• JOHN NEWTON B. Surv; M.I.S. Aust. • TONY DENNY B. Surv; (Hons); M.I.S. Aust. • DAMIAN CHAPELLE BTP. CPP.

Gateway Planning Proposal

To Permit a Proposed Large Lot Residential Subdivision

ON BEHALF OF
N. NEWMAN

Site: Lots 832 & 833 DP 847683

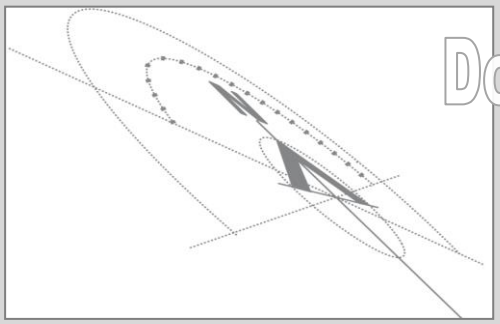
Cnr Reardons Lane & Darke Lane, Swan Bay

Our Ref: 14/227

Date: August 2024

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

· Suite 1, 31 Carrington Street, Lismore NSW 2480 · Shop 8/480 Casuarina Way, Casuarina
· PO Box 1138, Lismore NSW 2480
· (02) 6622 1011 · office@ndc.com.au · ABN: 18 094 689 845



Document Control Sheet

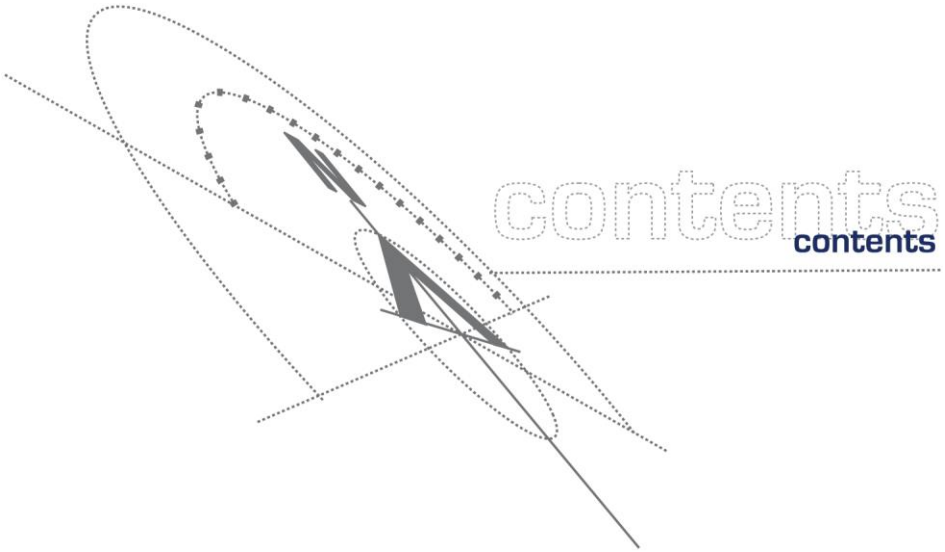
Document Control Sheet

Document and Project Details	
Document Title:	Gateway Planning Proposal
Author:	Luke Fittock
Project Manager:	Damian Chapelle
Date of Issue:	28 August 2024
Job Reference:	14/227
Project Outline:	This document presents a Planning Proposal to rezone part of the land to R5 Large Lot Residential in accordance with the RVLEP 2012.

Document Distribution				
Date	Status	Distribution – Number of Copies		
		Client	Council	Other
08/02/2022	Final	1	1	0
08/04/2024	Revised	1	1	0
28/08/2024	Revised	1	1	0

Documentation Verification	
Checked by:	L Fittock

USAGE NOTE:



ATTACHMENTS

Attachment 1	Deposited Plan 847683
Attachment 2	Onsite Wastewater Land Capability Assessment *Tim Fitzroy & Associates*
Attachment 3	Bushfire Assessment Report *Bushfire Certifiers*
Attachment 4	Land Use Conflict Risk Assessment *Tim Fitzroy & Associates*

Attachment 5	Bogal Aboriginal Land Council Correspondence AHIMS
Attachment 6	NDC Lot Supply & Demand Response
Attachment 7	Assessment against State Environmental Planning Policies
Attachment 8	Assessment against S9.1 Ministerial Directions
Attachment 9	Acid Sulfate Soil Assessment *Tim Fitzroy & Associates*
Attachment 10	Preliminary Site Contamination Report *Tim Fitzroy & Associates*
Attachment 11	Agricultural Assessment *Allen & Associates*
Attachment 12	Qualitative Flood Impact and Risk Assessment *BMT*
Attachment 13	NSW Department of Planning, Housing and Infrastructure (including BCD) correspondence
Attachment 14	Gateway Determination

PLANS

Plan 1 – Location

Plan 2 – Detail Survey

Plan 3 – Site Analysis

Plan 4 – LEP Mapping

1. Background

1.1 Summary of Project

Newton Denny Chapelle has been engaged by *Mr N Newman* to prepare a Planning Proposal for land identified in the below **Table 1**, being located on the corner of Reardons Lane & Darke Lane, Swan Bay.

This Planning Proposal has been completed in accordance with the Department of Planning & Infrastructure's guide to preparing Planning Proposals. A Gateway Determination under Section 3.34 of the Environmental Planning and Assessment Act has now been issued. The Planning Proposal has been updated accordingly to meet the conditions of the Gateway Determination.

The purpose of the Planning Proposal is to change the town planning provisions applying to Lots 832 & 833 DP 847683 to rezone part of the land presently zoned RU1 – Primary Production to R5 – Large Lot Residential in accordance with the provisions of the Richmond Valley Local Environmental Plan 2012. The Planning Proposal also seeks to amend the minimum lot size map to permit the creation of lots with minimum lot sizes of 7,000m^2 within the area to be rezoned.

As shown in **Plate 1**, the subject lands are currently zoned RU1 – Primary Production under the Richmond Valley Local Environmental Plan 2012.

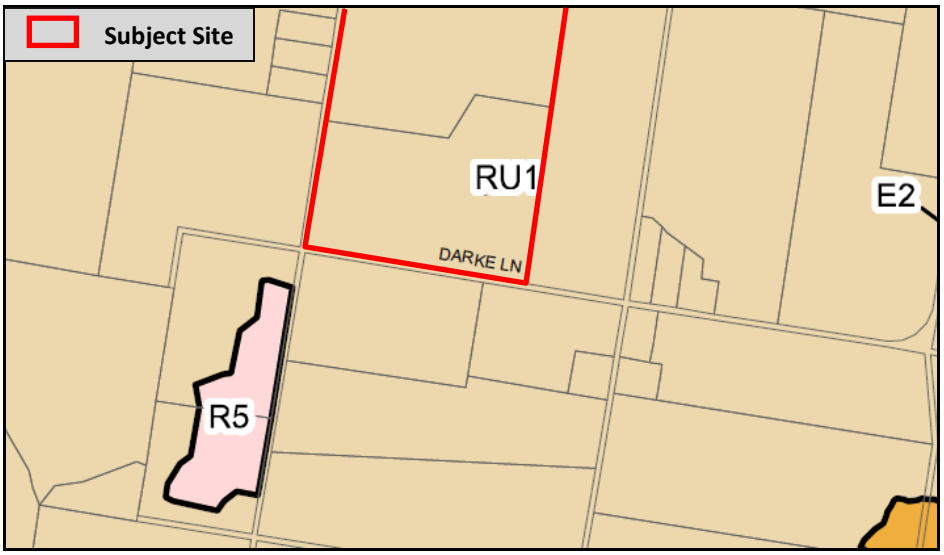


Plate 1: Current land zoning under the Richmond Valley LEP 2012
(Source Richmond Valley LEP 2012)

1.2 Location of Subject Lands and the Nature of Surrounding Rural Area

The subject lands are located on the corner of Reardons Lane and Darke Lane, Swan Bay as identified on **Plan 1** – Location and also within the below **Plate 2**. **Plate 3** provides a visual illustration of the subject lands in the context of an aerial photo.

The lands subject to this Planning Proposal are as follows in **Table 1**:

Table 1: Lands Subject to the Planning Proposal

Property Address	Property Description
Corner of Reardons Lane & Darke Lane, Swan Bay	Lot 832 DP 847683 Lot 833 DP 847683

The Deposited Plan (DP 847683) can be found within **Attachment 1** of this report.

