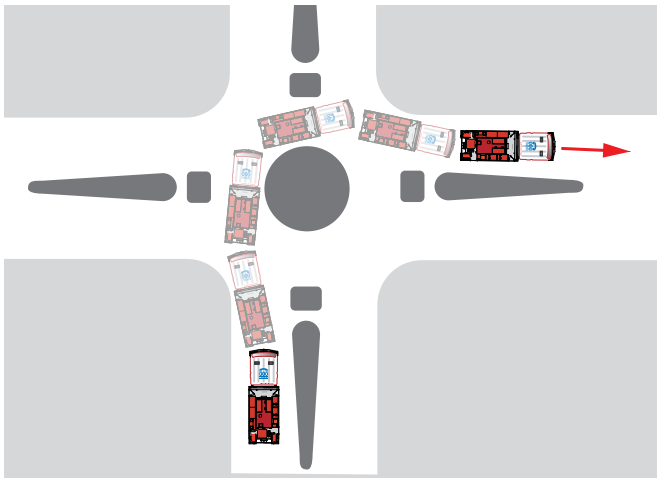
Swept path width for turning vehicles.



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).

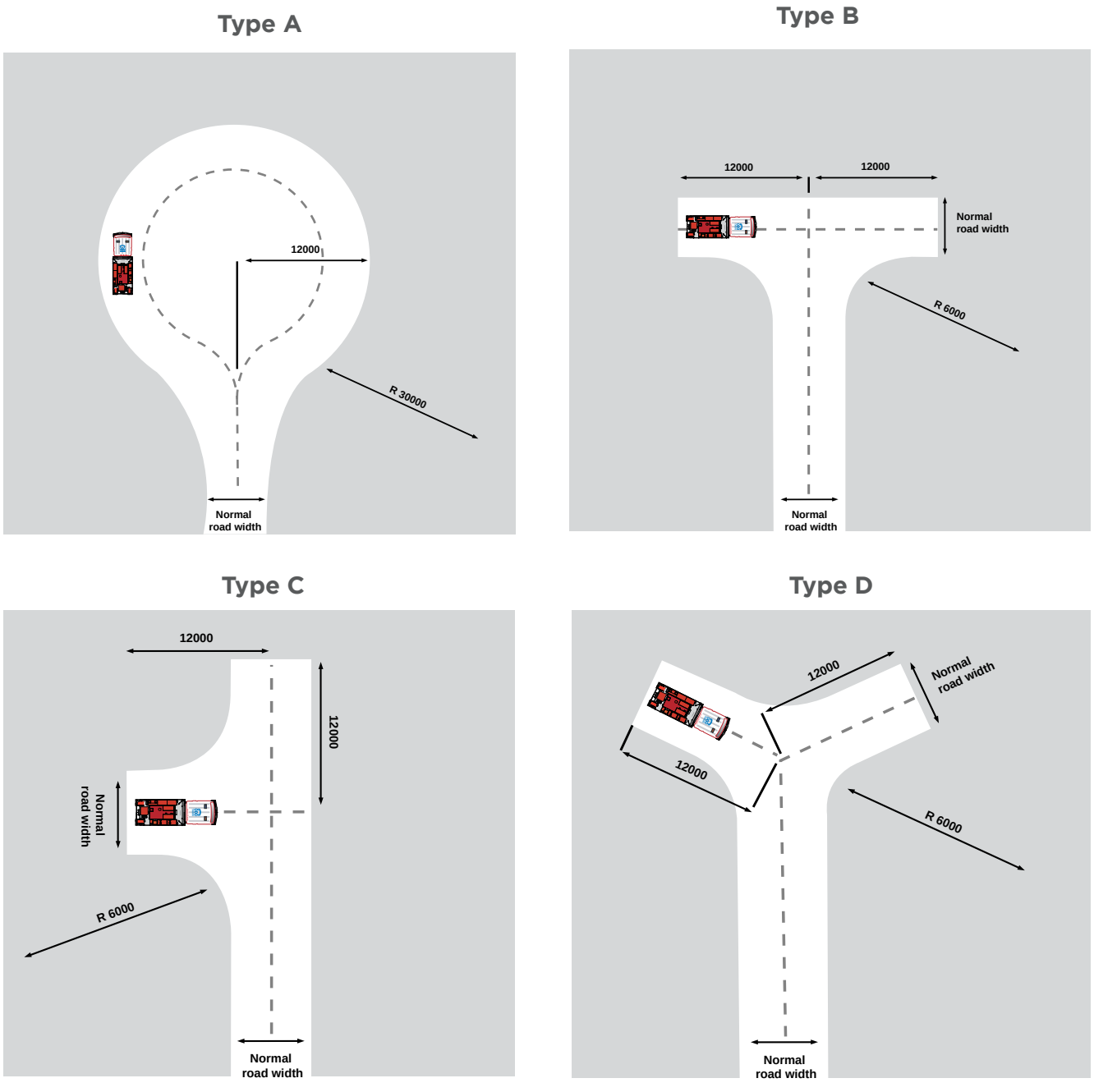
A3.3 Vehicle turning head requirements

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

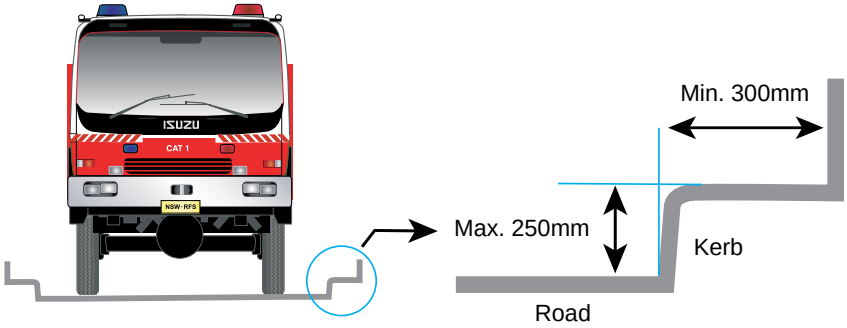
Hydrants and parking bays.

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.

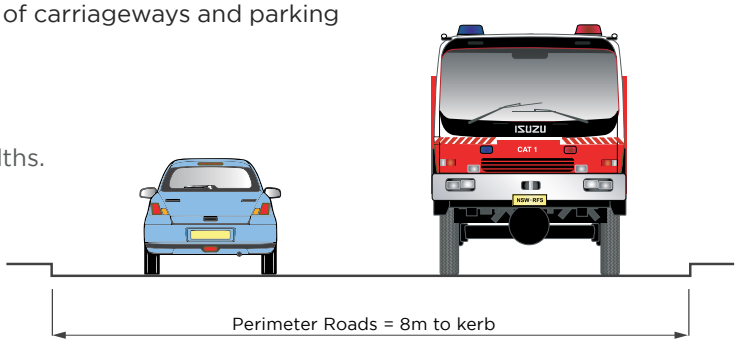
A3.9 Road types

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.