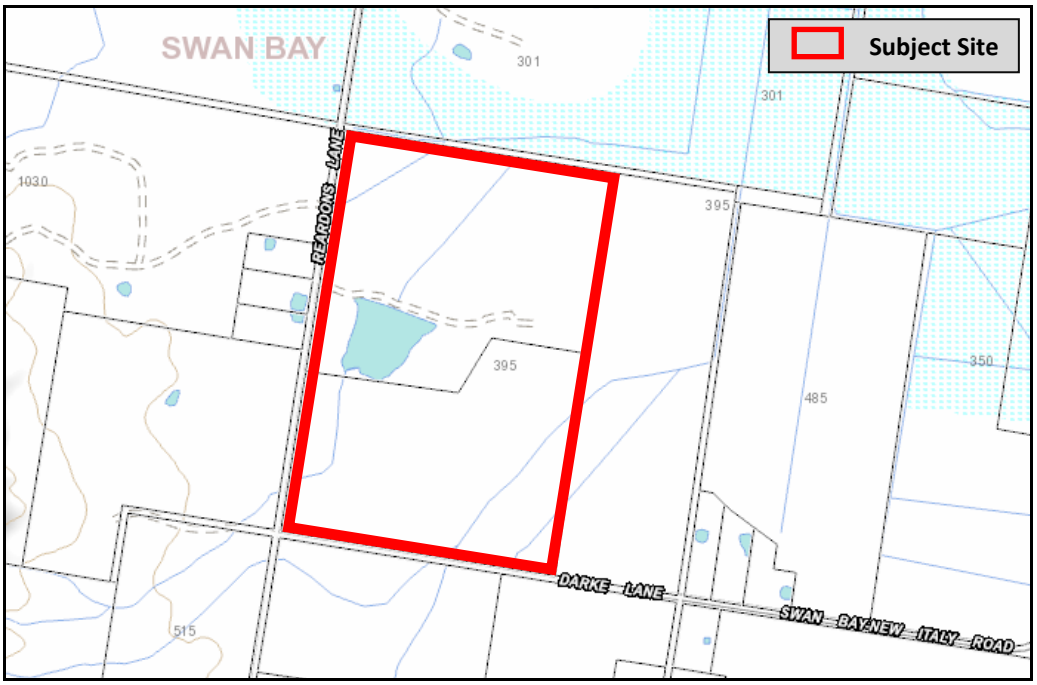


Plate 2: Subject lands located on corner of the Reardons Lane & Darke Lane, Swan Bay (Source LPMA Six Viewer)

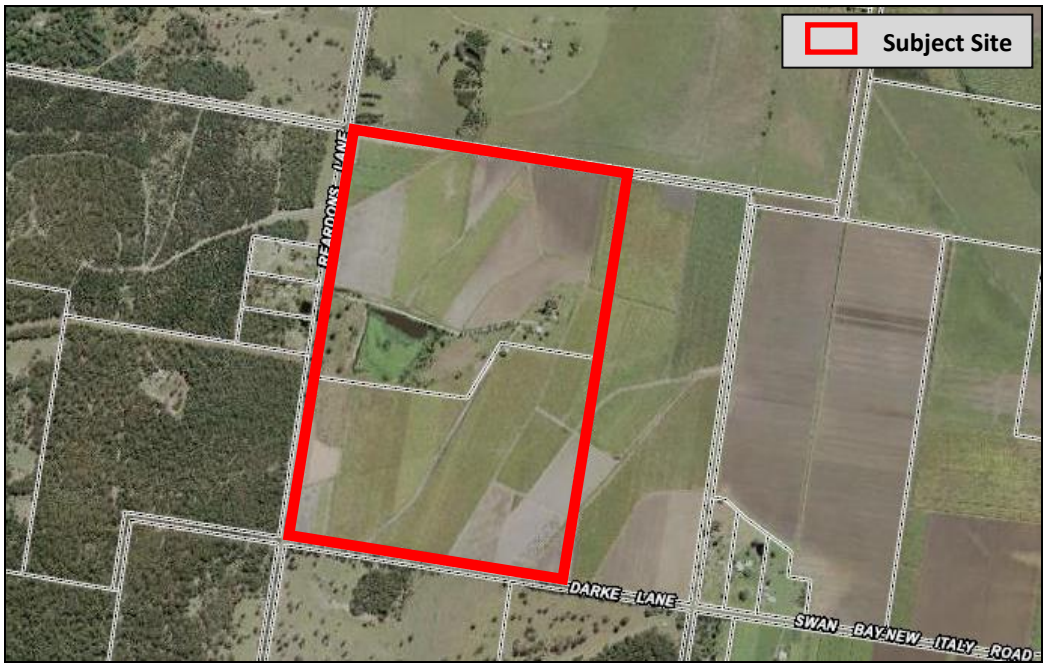


Plate 3: Aerial photo of the subject lands (Source LPMA Six Viewer)

The subject land itself is currently utilised for cane farming and contains existing dwelling houses, farm outbuildings, cane drains and dam. The physical features of the site, and topographical details are illustrated within **Plan 2 – Detail Survey**. Contours typically range between RL 2 metres AHD within the north eastern corner of the property to RL 16 metres AHD centrally within the site. The 1 in 100 year flood level previously advised by Council is RL 5.4m AHD.

The property gains access from Reardons Lane through an existing driveway connection.

The subject site is located within a precinct that is characterised by a mixture of the following land uses:

- Rural residential development within R5 Large Lot Residential zones;
- Rural dwellings within RU1 Primary Production zoned allotments;
- Farming activities comprising cattle grazing and sugar cane cropping;
- Forest vegetation;
- Quarry (Moonimba Quarry on Lot 193 DP 755603).

1.3 Site Analysis

Plan 3 - Site Analysis contained within this Planning Proposal document has been prepared to identify opportunities and constraints relating to the subdivision potential of the land which include:

- Existing lot boundary;
- Existing dwellings and farm building;
- Contours;
- Cane drains;
- Prime Agricultural Land (Class 3);
- Regionally Significant Farmland;
- Vegetation locations and cane farming land (taken from Google Earth);
- Flood prone land (5.4 metres AHD 1:100 year flood line previously advised by RVC, and High Flood Hazard (H5 and H6) in the Probable Maximum Flood (PMF) event);
- Mapped bushfire hazard vegetation (RVC mapping);
- Existing access point into the property from Reardons Lane;
- Acid Sulfate Soil class line (between Classes 3 & 5);
- Surrounding land uses;
- Ground water bore (NSW Government – Department of Primary Industries: Office of Water http://allwaterdata.water.nsw.gov.au/water.stm);
- Electricity powerlines (identified from CMA Topographic Map 1:25,000 Woodburn 9539-1-N Second Edition).

Under the Richmond Valley LEP 2012, the subject land is **not** mapped as:

- containing a heritage item;
- being located within a drinking water catchment; or
- containing land identified as a landslide risk.

1.4 Government Agency Consultation

The Planning Proposal was lodged with Richmond Valley Council together with Newton Denny Chapelle cover letter dated 21 December 2015. To date, consultation has been undertaken with various Government agencies. A summary of the chronology of events is as follows:

Issues Raised by Richmond Valley Council (RVC) & Their Status

- To date the lot supply and demand matter has been resolved which was initially raised by Council;
- An amended split zoning plan (R5 & RU1) was required to be submitted to Council which aligns with the 1 in 100 year flood level. The R5 zoning line will not extend beyond the 1 in 100 year flood line;
- The agricultural matters have now been resolved (see below);
- On-site wastewater and Minimum Lot Size (MLS) issues were raised by RVC. The application proposed a minimum lot size of 7,500m^2, which was the minimum lot size that could be supported by Council as advised by Mr Andy Edwards via e-mail to NDC dated 4/8/2020. An on-site wastewater land capability assessment was prepared by Tim Fitzroy & Associates which is contained within **Attachment 2** of this report, and identifies the feasibility of a subdivision being serviced with on-site wastewater for future dwellings. (Note: Further consultation has since been undertaken with Richmond Valley Council which has indicated that the minimum lot size can be further reduced to 7,000m^2, which is now reflected in the updated Planning Proposal);
- Council have accepted that an updated cultural heritage assessment can be provided post gateway determination.

Outstanding Issue Relating to Agriculture

- **8 April 2016** - RVC initially raised the issue that the agricultural report needs to demonstrate why areas of prime agricultural land should be removed from the designation. As the site was still under sugar cane production Council were of the opinion that the land was still agriculturally/economically viable. They noted that based on s117 direction, the land identified as Regionally Significant Farmland cannot be rezoned for rural residential purposes until they are demonstrated to be unsuitable for agricultural purposes.

- **15 November 2016** - John Allen & Associates prepared an agricultural report that concluded that the land mapped as regionally significant should be more appropriately zoned as 'other rural land'. The land in question is not good quality or valuable agricultural land.

- **9 August 2017** - NSW DPI provided a response that the site has been used for sugar cane production consistently for many years and is identified as regionally significant farmland. The site forms part of a large agricultural landscape and should be considered in this context. NSW DPI does acknowledge that the subject land is within the Richmond River Rural Residential Strategy 1999 however due consideration of the potential impact of the site in agriculture is required.

NSW DPI not supporting the loss of this land for agricultural production and the proposal will cause fragmentation of the agricultural landscape. Fragmentation increases land use conflict risk which can impact on agricultural operations surrounding the proposal.

NSW DPI have concerns about industry mass for the continue supply of product to the region's sugar mills and that Council are to consider the cumulative impact of agricultural land loss in the LGA and the impact this has on the available supply of product for secondary industries, in this case sugar mill production.

- **12 September 2017** - RVC again still not supporting the Planning Proposal due to the NSW DPI not supporting it. They state that identification of the site within the Richmond River Rural Residential Strategy 1999 does not assure appropriateness for this form of development, and that the Strategy outlines and requires that Prime Agricultural Land must not be rezoned for rural residential purposes.

Council believes that the land is prime agricultural as evidenced through the recent and present day use of the properties for sugar cane.

Council states they are unlikely to support this proposal in this, or amended form due to the contrary feedback from the NSW DPI and other agricultural interests (i.e. sugar mill).

Council advise that a review can be lodged with the Department of Planning and Environment.

- **30 November 2017 –** John Allen & Associates prepared a response to address the NSW DPI concerns to justify the land is not prime agricultural land.

The response provided additional justification with low sugar cane yield figures showing that the farm performed in the bottom 11%, 18%, and 10% of all farms in the particular zone. The production figures demonstrates the poor productivity of the site in comparison to the average achieved for the associated harvesting zone.

John Allen also addressed the matter of the agricultural landscape issue raised by the NSW DPI and concluded the land was not surrounded by sugar cane land. The proposal will not cause fragmentation of the sugar cane production landscape and is situated on the edge of sugar cane land.

John Allen also addressed the issue of critical mass in that the rezoning being approved will surely not affect the Industry's critical mass requirement.

NDC also stated that, based on communication from Noel Newman, the sugar cane planting on the proposed area to be rezoned ceased in 2014 due to being unproductive, and the ratoon cane on the property when cut is being ploughed out.

- **30 January 2018** – NDC issued e-mail to NSW DPI regarding:

    - Agricultural land and issued John Allen's response of 30th November 2017;
    - Land use conflict – attached Tim Fitzroy LUCRA which concludes the subject site is suitable for the proposed development;
    - Agricultural landscape. Diagram sent illustrating that the subject land is located on the eastern side of Reardons Lane where a number of rural residential estates have been approved and developed. The proposal maintains consistency with the already developed land within the rural residential precinct and does not fragment the surrounding agricultural landscape.

- **5 June 2018** – NSW DPI still not supporting the application given:

    - The scale of the proposal and lot density due to land use conflict;
    - Loss of agricultural land;
    - Cumulative impact on critical mass;

- They acknowledge that sugar cane is being removed from the site. However note other alternative crops could be investigated;
- Impacts on the broader agricultural landscape.

- **5 September 2018 –** Following a meeting held on 4 September 2018 between the NSW DPI and NDC, NDC issued an e-mail response to the NSW DPI to address the two primary matters raised by the NSW DPI relating to:

  - Change landscape (housing/density);
  - Interface of the site with sugar cane land to the east.

In this respect, the proposal is located within an area which already contains rezoning approval for some 120 lots, with the eastern approved lots (50 in total) already constructed. The lots all border land under sugar cane production on their eastern boundary.

The information and plan provided, provides an effective illustration as to how the landscape for this area has already progressed for rural residential housing consistent with Council's strategic planning for this locality. Land use conflict risk assessment implements appropriate vegetative buffers to the sugar cane.

- **1 November 2018 –** Following NDC meeting with RVC (16 October 2018) and Dept. of Planning (30.10.18), a modification was submitted to Council to remove all proposed land to be rezoned from the mapped 'Regionally Significant Farmland' as identified within the Northern Rivers Farmland Protection Final Map.

It was noted that the previous agricultural assessment and land use conflict risk assessment previously submitted, identified the suitability of the land for the project and the ability to maintain agricultural land uses on adjoining lands.

- **25 January 2019 –** Dept. of Planning provided a response to Council which identifies a mapping anomaly between 'Regionally Significant Farmland' and DPI mapping which identifies 'prime crop and pastureland'. The Dept. of Planning considered that the development (based

on the written intent behind the mapping of potential release areas, the assessment principles, and considering the sites current use for sugar cane production), particularly on the mapped prime crop and pasture land, would be difficult to justify as being consistent with the Strategy. It would also be difficult to justify against the North Coast Regional Plan (NCRP).

The Dept. of Planning also identified that the planning proposal must justify the need for the proposal in relation to supply and demand for rural residential development in the LGA.

- **13 February 2019 –** NDC issued a response to the Dept. of Planning (which was also sent to the NSW DPI via email 20 February 2020) to address their concerns raised on 25 January 2019 addressing planning and design principles, preservation of prime agricultural land, provision of buffers to intensive agricultural uses, viability of large agricultural holdings, and the impact of cane land within the Woodburn catchment.

The Planning Proposal was updated to remove all proposed land to be rezoned from land mapped as "class 3 prime crop and pastureland" and also "regionally significant farmland". Based on the reduced footprint, the previously proposed layout of 77 lots would likely be reduced to around approximately 35 – 40 lots, however is subject to the minimum lot size matter being resolved with Council and further detailed lot layout design.

The response further identified that Newton Denny Chapelle previously submitted written justification to Richmond Valley Council dated 29 August 2016 with regard to lot supply and demand. This matter has already been satisfactorily addressed following e-mail confirmation received from Richmond Valley Council on 10 November 2016 following Council's consultation with the Department of Planning.

- **24 September 2020 –** NSW DPI issued a response which again raised concerns with regard to the viability of large landholdings, potential conflicts with agricultural operations in the locality, and impacts on cane land.

To resolve the issues raised, the NSW DPI required consultation with the NSW Rural Fire Service (RFS) on a recommended distance between the residual cane land and vegetative buffer within the subdivision if such a buffer is to be considered appropriate by the RFS. A further

consideration could be greater lot attention at the interface boundary and a restricted building envelope.

- **22 May 2020 –** A response was provided to the NSW DPI advising that consultation has been undertaken with the NSW RFS regarding a recommended distance between the residual cane land and vegetative buffer. In response the RFS have advised that there does not need to be any APZ between the cane and vegetation buffer, as the separation distance to achieve 29k/W will be to the built form.

It was also advised to the NSW DPI that lot attenuation and provision of building envelopes within the lots will be further investigated and implemented where appropriate, however this would occur at the detailed design stage of the subdivision for the Development Application following the rezoning process.

- **23 June 2020 –** Tamara Prentice (NSW DPI) provided emailed confirmation that the NSW DPI is satisfied in relation to the bushfire attenuation matters.

- **9 July 2020 –** Luke Fittock from NDC spoke with Tamara Prentice via telephone who advised that the NSW DPI is now satisfied as the only outstanding requirement of the RFS has now been resolved.

- **9 July 2020 –** NDC e-mailed Craig Rideout from Richmond Valley Council to advise that we have received confirmation from Tamara Prentice (DPI - Manager of Land Use Planning) both via e-mail and verbally that the outstanding agricultural matters relating to the Planning Proposal have now been resolved.

- **9 July 2020 –** RVC (Angela Jones) responded via email to advise that they look forward to receiving the amended Planning Proposal.

NSW Department of Planning, Housing and Infrastructure

- RVC provided an email update to NDC on the 7th November 2022 with regards to the status of the Planning Proposal. RVC were advised that the Department of Planning was

developing a policy position regarding Planning Proposals on flood liable land or land that might be isolated during a flood. Until the policy is known all Planning Proposals involving flood constraints were on hold;

- NDC requested clear parameters of what was needed to be included within a flood study. RVC issued the request to the Department via e-mail on 30 August, 2023;
- The Department issued flood study parameters to RVC via email dated 8 September, 2023;
- NDC and BMT issued proposed methodology to RVC on 10th October 2023, with regards to preparing a flood impact risk assessment. This involved either a detailed assessment approach, or simple assessment approach;
- RVC confirmed via e-mail 24th October 2023 that the Department will accept the simple assessment approach for the flood assessment;
- NDC uploaded the Qualitative Flood Impact and Risk Assessment prepared by BMT to the NSW Planning Portal and forwarded a copy to RVC on 30th November 2023. A copy of this flood assessment is contained within **Attachment 12**;
- NSW Department of Planning, Housing and Infrastructure responded via e-mail to RVC on 30th January 2024 which also included a formal response from the NSW DPE Biodiversity and Conservation Division (BCD). A copy of both the e-mail and letter correspondence are contained within **Attachment 13**. In summary, the BCD advised:

    - They have no further comments on biodiversity for the Planning Proposal;
    - Knowledge of the flood conditions will need to be considered for future dwelling design on each lot at the development application stage;
    - Planning for a flood evacuation may be necessary with input from the State Emergency Services.