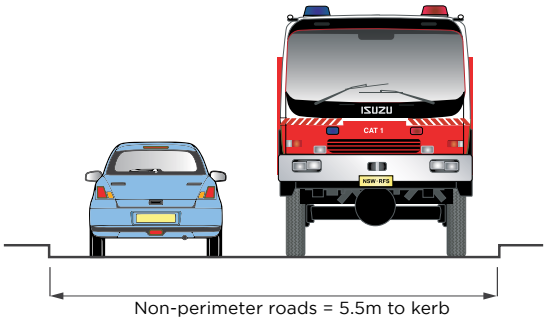


A3.9.2 Non-perimeter Roads

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.

SUMMARY

This addendum is to support the Bushfire Strategic Study (BSS) for a Planning Proposal to rezone land at Lot 148 DP755557 South Arm Rd in Urunga. The Biodiversity Conservation and Science (BCS) division of the North Coast branch of the NSW DEECCW requested clarification on the extent of required Asset Protection Zones (APZ), for the building envelopes for each of the 7 proposed lots, in regard to vegetation clearing and possible impacts to High Environmental Value (HEV) land.

Steve Ellis, the author of the study has recently passed away and Brendan Maher of BJM Environmental has been engaged to provide the required information for the BCS. The aim is to determine the possible impacts to any environmental values that exist at the site due to vegetation clearing for required APZs. Brendan Maher studied Bushfire Planning and Protection at Western Sydney University and achieved a Graduate Certificate in Bushfire Planning and Design.

The comments from the BCS were regarding the manner that the APZ requirements were illustrated within the BSS. Bushfire hazard assessments are undertaken examining slope and distance to vegetation from the external walls of the building fabric. The amount of radiant heat energy that is expected to be experienced at the building, measured in kilowatts per metre squared, is then interpreted as a Bushfire Attack Level (BAL).

Asset protection zones are attributed according to slope in accordance with Table A1.12.3 of Planning for Bushfire Protection 2019. The BSS did not accurately illustrate the extent of the required APZ for each proposed lot. This addendum provides GIS generated maps of each lot showing the extent of required APZs for each lot.

ASSET PROTECTION ZONES

The BSS carried out by Steve Ellis of Holiday Coast Bushfire Solutions accurately assessed the proposed lots for slope and distance to vegetation providing the information in Tables 12 to 18. The tables make a statement for each lot on its ability to comply with the APZ requirements, but do not nominate the required distance of APZs for each elevation of each of the building envelopes.

I used the data from these tables to generate APZ distances for each primary cardinal point elevations for each building envelope of each lot. In considering impacts to vegetation it should be noted that the APZ is not expected to be clear felled. The APZ can be divided into two zones, an inner protection area (IPA) and an outer protection area (OPA). Each zone must maintain a minimum 11% IPA and 30 % OPA canopy cover.

From the maps provided there is some vegetation within the required APZs for some of the blocks. Each of the blocks can comply with the requirements for APZS with minimal disturbance to the existing vegetation. The distances provided in Tables 19 to 25 of the BSS indicate the range of distance to a vegetation formation that is over a designated slope and the corresponding BAL that elevation would be subjected to. Tables 19 to 25 do not indicate APZ distances.

To elaborate an example, if we take the northern elevation of Table 19, the vegetation formation is grasslands that is 30m from the building envelope and the vegetation is upslope. From Table A1.12.5 of Planning for Bushfire Protection 2019, it can be determined that the northern elevation of lot 1 can achieve a BAL 12.5. The author of the BSS has provided three different BAL scenarios within Tables 19 to 25 of the BSS, for reasons that he felt were appropriate. Tables do not indicate distances for APZs. The minimum distances for APZs are provided in Table A1.12.3 of Planning for Bushfire Protection 2019 based on slope.

HIGH ENVIRONMENTAL VALUE LAND

Section 2.2.4 of the BSS makes a statement regarding the provision of APZ and impacts to vegetation. The author states that the proposed lots are large lot residential and that there should not be cause to maintain the entire lot to inner protection area standards. Section 2.2.4 provides that each block should maintain an inner protection area to the appropriate distances and the rest of the block be maintained to outer protection area standards. In a final determination the BSS in section 2.2.4 states that the lots can comply with APZ requirements without the need for the removal of any woody native vegetation, and that all of the APZs utilise previously cleared and managed land.

Author

Brendan Maher obtained the Horticulture Certificate from Ryde School of Horticulture in 1985. Has been an Arborist with Valley Tree Services for 20 years. Studied and obtained a Bachelor Degree in Environmental Science from Southern Cross University in 2012. Completed a Graduate Certificate in Planning for Bushfire Protection with the University of Western Sydney in February 2021. Director of BJM Environmental consultancy.

BRENDAN MAHER

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Ph: 02 66551916

Lot 1 APZs

Legend

- Lot 1
- Lot 1 APZ
- Building Envelope

0 5 10 20 30 40 50
Meters

Lot 2 APZs

Legend

- Lot 2 APZ
- Lot 2
- Building Envelope

0 5 10 20 30 40 50
Meters

Lot 3 APZs

Legend

- Lot 3
- Lot 3 APZ
- Building Envelope

0 5 10 20 30 40 50
Meters

Lot 4 APZs


N
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Legend
Lot 4
Lot 4 APZ
Building Envelope
0 5 10 20 30 40 50
Meters

Lot 5 APZs

Legend

- Lot 5
- Lot 5 APZ
- Building Envelope

0 5 10 20 30 40 50
Meters

Lot 6 APZs

Legend

- Lot 6
- Lot 6 APZ
- Building Envelope

0 5 10 20 30 40 50
Meters

Lot 7 APZs


N
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Legend
Lot 7
Lot 7 APZ
Building Envelope
0 5 10 20 30 40 50
Meters

Appendix

Appendix 1: Assessment checklist for planning proposals

Hierarchy of coastal management areas:

1. CWLRA = coastal wetlands and littoral rainforests area
2. CVA = coastal vulnerability area
3. CEA = coastal environment area
4. CUA = coastal use area