The nature of the above referenced correspondence is as follows:

- The BCD have no objection to the Planning Proposal from a flooding perspective, and provide the following recommendations:

1. Prior to issuing subdivision development consent:

a. Advice by sought from State Emergency Services on planning for flood evacuation;
b. Appropriate measures and building design restrictions be applied to lots that may be subject to Probable Maximum Flood and overland flood impacts.

- NSW Department of Planning, Housing and Infrastructure require the following updates to the Planning Proposal:

  - address the Qualitative Flood Impact and Risk Assessment prepared by BMT;
  - address the outcomes of consultation with BCD;
  - reference the consolidated State Environmental Planning Policies that commenced on 1 March 2022;
  - reference the Local Environmental Plan Making Guideline, dated August 2023;
  - include an assessment against the North Coast Regional Plan 2041;
  - revise the text and maps to remove Lot 831 DP 847683 to align with the proposed Land Zoning and Lot Size maps;
  - increase the scale of the proposed Land Zoning and Lot Size maps to show changes in a broader context;
  - include an existing and proposed 'Dwelling Opportunity Map';
  - include an updated project timeline and consultation timeframe.

- NDC lodged an updated Planning Proposal on 26/04/24 via the NSW Planning Portal;
- Richmond Valley Council completed an initial review and advised that they will progress the Planning Proposal;
- The Planning Proposal was reviewed by the Department. The Gateway request was adequate to proceed to assessment as advised on the NSW Planning Portal on 03/06/24.

NSW Department of Planning, Housing and Infrastructure – Gateway Determination

A Gateway Determination was issued by the NSW Department of Planning, Housing and Infrastructure on 21/06/24. A copy of the Gateway Determination is provided within **Attachment 14**. The Gateway conditions (condition no. 1) specify the following updates that are required to be made to the Planning Proposal prior to agency and community consultation:

1. Prior to agency and community consultation, the planning proposal is to be updated to:
    (a) remove those parts of the land affected by a high flood hazard (H5 and H6) in the Probable Maximum Flood event;
    (b) delete all text discussing the North Coast Regional Plan 2036;
    (c) include an updated project timeline and consultation timeframe; and
    (d) remove the conceptual subdivision layout - Map Plan 4.

Accordingly, the Planning Proposal has hereby been updated as required by Gateway condition no. 1.

2. Planning Proposal

Part 1 Objectives and Intended Outcomes

The objective of the Gateway Planning Proposal is to change the town planning provisions applying to Lots 832 & 833 DP 847683 to rezone part of the land presently zoned RU1 – Primary Production to R5 – Large Lot Residential in accordance with the provisions of the Richmond Valley Local Environmental Plan 2012.

The Planning Proposal also seeks to amend the Richmond Valley Local Environmental Plan 2012 minimum lot size map to enable the creation of lots with a minimum lot size of 7,000m^2 within the area to be rezoned.

Intended Outcomes of the Planning Proposal

The aims of the Planning Proposal are outlined below:

1. To increase the rural residential lot yield by enabling a mix of lot size densities within the Western Sector of the Woodburn Catchment District (as identified within the former Richmond River Rural Residential Development Strategy) of the Richmond Valley LGA. The land is now identified within the Reardons Lane precinct (Figure 16) of the Richmond Valley Growth Management Strategy;
2. To enable suitable land to be developed for rural residential housing through making efficient use of the land for rural residential purposes and land uses permissible within the R5 Large Lot Residential Zone;
3. To provide for the retention of agricultural farming activities within the residual land which will retain the current RU1 – Primary Production zone.

Part 2 Explanation of Provisions

2.1 Proposed Changes to the Richmond Valley LEP 2012

The subject lands forming this Planning Proposal are currently zoned RU1 – Primary Production under the Richmond Valley Local Environmental Plan (RVLEP) 2012, and contains a minimum lot size requirement of 40 hectares.

The following amendments are required to the Richmond Valley LEP 2012 to enable the subdivision and development of the land for rural residential purposes.

- **Acid Sulphate Soils Map** – No change.
- **Wetlands Map, Riparian Land and Waterways Map** – No change.
- **Drinking Water Catchment Map** – No change.
- **Dwelling Opportunity Map** – Remove proposed R5 zoned land in accordance with NDC Plan 4.
- **Heritage Map** – No change.
- **Height of Buildings Map** – No change.
- **Key Sites Map** – No change.
- **Land Application Map** – No change.
- **Land Reservation Acquisition Map** – No change.
- **Lot Size Map (Sheet LSZ-009 & LSZ-010)** – Application of a 7,000m^2 minimum lot size for the area of land proposed to be rezoned in accordance with NDC Plan 4.
- **Land Zoning Map (Sheet LZN-009 & LZN-010)** – Application of an R5 – Large Lot Residential Zone in accordance with NDC Plan 4.
- **Terrestrial Biodiversity Map** – No change.
- **Landslide Risk Map** – No change.
- **Schedule 1 Additional Permitted Uses** – No change.

Part 3 Justification of Strategic and Site Specific Merit

Section A – Need for the Planning Proposal

1. Is the Planning Proposal a result of an endorsed LSPS, strategic study or report?

Yes. The former Richmond River Shire Council 'Rural Residential Development Strategy (March 1999)' identifies the subject lands within Figure 2.5b being a 'Detailed Plan of Suitable Rural Residential Land in the Western Sector of the Woodburn Catchment District' of which is reproduced below in **Plate 4**.

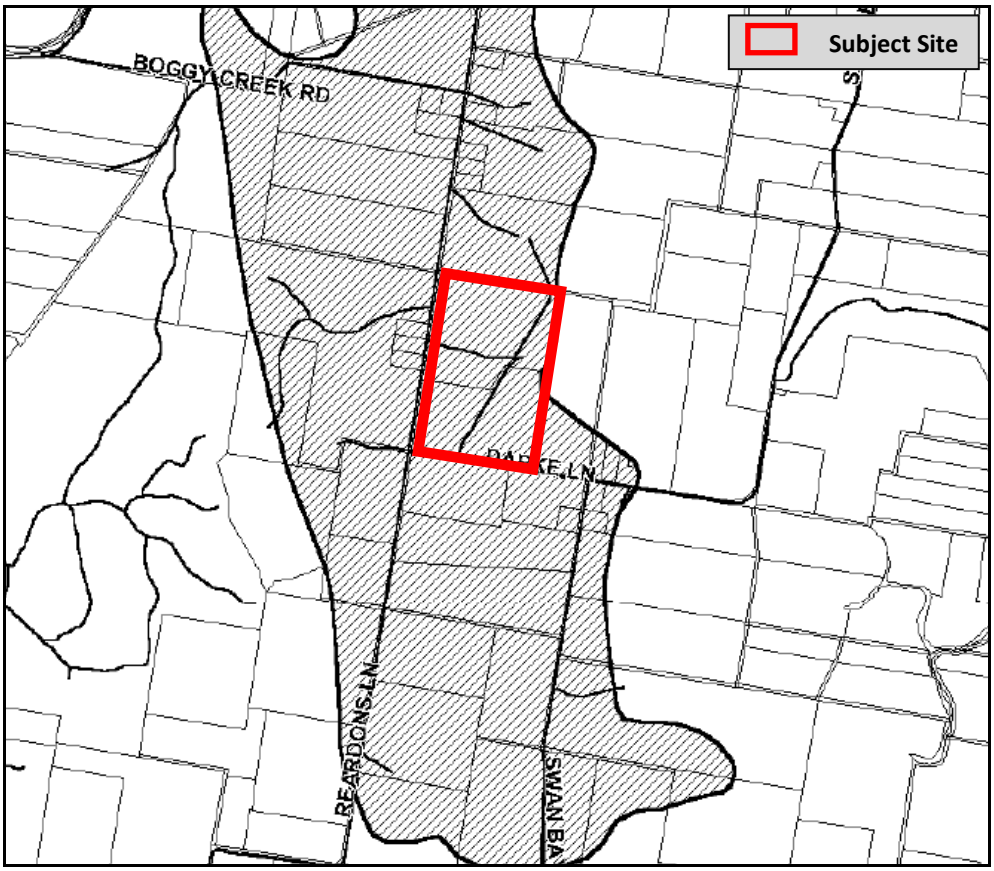


Plate 4: The subject land identified within the Richmond River Shire Council 'Rural Residential Development Strategy (March 1999) (Source: Richmond River Shire Council Rural Residential Development Strategy (March 1999))

The land is now identified within the Reardons Lane precinct of the Richmond Valley Growth Management Strategy as illustrated below in **Plate 5**.