Outcome A. Protect and enhance coastal environmental values			
Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
Outcome A.1 Protect coastal ecosystems			
A.1a Avoid development on undeveloped headlands and significant coastal landforms.	CVA, CEA	NO	YES
A.1b Do not increase development or intensify land uses where there is existing development on headlands and significant coastal landforms.	CVA, CEA	NO	YES
A.1c Identify, protect and enhance sensitive coastal ecosystems including coastal wetlands, littoral rainforests and other coastal threatened ecological communities that may be affected by development.	CWLRA, CEA	YES	YES
A.1d Maintain and protect the presence of beaches, rock platforms, coastal dunes, riparian vegetation and the natural features of foreshores, including along estuaries and coastal lakes.	CWLRA, CVA, CEA	NO	YES
A.1e Use environmental buffers and limit the number of access points and pathways to protect coastal ecosystems. In some cases, it may not be appropriate to allow public access to areas with highly sensitive ecosystems or animal populations.	CWLRA, CEA, CUA	NO	YES
A.1f Consider if the planning proposal is needed or if development zones could be better located to minimise effects on biodiversity.	CWLRA, CEA, CUA	YES	YES
A.1g Avoid development that may disturb, expose or drain areas of Class 1 and Class 2 acid sulfate soils.	CWLRA, CEA, CUA	NO	YES
A.1h Consider direct and indirect effects of development, including any necessary infrastructure, on water quality, water quantity and hydrological flows of waterways and groundwater.	CEA, CUA	NO	YES

Outcome A. Protect and enhance coastal environmental values			
Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
Outcome A.2 Protect coastal wetlands and littoral rainforests			
A.2a Identify coastal wetlands and littoral rainforests, including areas that could be rehabilitated or restored in the future, and do not increase development or intensify land uses in these areas.	CWLRA	YES	YES
A.2b Allow for the adaptive management of stormwater run-off so that the quality of water leaving the site is better than pre-development quality to lessen effects on coastal wetlands or other sensitive receiving environments.	CWLRA, CEA, CUA	YES	YES
A.2c Provide environmental buffers and riparian corridors that enable the long-term management and protection of areas of biodiversity and ecosystem integrity.	CWLRA, CVA, CEA, CUA	YES	YES.
A.2d Identify and protect areas that allow for landward migration pathways for coastal wetlands to respond to climate change.	CWLRA, CEA	YES	YES
A.2e Exclude land uses that affect the natural state of coastal wetlands and littoral rainforests or that will make it harder to rehabilitate these ecosystems in the future.	CWLRA	YES	YES
Outcome A.3 Protect marine parks and aquatic reserves			
A.3a Avoid development and land uses that affect the environmental, economic, social and cultural values of marine parks and aquatic reserves.	CEA, CUA	NO	YES
A.3b Protect the ecological health of marine parks and aquatic reserves, including providing for riparian vegetation and buffers in their catchments.	CEA, CUA	NO	YES

Outcome B. Ensure the built environment is appropriate for the coast and local context			
Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
Outcome B.1 Respond to and protect elements that make the place special			
B.1a Integrate development within the natural topography of the site and ensure land use, building scale and height respond sympathetically to coastal landforms.	CWLRA, CVA, CEA, CUA	YES	YES
B.1b Ensure the intended form and footprint of development does not dominate coastal elements, including foreshores, public spaces and other areas of natural beauty.	CWLRA, CVA, CEA, CUA	YES	YES
B.1c Incorporate adaptive, water-sensitive urban design into the development footprint to reduce run-off and manage water quality within receiving environments.	CWLRA, CEA, CUA	YES	YES
B.1d Ensure that lot sizes, building heights and density are appropriate for the coastal settlement, and complement the existing or desired local character, supported by place-based strategies.	CEA, CUA	YES	YES
B.1e Avoid development that would harm geological features and geoheritage.	CEA, CUA	NO	YES
Outcome B.2 Ensure urban development complements coastal scenic values			
B.2a Limit ribbon development and urban sprawl wherever possible. In certain locations, place-based strategies may support increased development density and building heights as a better response to urban growth.	CEA, CUA	YES	YES
B.2b Use greenbelts to create, maintain and mark out separation between settlements.	CEA, CUA	NO	YES
B.2c Consider effects on scenic values and maintain publicly accessible views to significant landmarks.	CEA, CUA	YES	YES
B.2d Ensure that building heights consider the effect on views from different vantage points.	CEA, CUA	NO	YES
B.2e Retain or create views from public spaces. Prioritise this over creating views from private property.	CEA, CUA	YES	YES
B.2f Provide for active transport links along foreshores, including along estuaries and coastal lakes, and between settlements to increase public access and amenity.	CWLRA, CVA, CEA, CUA	NO	YES

Outcome C. Protect and enhance the social and cultural values of the coastal zone			
Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
Outcome C.1 Protect and promote heritage values			
C.1a Ensure development does not harm heritage values or sites.	CWLRA, CVA, CEA, CUA	YES	YES
C.1b Work collaboratively with local Aboriginal people before and throughout the planning proposal process.	CWLRA, CVA, CEA, CUA	YES	YES
C.1c With permission and guidance from local Traditional Custodians, identify and emphasise significant features of coastal land and sea Country.	CWLRA, CVA, CEA, CUA	NO	YES
C.1d With permission and guidance from local Traditional Custodians, identify and protect sacred and significant areas through the appropriate siting of development.	CWLRA, CVA, CEA, CUA	NO	YES
C.1e Ensure land use, building type, scale and height respond to heritage items and areas.	CEA, CUA	NO	YES
Outcome C.2 Provide public access to significant coastal assets			
C.2a Protect and, where practical, improve, public amenity, access to and use of beaches, foreshores, rock platforms, geoheritage sites and headlands, unless you must restrict access for public safety or for environmental or cultural protection. In doing so, consider both current and projected future coastal hazards.	CVA, CEA	NO	YES
C.2b Identify opportunities to maintain and improve existing public access to beaches, foreshores, coastal waters and coastal lakes that support active and passive recreation activities, where this does not interfere with existing coastal industries.	CWLRA, CVA, CEA, CUA	NO	YES
C.2c Consolidate access points and consider alternative access to protect sacred and significant Aboriginal cultural areas.	CWLRA, CVA, CEA, CUA	NO	YES
C.2d Maintain and improve foreshore access and connections to existing or proposed networks of public open spaces. This includes waterways, riparian areas, bushland and parks for active and passive recreation.	CWLRA, CVA, CEA, CUA	NO	YES
C.2e Consider opportunities to protect and improve habitat connectivity through settlements, such as those described in the *Greener Places Design Guide*.	CWLRA, CEA, CUA	NO	YES

Outcome C. Protect and enhance the social and cultural values of the coastal zone			
Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
C.2f Avoid development on coastal dunes and foreshore reserves unless it is for essential public purposes, such as surf life-saving club buildings. Any building or structure located on dunes must be of lightweight construction and relocatable.	CVA, CEA	NO	YES
C.2g Define the boundaries of development sites with a public edge – for example, a pedestrian pathway or public laneway.	CEA, CUA	NO	YES
C.2h Prevent the privatisation of coastal open space by ensuring development next to foreshores is set back, maintains public access and accessibility, and provides links and connections to other public accessways.	CEA, CUA	NO	YES
Outcome C.3 Protect public amenity			
C.3a Avoid development that will overshadow the beach, foreshore or public domain. Apply the standard that there must be no overshadowing before 4 pm (midwinter) and 7 pm (Eastern Daylight Saving Time).	CEA, CUA	NO	YES
C.3b Protect the amenity of public spaces from buildings, structures or land uses that may be visually and/or acoustically intrusive or create wind funnels.	CEA, CUA	NO	YES

Outcome D. Support sustainable coastal economies			
Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
Outcome D.1 Support sustainable industries and recreational activities that depend on the coast			
D.1a Ensure that development will not harm sustainable coastal industries needing waterfront access, or recreational use of the coastal environment.	CEA, CUA	NO	YES
D.1b Protect and improve essential facilities such as access ramps and jetties for sustainable coastal industries needing waterfront access.	CEA, CUA	NO	YES
D.1c Ensure access ramps, jetties, pontoons, groynes and other structures do not impede navigation on the water or harm coastal landforms or impair processes such as surf breaks.	CWLRA, CVA, CEA, CUA	NO	YES
D.1d Ensure that the proposal considers how development in a waterway may affect the land.	CEA, CUA	NO	YES
Outcome D.2 Promote green infrastructure			
D.2a Do not allow development that is likely to significantly reduce connectivity of existing green infrastructure.	CEA, CUA	NO	YES
D.2b Provide for diverse green infrastructure that can support the changing needs of current and future communities, and provide tourism and recreational opportunities.	CEA, CUA	NO	YES

Outcome E. Respond to coastal hazards			
Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
Outcome E.1 Respond to coastal processes			
E.1a Planning proposals that affect land within a coastal hazard and risk area must not alter coastal processes in a way that harms the natural environment or other land.	CWLRA, CVA, CEA, CUA	NO	YES
E.1b Exclude development in areas affected by a current or projected future coastal hazard that is likely to increase the risk of coastal hazards on that land or other land.	CWLRA, CVA, CEA, CUA	NO	YES
E.1c Locate or consolidate development in areas with little or no exposure to current and projected future coastal hazards, to ensure public safety and prevent risks to life.	CWLRA, CVA, CEA, CUA	YES	YES
E.1d Do not increase development potential or intensify land uses in a coastal hazard or risk area.	CWLRA, CVA, CEA, CUA	NO	YES
Outcome E.2 Account for natural hazard risks			
E.2a Identify areas on and near the proposal that are affected by current or projected future coastal hazards. Ensure that the proposal is compatible with any identified threat or risk.	CWLRA, CVA, CEA, CUA	NO	YES
E.2b Account for potential interaction between coastal hazards and other current and future natural hazards. This includes flooding, bushfires, landslip, heatwaves, severe storms, east coast lows and cyclones. Refer to the *Strategic Guide to Planning for Natural Hazards.*	CWLRA, CVA, CEA, CUA	YES	YES
E.2c Manage natural hazard risk within the development site. Avoid using public space or adjoining land to lessen risk.	CWLRA, CVA, CEA, CUA	YES	YES.
Outcome E.3 Account for climate change			
E.3a Demonstrate that the proposal applies a 100-year planning horizon for the full range of climate change projections for coastal hazards. This approach recognises that sea level is projected to continue to rise for centuries because of climate change.	CWLRA, CVA, CEA, CUA	YES	YES
E.3b Consider how climate change could affect the risk profile of existing natural hazards and create new vulnerabilities and exposure for the proposal in the future.	CWLRA, CVA, CEA, CUA	YES	YES

Outcome E. Respond to coastal hazards			
Requirement	Relevant coastal management area(s)	Applicable to planning proposal (Y/N)	Planning proposal is consistent with guidelines (Y/N) If 'No', justify this
Outcome E.4 Provide sustainable defences to coastal hazards			
E.4a Reduce exposure to coastal hazards by protecting, restoring or improving natural defences. This includes coastal dunes, vegetation, coastal floodplains and coastal wetlands, where suitable.	CWLRA, CVA, CEA, CUA	NO	YES
E.4b If natural defences are not possible, reduce exposure to coastal hazards without significantly degrading: • **biological diversity and ecosystem integrity** • **ecological, biophysical, geological and geomorphological coastal processes** • **beach and foreshore amenity, or the social and cultural value of these areas** • **public safety and access to, or use of, beaches or headlands.**	CWLRA, CVA, CEA, CUA	NO	YES
Outcome E.5 Protect essential infrastructure			
E.5a Locate and design essential infrastructure to reduce vulnerability to current and projected future coastal hazards. Consider the effects of climate change over at least a 100-year planning horizon.	CWLRA, CVA, CEA, CUA	YES	YES
E.5b Where exposure to coastal hazards cannot be avoided, prepare adaptation plans for essential service infrastructure. These plans should be consistent with any applicable coastal management program.	CWLRA, CVA, CEA, CUA	NO	YES
E.5c Consult local Aboriginal land management experts and emergency management agencies on how to strategically locate access routes and other essential infrastructure.	CWLRA, CVA, CEA, CUA	YES	YES
Outcome E.6 Change land uses to manage legacy issues and avoid creating new ones			
E.6a Ensure the proposal will not require coastal management interventions to remain viable over its expected lifespan.	CWLRA, CVA, CEA, CUA	YES	YES
E.6b Consider the potential legacy effects of the proposal and if the proposed land uses or development will create a social, environmental, economic or cultural burden for future generations.	CWLRA, CVA, CEA, CUA	YES	YES
E.6c Consider if the proposed change of land use could remove redundant legacy infrastructure or reduce existing legacy effects.	CWLRA, CVA, CEA, CUA	NO	YES

The General Manager

Bellingen Shire Council

PO Box 177

BELLINGEN NSW 2454

Ref: DA 089

20 November 2024

Attention: Mr Daniel Bennett

Dear Sir

Re: Planning Proposal – 2024 - 1209, South Arm Road, Urunga.

The Department of Primary Industries provided a response to Council in relation to the above-mentioned Planning Proposal dated 2nd October 2024. In the Department's response, they recommended that a Land Use Conflict Risk Assessment (LUCRA) be prepared to determine any potential land use conflict risk between existing land uses and the proposed development.

The attached LUCRA has been prepared in response to this request for consideration in the determination of this Planning Proposal.

Yours Faithfully

Denis Atkinson

Denis Atkinson Planning

Land Use Conflict Risk Assessment.