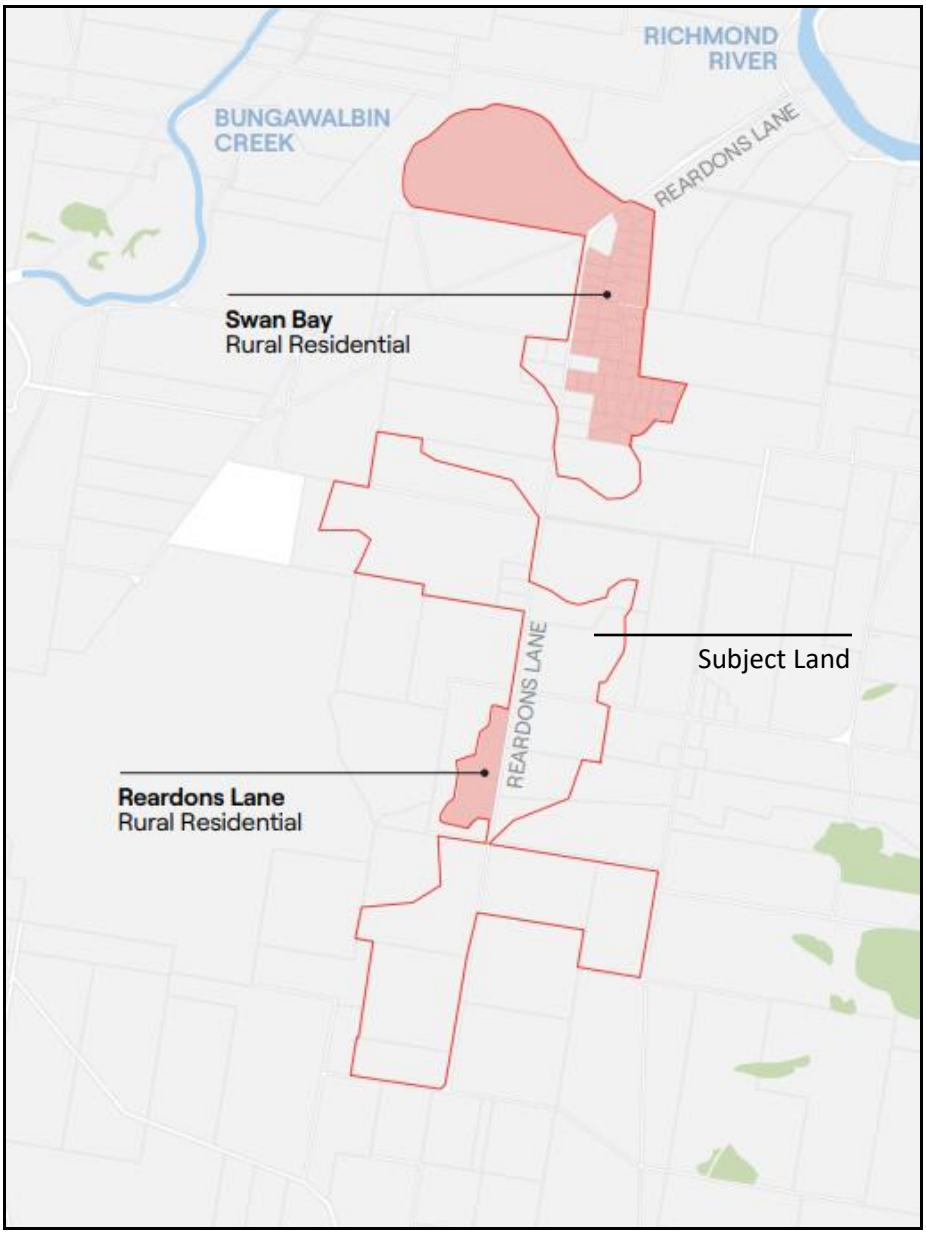


Plate 5 - The subject land is identified within the Richmond Valley Growth Management Strategy (Source: Figure 16 of the Richmond Valley Growth Management Strategy)

The former and current Strategies are discussed further under Question 4 of this Planning Proposal.

2. Is the Planning Proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

Yes. In order for a Development Application to be considered for the subdivision and development of the land for large lot (i.e. rural residential) purposes it is necessary to first amend the planning framework applying to the land – being those elements of the Richmond Valley Local Environmental Plan 2012 relating to land zoning and subdivision (minimum lot size).

Section B – Relationship to the Strategic Planning Framework

3. Will the Planning Proposal give effect to the objectives and actions of the applicable regional, or district plan or strategy (including any exhibited draft plans or strategies)?

The Planning Proposal has been assessed against the North Coast Regional Plan 2041 as follows:

North Coast Regional Plan 2041

The North Coast Regional Plan 2041 is the updated Government blueprint to harness the opportunities and sustainably support ongoing prosperity and growth for the region over the next two decades.

The Plan sets a 20 year strategic land use planning framework for the region, aiming to protect and enhance the region's assets and plan for a sustainable future. The document represents a five-year review of the region's strategic planning settings and considers some of the key land use challenges and opportunities over the last five years and moving forward. It covers all facets of land use planning, including employment areas, town centres, housing and related infrastructure, the natural environment and hazards.

The Plan applies to the Local Government Areas (LGAs) of Ballina, Bellingen, Byron, Clarence Valley, Coffs Harbour, Kempsey, Kyogle, Lismore, Nambucca, Richmond Valley, Port Macquarie-Hastings and Tweed.

The Plan contains a number of objectives, strategies and actions of relevance that will be satisfied by the current Planning Proposal. The items of relevance are addressed below in **Table 5.**

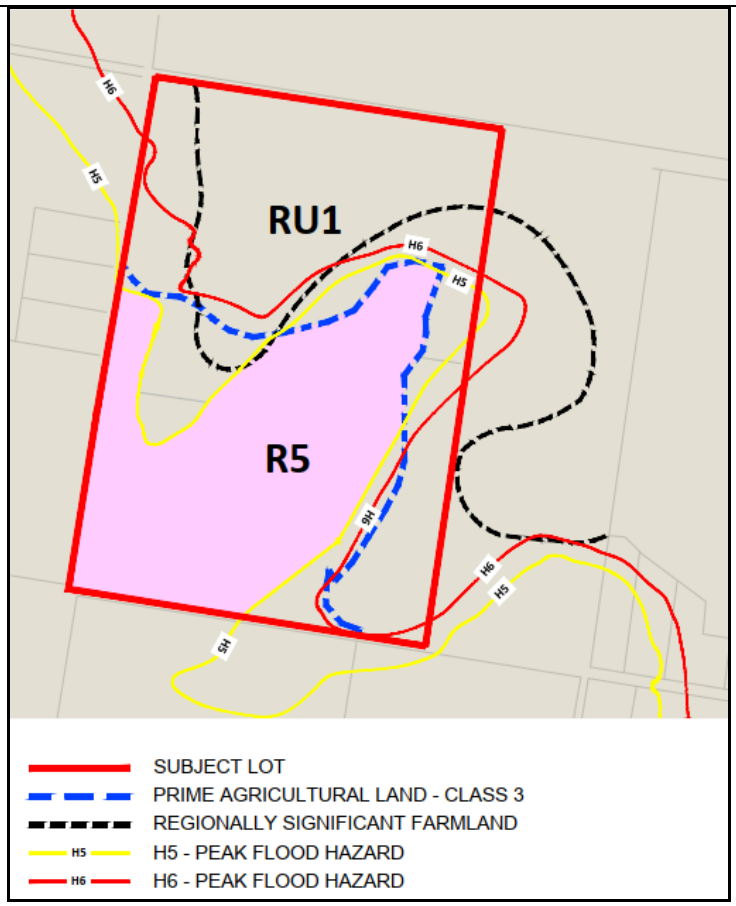
Table 5: Strategic Merit Assessment for Lots 832 & 833 DP 847683 (NCRP 2041)