For Lot 148 DP 755557, South Arm Road, Urunga.

1. Introduction

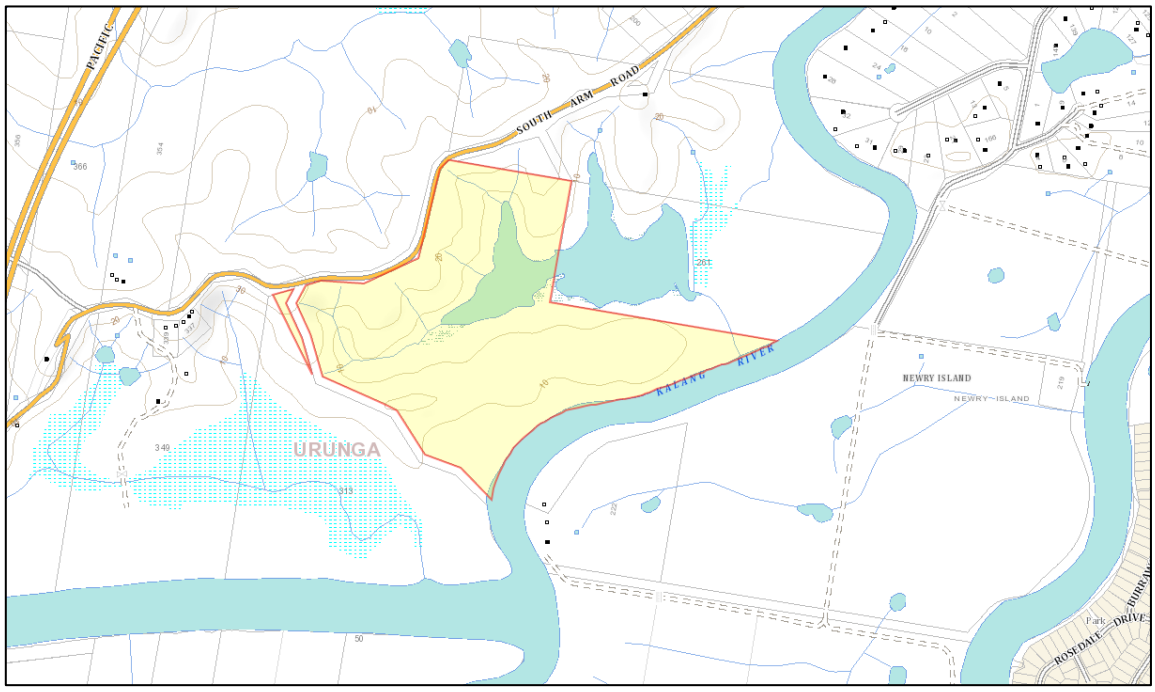
The aim of this Land Use Conflict Risk Assessment (LUCRA) is to consider the potential for land use conflict and risk of occurrence as a result of a proposed change in land use.

The circumstances of this particular Planning Proposal is the intention to rezone part of the land presently zoned Zone RU4, Primary Production Small Lots to Zone R5 Large Lot Residential. This will result in the creation of 7 lots of which 6 will be 1ha in area (minimum) and potential dwellings and associated infrastructure.

2. Location

The land is located at 261 South Arm Road, Urunga, approximately 5.9 kilometres by road from Urunga central business district, in the local government area of Bellingen Shire Council. The land is bound by the Kalang River in the east and South Arm Road in the west. (Refer to image 1).

Image 1: Locality Map



Source: Six Maps 2022

3. Site Description

The subject freehold land is described as Lot 148 DP 755557 with an area of 31.81 hectares. The land is irregularly shaped and in two (2) parts, with one part having a 40m frontage to South Arm Road and the other a 486m frontage to South Arm Road. The two (2) parts are separated by an unformed Council road which traverses the length of the land in the southwest. An unformed Crown road fronts the land in the north and the Kalang River forms the eastern property boundary.

The land drains from South Arm Road at around 29m AHD to the south and southeast via intermittent drainage lines mapped as Strahler order 1 and 2 watercourses to a central wetland at around 3m AHD. A ridge south thereof divides the wetland and Kalang River and rises to South Arm Road in the northwest. The land drains from this ridgeline to both the Kalang River in the south at around 1m AHD and the internal drainage and wetland ecosystem.

The land is partially cleared and managed as pasture grasses and contains woodlots and paddock trees dominated by Tallowwood and Blackbutt species and, bordering the Kalang River, Pink Bloodwood. The density of vegetation on the land increases in the gullies and in the wetland ecosystem which is likely the Endangered Ecological Community *Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions.*

The vegetation is underlain by the Pine Creek soil landscape over the hills and slopes and the Charlmont soil landscape over the lower lying wetland and flood basin. The Raleigh soil landscape occurs in the south of the land adjoining the River channel.

Image 2: Aerial Photography

Source: Coffs Harbour City Council 2022

4. Scope of Works

The preparation of this LUCRA has been undertaken in accordance with the NSW DPI Land Use Conflict Risk Assessment Guide published in October 2011. The work undertaken during the investigation included the following:

- collection of site-specific information
- detailed inspection of the site
- talk to adjoining owners
- evaluation of potential land use conflict
- summarising the key issues, their risk level and recommended management strategies.

5. Existing and Proposed Land Use Zones.

Appendix A to this LUCRA provides extracts from the Planning Proposal which clearly shows the area subject to the rezoning and also the change in potential minimum lot sizes. The plans show both existing and proposed detail for both zoning and minimum lot sizes.

6. Background Information

The area subject to the rezoning has itself been used in the past for limited grazing of beef cattle. Due to the slope of the land and the unimproved pasture stocking rates were low.

The land has limited agricultural use due to the proximity of the wetlands along with the gradients and vegetation. Presently the land to be rezoned is not used for any agricultural use.

The subject site has been inspected on many occasions during the preparation of the Planning Proposal along with the adjoining lands.

Surrounding land uses are:

- North – existing wetlands and lands recently rezoned to R5 Large Lot Residential.
- South - heavily vegetated land with no agricultural use.
- East – Kalang River with grazing lands on the opposite bank and wetlands between the rezoning and the river.
- West – an isolated cleared area on the opposite side of South Arm Road which adjoins an area zoned R5 Large Lot Residential, is unfenced and its only existing agricultural use is that it contains a number of bee hives.

7. Department of Primary Industries Input.

In the DPI submission to Council dated 2nd October 2024 the DPI recommended the preparation of a LUCRA and in part stated the following:

> *"The northern side of South Arm Road also shows agricultural production with recent imagery (June 2024) depicting cut pasture and baling evidence. Grazing is, therefore, suitable for the area, noting cattle production is a major agricultural contributor to the Bellingen LGA gross agricultural production. Small lot sizes can be successfully used for forms of agriculture other than grazing. Whilst the proposal states that the 8.3ha to be rezoned in isolation may be considered unviable for grazing, cumulative impacts of progressive development should be taken into account when understanding the loss of agricultural land within an area.*
> *The Department's AgTrack identifies Bellingen as having a total agricultural production of $44.28M, ranking as 6th in the North Coast Region. Bellingen is ranked No. 3 in NSW for berries at $16.5M, and No. 6 for Avocados at $1.6M. Cattle and calves have a total gross production of $13.01M and milk of $11.19M. Sheep, beef cattle, and grain farming are the highest agricultural employment sectors.*

It is recommended that a suitably qualified person undertake a Land Use Conflict Risk Assessment (LUCRA) to determine any potential land use conflict risk between existing land uses and the proposed development. Consideration should include, but not be limited to, agricultural uses on adjoining land, and any effects development may impose on the adjacent agricultural uses and wetlands both during and post-construction, considering the steep slopes and potential for erosion that have already been identified as limiting factors for the site in the proposal."

This LUCRA has been prepared in response to this recommendation from the DPI.

8. Consultation.

The only potential agricultural land in proximity to the proposed rezoning is the land to the west on the opposite side of South Arm Road. We contacted one of the owners (Mr David Riddel) by telephone on the 29th October 2024 to ascertain the use of the land.

During the conversation, Mr Riddel confirmed that they have never baled any cut material from the slashing as the land is unimproved pasture including weed species. Mr Riddel advised that the area is slashed 2 to 3 times per year to maintain a fire break to their adjoining 1ha subdivision area. Mr Riddel also confirmed that the land is not fenced and is not used for grazing and has not been used for grazing for many years. Mr Riddel advised that the area contained some bee hives.

Mt Riddel also responded by email on 30th October 2024 confirming the verbal advice. A copy of this email is attached as **Appendix B**.

9. Land Use Conflict Risk Assessment.

9.1 Risk Identification

The main land use activities that are likely to generate conflict in the circumstances particular to this site are large lot residential (rural residential) development and the potential for grazing of stock on the lands to the west and large lot residential (rural residential) development and the wetlands to the immediate east.

The land to the west which has the potential to be utilised for grazing is limited in its area and proximity to existing lands zoned R5, Large Lot Residential to the north and heavily vegetated lands to its west. The land is also considered

to be Class 6 Low capability land further restricting potential and stocking rates resulting in reduced risk.

Table 1: Cattle Grazing Conflicts

Activity	Potential Conflict	Probability Level	Consequence Level	Risk Ranking
Cattle grazing	Noise	C	4	8
	Smell	C	4	8
	Flies	D	4	5
	Dust	D	5	2
	Sprays	D	4	5

Table 2: Rural Residential Development Conflicts

Activity	Potential Conflict	Probability Level	Consequence Level	Risk Ranking
Rural Residential Development	Domestic Dogs	C	4	8
	Weeds from gardens escaping onto farms.	C	4	8
	Fence damage and trespass	E	5	1

Table 3: Wetlands Conflicts

Activity	Potential Conflict	Probability Level	Consequence Level	Risk Ranking
Wetlands	Domestic Pets	C	4	8
	Erosion / Sedimentation	C	4	8
	Weeds from gardens	C	4	8
	Stormwater	C	4	8

9.2 Risk Assessment

9.2.1 Cattle Grazing and Residential Development.

The indicative building envelopes proposed on the land to be rezoned are setback 10m from South Arm Road which has a 20m wide road reserve. This provides a 30m buffer to any potential cattle grazing. The buffer also includes South Arm Road and the vegetation along it. Due to the restricted grazing potential of the land to the west, this 30m buffer with roadway and road reserve vegetation is considered suitable and no additional vegetation measures are considered necessary as can be identified by the Risk Rankings in Tables 1 and 2.

9.2.2 Wetlands and Residential Development.

Table 7 of the document “Living and Working in Rural Areas” by the DPI gives a recommended buffer of 50m for rural residential development from wetlands. Any proposed development of lots in the area to be rezoned must comply with the land capability requirement study undertaken for the Planning Proposal and Council’s requirements for on-site waste water disposal. No additional mitigation measures are considered necessary as can be identified by the Risk Rankings in Table 3.

10. Conclusion

This LUCRA has been undertaken in accordance with the DPI’s Assessment Guide, review of surrounding land uses, consultation with the owner of the land to the west and detailed site inspections.

The potential sources of conflict have been identified and the probability and consequence considered to arrive at a risk rating for the individual potential conflict sources. The risk ratings have all been determined as acceptable as none of the ratings are in excess of 10 and the only recommended strategies are:

- any future dwelling on the rezoned land shall have a minimum 10m setback from the front boundary.
- any on-site waste management system shall be designed and sited in accordance with a land capability assessment.

Council's DCP requires a minimum 10m setback from the road frontage and any on-site waste management system must be approved by Council resulting in both strategies being existing requirements of Council's policies.