Matters for Consideration	Response
North Coast Regional Plan 2041	**Objective 1: Provide well located homes to meet demand** **Strategy 1.1:** A 10 year supply of zoned and developable residential land is to be provided and maintained in Local Council Plans endorsed by the Department of Planning and Environment. **Strategy 1.2:** Local Council plans are to encourage and facilitate a range of housing options in well located areas. **Comment:** The subject land is nearby land that has been rezoned for rural residential purposes within the Reardons Lane, Swan Bay precinct. Following rezoning, the subdivision will deliver housing within the Reardons Lane precinct that will support the delivery of housing diversity on lots with minimum lot sizes of 7,000m^2. The site's location and attributes are consistent with the southerly expansion of the Reardons Lane rural residential precinct. The proposed rezoning is located on land identified within the Reardons Lane precinct of the Richmond Valley Growth Management Strategy as illustrated above in **Plate 5.** **Strategy 1.3:** Undertake infrastructure service planning to establish land can be feasibly serviced prior to rezoning. **Comment:** The lots will be required to be serviced by all necessary utility infrastructure that will be addressed at the development application stage. The lots will be self sufficient with regards to water supply for potable and fire-fighting purposes (via rainwater storage tanks), and on-site wastewater systems for the disposal of wastewaters. The proposal will enable residents to have access to Casino, Woodburn, and Evans Head which provide services and facilities including retail services, financial services, Council offices, recreational opportunities, educational and childcare services, health services, industrial services, and good transport infrastructure. **Strategy 1.4:** Councils in developing their future housing strategies must prioritise new infill development to assist in meeting the region's overall 40% multi-dwelling / small lot housing target and are encouraged to work collaboratively at a subregional level to achieve the target. **Comment:** Whilst the Planning Proposal is not for the purpose of small lot housing, the proposal will support the delivery of housing diversity on lots with minimum lot sizes of 7,000m^2. **Objective 3: Protect and enhance important environmental assets** **Strategy 3.1:** Strategic planning and local plans must consider opportunities to protect biodiversity values by:

	○ focusing land-use intensification away from HEV assets and implementing the 'avoid, minimise and offset' hierarchy in strategic plans, LEPs and planning proposals ○ ensuring any impacts from proposed land use intensification on adjoining reserved lands or land that is subject to a conservation agreement are assessed and avoided ○ encouraging and facilitating biodiversity certification by Councils at the precinct scale for high growth areas and by individual land holders at the site scale, where appropriate ○ updating existing biodiversity mapping with new mapping in LEPs where appropriate ○ identifying HEV assets within the planning area at planning proposal stage through site investigations ○ applying appropriate mechanisms such as conservation zones and Biodiversity Stewardship Agreements to protect HEV land within a planning area and considering climate change risks to HEV assets ○ developing or updating koala habitat maps to strategically conserve koala habitat to help protect, maintain and enhance koala habitat. ○ considering marine environments, water catchment areas and groundwater sources to avoid potential development impacts. **Strategy 3.2:** In preparing local and strategic plans Councils should: ○ embed climate change knowledge and adaptation actions ○ consider the needs of climate refugia for threatened species and other key species **Comment:** High Environmental Value land identified within the former North Coast Regional Plan 2036 is located adjacent to the edge of Darke Lane being the southern border of the property. Future dwelling development within the lots will be clear of the HEV mapped land. As identified earlier in Section 1.4, the Planning Proposal has been reviewed by the NSW DPE BCD, and they have no further comments on biodiversity for the Planning Proposal. The Biodiversity Offsets Scheme Entry Threshold Tool (BOSET) is a test used to determine when it is necessary to engage an accredited assessor to apply the Biodiversity Assessment Method to assess the impacts of a proposal. The subject land is not mapped as containing areas of biodiversity on the NSW Government Biodiversity Values Map and Threshold Tool (accessed 3/2/21). The BOSET tool was again accessed 08/04/24 and does not identify the area to be rezoned to R5 Large Lot Residential as containing mapped biodiversity values. RVC Intramaps identifies Terrestrial Biodiversity located adjacent to the edge of Darke Lane being the southern border of the property. Future dwelling development within the lots will be clear of the Terrestrial Biodiversity mapped land. Section 2.3 of the on-site wastewater land capability assessment contained within **Attachment 2** considers the location of ground water bores. The location of the decommissioned ground water bore (GW20496) on the subject land is shown on **NDC Plan 3**.

	The Richmond Valley LEP 2012 does not identify the subject land as being located within a drinking water catchment. **Objective 4: Understand, celebrate and integrate Aboriginal Culture** **Strategy 4.1:** Councils prepare cultural heritage mapping with an accompanying Aboriginal cultural management plan in collaboration with Aboriginal communities to protect culturally important sites. **Strategy 4.2:** Prioritise applying dual names in local Aboriginal language to important places, features or infrastructure in collaboration with the local Aboriginal community. **Comment:** The following comments are provided: o Aboriginal Cultural Heritage has been addressed in Section C Question 8(d) of this Planning Proposal. o We note that this is a revised Planning Proposal report that was initially lodged with Richmond Valley Council in 2015. Council correspondence issued to Newton Denny Chapelle dated 8 April 2016 provided that *"An updated cultural heritage assessment of the site is required, including an updated AHIMS search to satisfy the area is devoid of any Aboriginal or European artefacts etc. over the site and adjoining land. The attachment 2 refers to Bogal LALC Representatives accessing the site almost 10 years ago. It is acknowledged, however this is a lower priority for the submitted proposal – and may be updated and provided post gateway."* o Revised AHIMS searches have been completed and are contained within **Attachment 5**. The searches indicate that no Aboriginal sites or places are located within 50 metres of the subject land. The previous Bogal LALC correspondence is also contained within **Attachment 5.** **Objective 5: Manage and improve resilience to shocks and stresses, natural hazards and climate change** **Strategy 5.1:** When preparing local strategic plans, councils should be consistent with and adopt the principles outlined in the Strategic Guide to Planning for Natural Hazards. **Strategy 5.2:** Where significant risk from natural hazard is known or presumed, updated hazard strategies are to inform new land use strategies and be prepared in consultation with emergency service providers and Local Emergency Management Committees (LEMCs). Hazard strategies should investigate options to minimise risk such as voluntary housing buy back schemes. **Strategy 5.3:** Use local strategic planning and local plans to adapt to climate change and reduce exposure to natural hazards by: o identifying and assessing the impacts of place-based shocks and stresses o taking a risk-based-approach that uses the best available science in consultation with the NSW Government, emergency service providers, local emergency management committees and bush fire risk management committees o locating development (including urban release areas and critical infrastructure) away from areas of known high bushfire risk, flood and

	coastal hazard areas to reduce the community's exposure to natural hazards ○ identifying vulnerable infrastructure assets and considering how they can be protected or adapted ○ building resilience of transport networks in regard to evacuation routes, access for emergencies and, maintaining freight connections ○ identifying industries and locations that would be negatively impacted by climate change and natural hazards and preparing strategies to mitigate negative impacts and identify new paths for growth ○ preparing, reviewing and implementing updated natural hazard management plans and Coastal Management Programs to improve community and environmental resilience which can be incorporated into planning processes early for future development ○ identifying any coastal vulnerability areas ○ updating flood studies and flood risk management plans after a major flood event incorporating new data and lessons learnt ○ communicating natural hazard risk through updated flood studies and strategic plans. **Comment:** As identified below under Question 8, current mapping obtained from Richmond Valley Council indicates that the north western and south western portions of the land are mapped as being bushfire prone. A bushfire assessment report prepared by Bushfire Certifiers is contained within **Attachment 3**. As addressed in Section 1.4, BMT have completed a Qualitative Flood Impact and Risk Assessment (FIRA) which is contained within **Attachment 12**. The report concludes that *"the FIRA was based on the simple assessment approach in accordance with the FIRA guideline LU01 (DPE, 2023). The assessment was conducted based on an understanding of existing flood behaviour from the recently completed Richmond River Flood Study (RVFS) (BMT, September 2023)."* Whilst Section 5 summarises the key findings of the FIRA, the report concludes that *"Overall, the proposed concept subdivision plan (incorporating the proposed flood risk treatment options) is considered to be compatible with the flood hazard."* In accordance with the Gateway Determination conditions, the Planning Proposal has removed those parts of the land affected by a high flood hazard (H5 and H6) in the Probable Maximum Flood event.



H5 and H6 flood hazard in relation to the proposed R5 zone

The subject site is not located within a coastal zone defined by Chapter 2 of the Resilience and Hazards SEPP 2021.