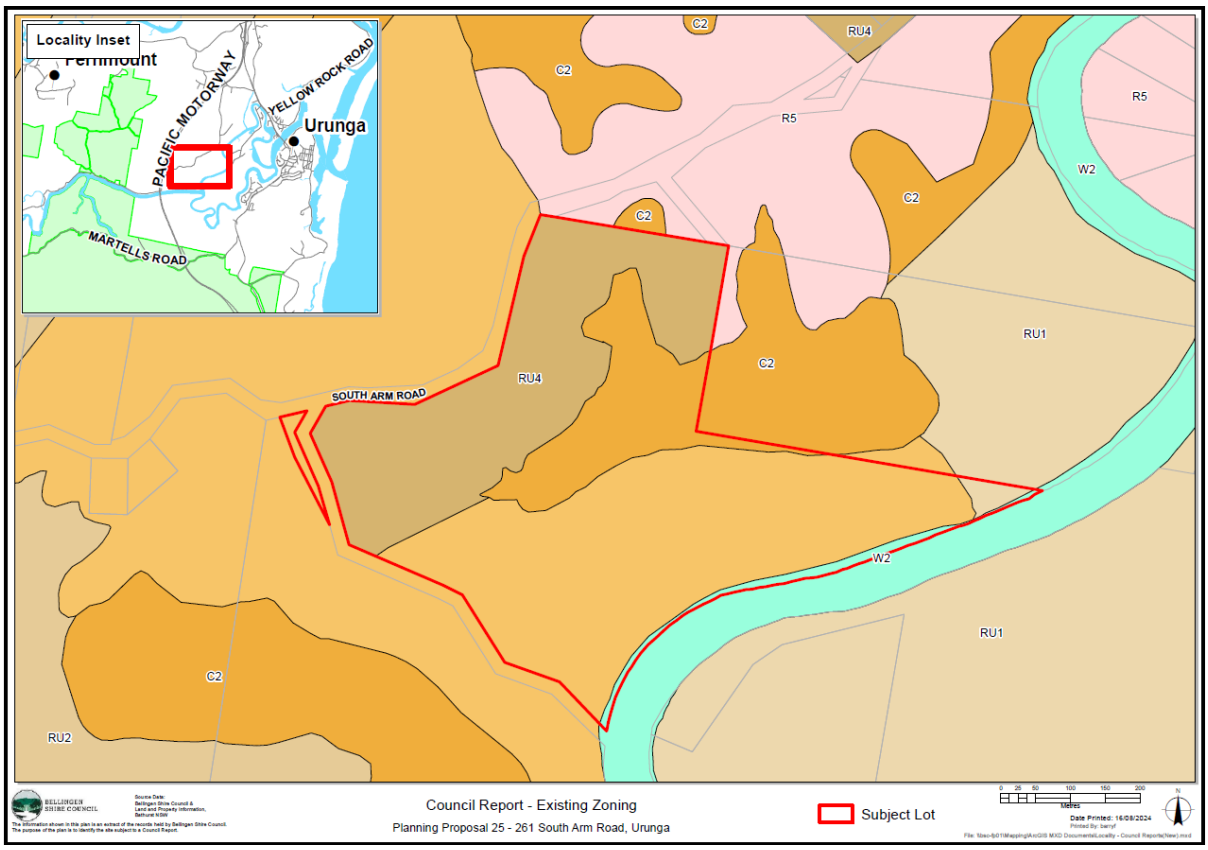
The LUCRA has concluded that the subject area to be rezoned in this Planning Proposal is considered suitable in that it has limited probability to create conflict with adjoining agriculture uses.