Objective 8: Support the productivity of agricultural land

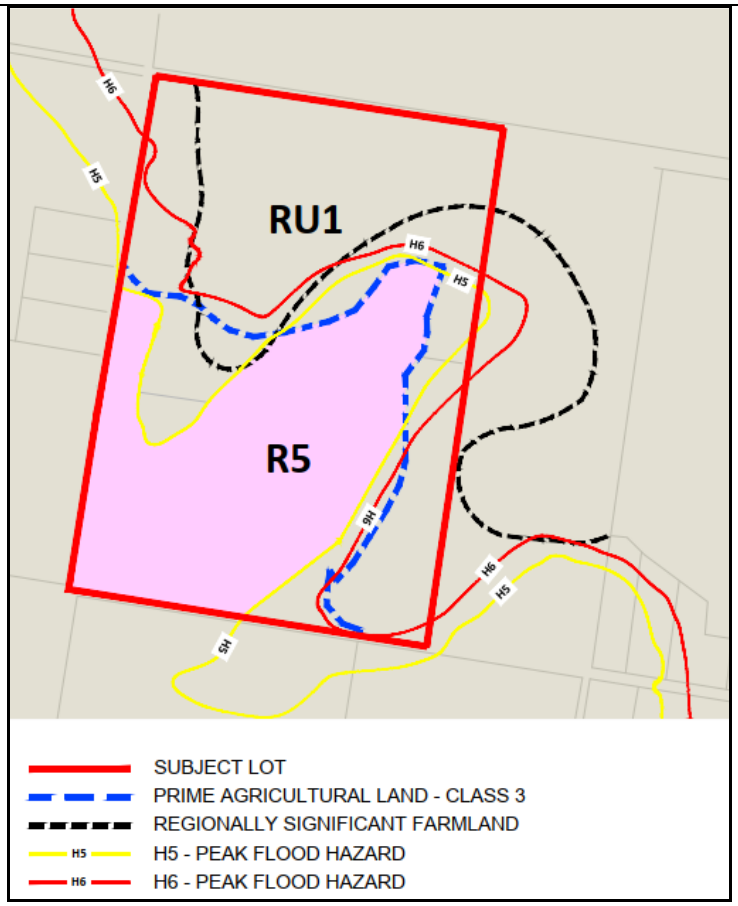
Important Agricultural Land

Strategy 8.1: Local planning should protect and maintain agricultural productive capacity in the region by directing urban, rural residential and other incompatible development away from important farmland.

Comment: The Planning Proposal does not propose to rezone State Significant farmland identified within the Northern Rivers Farmland Protection Project Final Map 2005.

The Planning Proposal does not propose to rezone Regionally Significant farmland identified within the Northern Rivers Farmland Protection Project Final Map 2005.

The Planning Proposal does not propose to rezone areas of mapped Class 3 prime agricultural land.



Regionally Significant Farmland and Class 3 Prime Agricultural Land in relation to the proposed R5 zone

Further discussion regarding the development footprint and the agricultural land can be found in Section 1.4 of this report, which discusses the consultation that has been undertaken with the NSW DPI.

To address land use conflict and the proposed development, reference should be made to the LUCRA report prepared by Tim Fitzroy & Associates contained within **Attachment 4**. Recommendations with regard to vegetation buffers can be implemented into a future subdivision lot layout at the Development Application stage.

Objective 13: Champion Aboriginal self-determination

Strategy 13.1: Provide opportunities for the region's LALCs, Native Title holders and community recognised Aboriginal organisations to utilise the NSW planning system to achieve development aspirations, maximising the flow of benefits generated by land rights to Aboriginal communities through strategic led planning.
Strategy 13.2: Prioritise the resolution of unresolved Aboriginal land claims on Crown land.

Strategy 13.3: Partner with community recognised Aboriginal organisations to align strategic planning and community aspirations including enhanced Aboriginal economic participation, enterprise and land, sea and water management.

	Strategy 13.4: Councils consider engaging Aboriginal identified staff within their planning teams to facilitate strong relationship building between councils, Aboriginal communities and key stakeholders such as Local Aboriginal Land Councils and local Native Title holders. **Strategy 13.5:** Councils should establish a formal and transparent relationship with local recognised Aboriginal organisations and community, such as an advisory committee. **Comment:** The following comments are provided: o Aboriginal Cultural Heritage has been addressed in Section C Question 8(d) of this Planning Proposal. o We note that this is a revised Planning Proposal report that was initially lodged with Richmond Valley Council in 2015. Council correspondence issued to Newton Denny Chapelle dated 8 April 2016 provided that *"An updated cultural heritage assessment of the site is required, including an updated AHIMS search to satisfy the area is devoid of any Aboriginal or European artefacts etc. over the site and adjoining land. The attachment 2 refers to Bogal LALC Representatives accessing the site almost 10 years ago. It is acknowledged, however this is a lower priority for the submitted proposal – and may be updated and provided post gateway."* o Revised AHIMS searches have been completed and are contained within **Attachment 5**. The searches indicate that no Aboriginal sites or places are located within 50 metres of the subject land. The previous Bogal LALC correspondence is also contained within **Attachment 5.** **Objective 18: Plan for Sustainable Communities** The objective primarily relates to the preparation of land use planning strategies by Council's to deliver appropriate land to accommodate population growth. The Plan states that these strategies *"will reflect the aims and strategies of this plan and be based on the following key settlement planning principles and the settlement planning guidelines in Appendix A"*. The following discussion is provided in response to the identified key settlement planning principles and the settlement planning guidelines in Appendix A. **Key Settlement Planning Principles** <u>Principle no. 1 – Identify growth needs and opportunities</u> The following is provided in response to this principle: o As identified earlier in Section 1.4, NDC previously submitted written justification to Richmond Valley Council dated 29 August 2016 with regard to lot supply and demand. This matter has already been satisfactorily addressed following e-mail confirmation received from Richmond Valley Council on 10 November 2016 following Council's consultation with the Department of Planning. o The subject land is nearby land that has been rezoned for rural residential purposes within the Reardons Lane, Swan Bay precinct. Following rezoning, the subdivision will deliver housing within the Reardons Lane precinct that will support the delivery of housing diversity on lots with minimum lot sizes of 7,000m^2. o The site's location and attributes are consistent with the southerly expansion of the Reardons Lane rural residential precinct.

	○ The land is identified within the Reardons Lane precinct (Figure 16) of the Richmond Valley Growth Management Strategy. <u>Principle no. 2 – Direct growth to identified urban growth areas</u> The subject land was identified within the Western Sector of the Woodburn Catchment District (as identified within the former Richmond River Rural Residential Development Strategy) of the Richmond Valley LGA. The land is now identified within the Reardons Lane precinct (Figure 16) of the Richmond Valley Growth Management Strategy. The current Planning Proposal is not considered to be antipathetic to the objectives and outcomes of the North Coast Regional Plan 2041. The proposal seeks to provide additional rural residential land to accommodate the future growth of the Richmond Valley area. <u>Principle no. 3 – Ensure sustainable development within the coastal strip</u> The subject site is not located within a coastal zone defined by Chapter 2 of the Resilience and Hazards SEPP 2021. <u>Principle no. 4 – Determine a required structure for future development</u> This principle is applicable to Council's when preparing structure and precinct plans with respect to employment and growth areas. Notwithstanding, sufficient justification is provided within this Planning Proposal to rezone the land in the manner proposed to facilitate additional rural residential development. <u>Principle no. 5 – Encourage locally responsive sustainable design</u> This principle is applicable to Council's when preparing land use strategies. Notwithstanding, the following points are provided: ○ The proposal is consistent with the Richmond Valley Local Government Narrative as addressed further below; ○ The proposed rezoning will assist in the achievement of the objectives of Council's relevant local strategies as demonstrated below under Question 4; ○ The lots will be required to be serviced by all necessary utility infrastructure that will be addressed at the development application stage. The lots will be self sufficient with regards to water supply for potable and fire-fighting purposes (via water rainwater storage tanks), and on-site wastewater systems for the disposal of wastewaters. ○ The proposal will enable residents to have access to Casino, Woodburn, and Evans Head which provide services and facilities including retail services, financial services, Council offices, recreational opportunities, educational and childcare services, health services, industrial services, and good transport infrastructure. **Sub-Regional Planning Principles** The information submitted as part of this Planning Proposal documentation demonstrates that the proposal is consistent with the relevant 'Subregional Planning Principles'. In this regard: ○ The subject land was identified within the Western Sector of the Woodburn Catchment District (as identified within the former Richmond River Rural Residential Development Strategy) of the Richmond Valley LGA. The land is