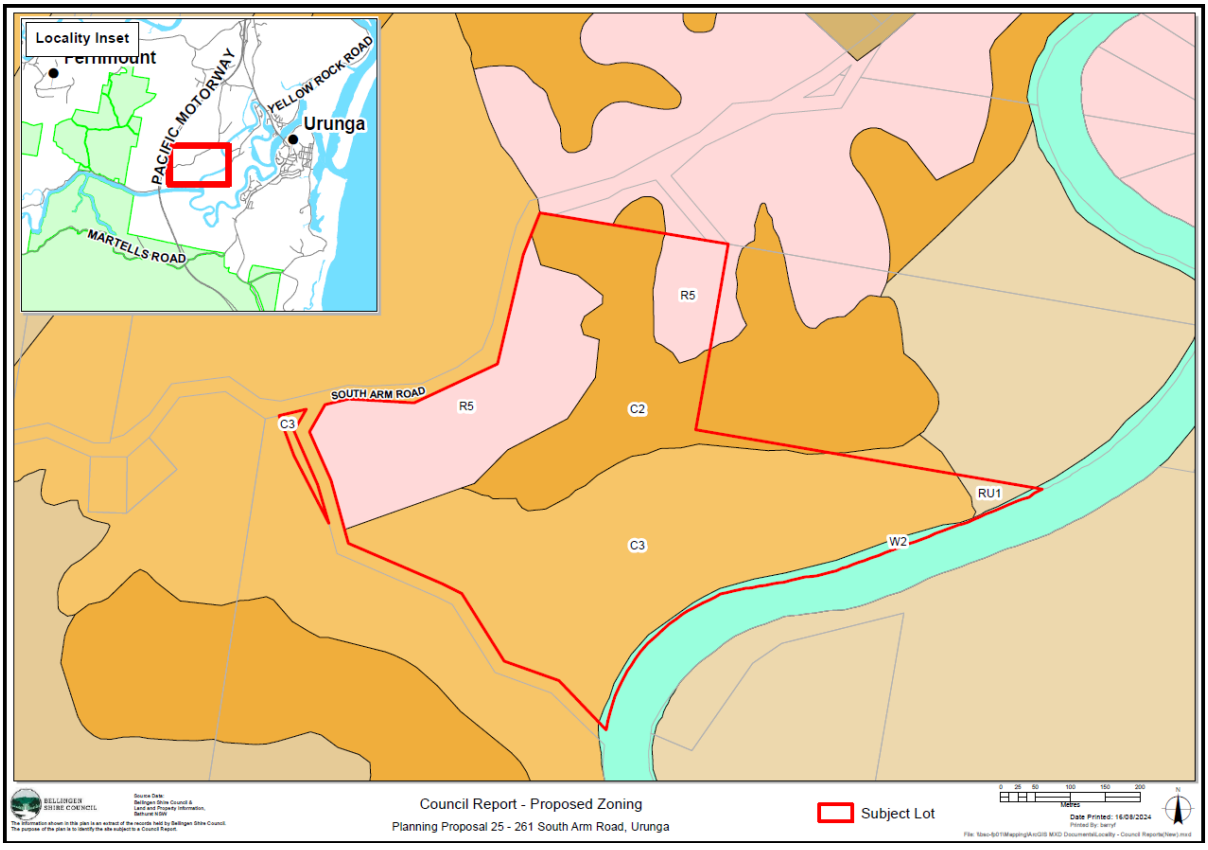
Denis Atkinson

20 November 2024.

APPENDIX A. Page 1 of 2

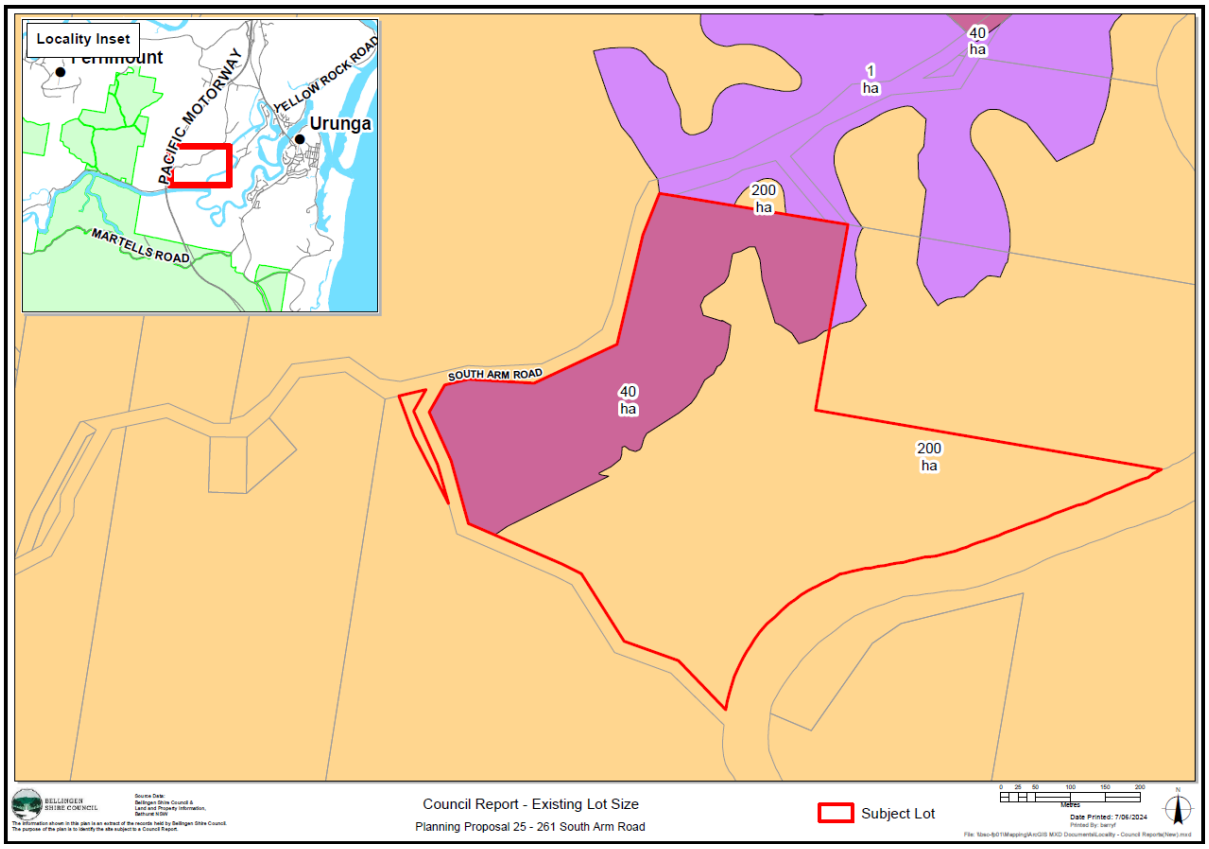
Showing both existing & proposed zoning boundaries, and existing and proposed lot size categories.

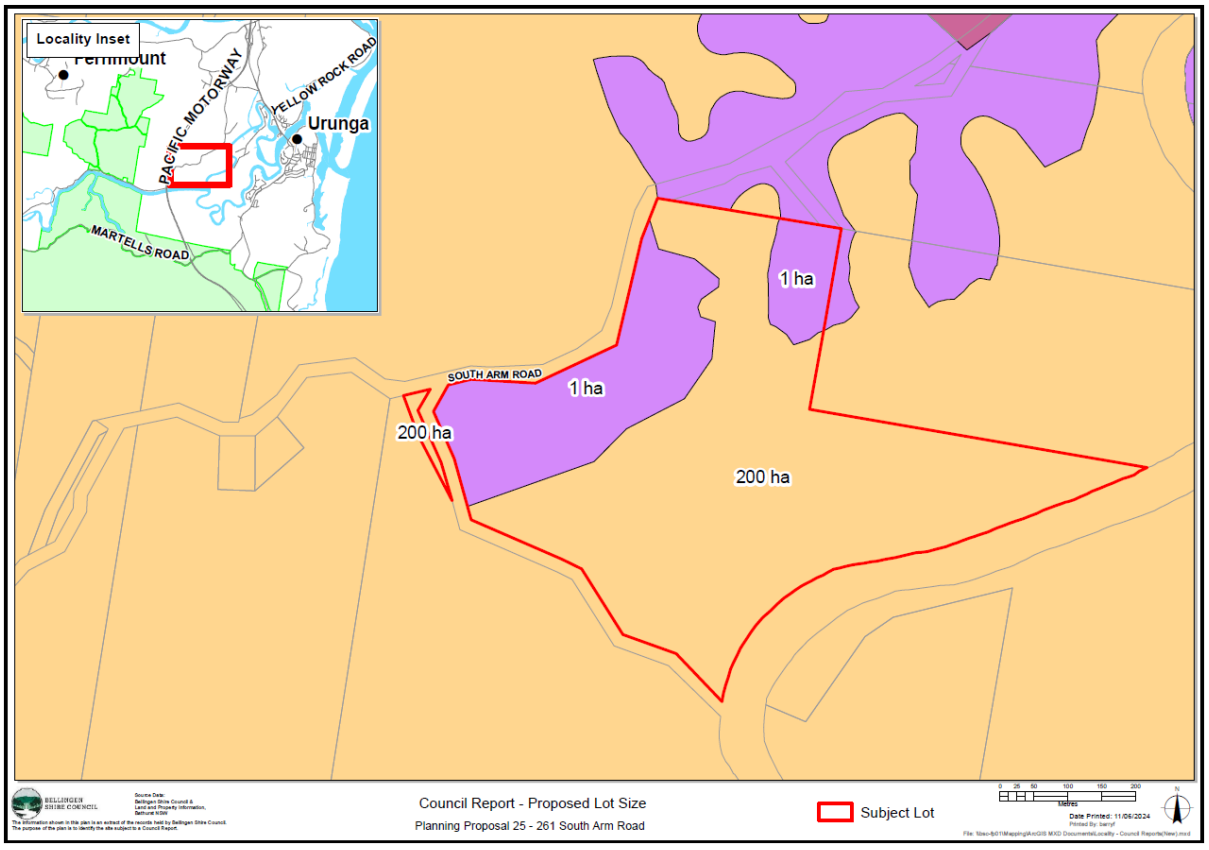




APPENDIX A. Page 2 of 2.

Showing both existing & proposed zoning boundaries, and existing and proposed lot size categories.





APPENDIX B.

Email response from Mr D. Riddel.

Re: Col and Shane Wood - South Arm Road

DR David Riddel <david.roy.riddel@gmail.com>
To Denis Atkinson

Reply | Reply All | Forward | ...
Wed 30/10/2024 8:27 AM

You replied to this message on 30/10/2024 8:43 AM.

Hi Dennis
It was good to talk with you yesterday I hope all is well with you and your family.

In relation to the slashing on my area of the farm at Southarm Rd. I only slash to keep the land fire safe and tidy.
We have no cattle proof fences so no stock. We have never bailed the grasses for feed.

Their are bee hives however last time I spoke with Steve the bee keeper he was concerned with the viability of the hives. This was due to the fact his honey price was the same as he was receiving 15 years ago.

I will ask Josh to up date you in relation to the boundary adjustment issues.

Regards

David Riddel