	now identified within the Reardons Lane precinct (Figure 16) of the Richmond Valley Growth Management Strategy. o The site's location and attributes are consistent with the southerly expansion of the Reardons Lane rural residential precinct. o The subject land is nearby land that has been rezoned for rural residential purposes within the Reardons Lane, Swan Bay precinct. Following rezoning, the subdivision will deliver housing within the Reardons Lane precinct that will support the delivery of housing diversity on lots with minimum lot sizes of 7,000m^2. o The land proposed for rezoning is not constrained by important farmland, HEV land (as mapped within former NCRP 2036), or environmentally areas; o Aboriginal Cultural Heritage has been addressed in Section C Question 8(d) of this Planning Proposal. No issues are raised in this regard. o Agricultural matters associated with the Planning Proposal have been addressed in consultation with the NSW DPI. o The proposal will not impact on a visually sensitive landscape, as the rezoning will align with the intent and identified locations of the Richmond Valley GMS for rural residential development. **Appendix A - Settlement Planning Guidelines** The settlement planning guidelines provide key strategy aims to 'identify and direct suitable land to accommodate planned growth'. The following points are offered in response to these aims: o NDC previously submitted written justification to Richmond Valley Council dated 29 August 2016 with regard to lot supply and demand. This matter has already been satisfactorily addressed following e-mail confirmation received from Richmond Valley Council on 10 November 2016 following Council's consultation with the Department of Planning. o The subject land is nearby land that has been rezoned for rural residential purposes within the Reardons Lane, Swan Bay precinct. Following rezoning, the subdivision will deliver housing within the Reardons Lane precinct that will support the delivery of housing diversity on lots with minimum lot sizes of 7,000m^2. o The land is identified within the Reardons Lane precinct (Figure 16) of the Richmond Valley Growth Management Strategy. o The site's location and attributes are consistent with the southerly expansion of the Reardons Lane rural residential precinct. o The lots will be required to be serviced by all necessary utility infrastructure that will be addressed at the development application stage. The lots will be self sufficient with regards to water supply for potable and fire-fighting purposes (via rainwater storage tanks), and on-site wastewater systems for the disposal of wastewaters. o The proposal will enable residents to have access to Casino, Woodburn, and Evans Head which provide services and facilities including retail services, financial services, Council offices, recreational opportunities, educational and childcare services, health services, industrial services, and good transport infrastructure. o Given the land is situated amongst the Reardons Lane rural residential precinct, the proposed rezoning is considered well integrated with the anticipated visual and landscape value of the immediate catchment and in this respect is considered a suitable form of development.

	○ The land proposed for rezoning is not constrained by HEV land (as mapped within former NCRP 2036). ○ BMT have completed a Qualitative Flood Impact and Risk Assessment (FIRA) which is contained within **Attachment 12**. The report concludes that *"Overall, the proposed concept subdivision plan (incorporating the proposed flood risk treatment options) is considered to be compatible with the flood hazard."* ○ In accordance with the Gateway Determination conditions, the Planning Proposal has removed those parts of the land affected by a high flood hazard (H5 and H6) in the Probable Maximum Flood event. ○ As identified below under Question 8, current mapping obtained from Richmond Valley Council indicates that the north western and south western portions of the land are mapped as being bushfire prone. A bushfire assessment report prepared by Bushfire Certifiers is contained within **Attachment 3**. ○ The subject land is not identified as being an item of heritage significance nor as being located within a heritage conservation area pursuant to the Richmond Valley LEP 2012. ○ Aboriginal Cultural Heritage has been addressed in Section C Question 8(d) of this Planning Proposal. No issues are raised in this regard ○ Future rural residential subdivision of the land is not impacted by land use conflict as addressed earlier in this Planning Proposal. **Local Government Narrative – Richmond Valley** **Comment:** The NCRP 2041 identifies the following narratives as of relevance to the proposal. <u>Liveable and Resilient</u> ○ *Improve water quality and security in the Richmond Valley to better accommodate growth, and the peak visitor season.* ○ *Support environmentally sustainable development that is responsive to climate change and natural hazards, in particular bushfire and flood risk.* ○ *Retain and protect local biodiversity through effective management of environmental assets and ecological communities.* **Comment:** The following comments are provided: ○ BMT have completed a Qualitative Flood Impact and Risk Assessment (FIRA) which is contained within **Attachment 12**. The report concludes that *"Overall, the proposed concept subdivision plan (incorporating the proposed flood risk treatment options) is considered to be compatible with the flood hazard."* ○ In accordance with the Gateway Determination conditions, the Planning Proposal has removed those parts of the land affected by a high flood hazard (H5 and H6) in the Probable Maximum Flood event. ○ High Environmental Value land (identified within the former North Coast Regional Plan 2036) is located adjacent to the edge of Darke Lane being the southern border of the property. Future dwelling development within the lots will be clear of the HEV mapped land. ○ The Planning Proposal has been reviewed by the NSW DPE BCD, and they have no further comments on biodiversity for the Planning Proposal. ○ The Biodiversity Offsets Scheme Entry Threshold Tool (BOSET) is a test used to determine when it is necessary to engage an accredited assessor to apply

	the Biodiversity Assessment Method to assess the impacts of a proposal. The subject land is not mapped as containing areas of biodiversity on the NSW Government Biodiversity Values Map and Threshold Tool (accessed 3/2/21). The BOSET tool was again accessed 08/04/24 and does not identify the area to be rezoned to R5 Large Lot Residential as containing mapped biodiversity values. o RVC Intramaps identifies Terrestrial Biodiversity located adjacent to the edge of Darke Lane being the southern border of the property. Future dwelling development within the lots will be clear of the Terrestrial Biodiversity mapped land. <u>Productive and Connected</u> o *Deliver new and diverse employment opportunities across the LGA.* o *Protect the ongoing viability of important farmland across the LGA to sustainably enable agricultural growth.* o *Support the development of the Regional Job Precinct, with a focus on food production, manufacturing and alternative energy.* **Comment:** Agricultural matters associated with the Planning Proposal have been addressed in consultation with the NSW DPI. <u>Housing and Place</u> o *Deliver new housing in appropriate locations, in line with new economic and employment opportunities.* o *Enhance the variety of housing options available across Richmond Valley, ensuring there is adequate housing supply that meets demographic need.* o *Retain and support the unique character of local towns and villages.* **Comment:** The following comments are provided: o The subject land was identified within the Western Sector of the Woodburn Catchment District (as identified within the former Richmond River Rural Residential Development Strategy) of the Richmond Valley LGA. The land is now identified within the Reardons Lane precinct (Figure 16) of the Richmond Valley Growth Management Strategy. o The site's location and attributes are consistent with the southerly expansion of the Reardons Lane rural residential precinct. o The subject land is nearby land that has been rezoned for rural residential purposes within the Reardons Lane, Swan Bay precinct. Following rezoning, the subdivision will deliver housing within the Reardons Lane precinct that will support the delivery of housing diversity on lots with minimum lot sizes of 7,000m^2. o The proposal will not impact on a visually sensitive landscape, as the rezoning will align with the intent and identified locations of the Richmond Valley GMS for rural residential development.

4. Is the Planning Proposal consistent with a Council LSPS that has been endorsed by the Planning Secretary or GCC, or another endorsed local strategy or strategic plan?

From a strategic perspective, the proposed rezoning will assist in the achievement of the obejctives of Council's relevant local strategies as demonstrated below, and is therefore consistent with Council's strategic planning intent for the LGA. These strategies include:

- Richmond River Council Rural Residential Development Strategy 1999
- Richmond Valley Growth Management Strategy
- Richmond Valley Local Strategic Planning Statement (LSPS) 2020
- Richmond Valley 2040 Community Strategic Plan

The Planning Proposal has been previously assessed against the former Richmond River Council Rural Residential Development Strategy 1999, which has now been superseded by the Richmond Valley Growth Management Strategy (GMS). To provide strategic context and merit to the current Planning Proposal, both of these strategies have been addressed below.

Note: The comments provided against the Richmond River Council Rural Residential Development Strategy 1999, that were current at the date of re-lodgement of the updated Planning Proposal on the 15.02.22, have not been changed and are reproduced below.

Richmond River Council Rural Residential Development Strategy 1999

Yes. The Planning Proposal is consistent with the Richmond River Shire Council Rural Residential Development Strategy in the following way.

The Richmond River Shire Council Rural Residential Development Strategy 1999 (RRDS) identifies preferred lands that are suitable for rural residential housing which:

(a) are physically capable of supporting rural housing, and

(b) are close to existing settlements which already have services and community facilities, or can otherwise be efficiently and economically serviced, and

(c) are physically suitable for septic effluent disposal, and

(d) are not required or likely to be required for future urban expansion of existing settlements, and

(e) do not comprise prime crop or pasture land, and

(f) are not subject to significant environmental hazards, and

(g) are not of significant value for the conservation of wildlife.

The Western Sector of the Woodburn Catchment District contained within the RRDS identifies the subject land as being available rural residential land based on the required selection criteria for the identification of such land.

The Conclusion of Section 2.4.3i. of the RRDS provides the following commentary concerning the Western Sector of the Woodburn Catchment District relevant to this application.

> *Woodburn currently has a population of some 496 persons and therefore has a limited range in social infrastructure needs. Whilst Woodburn has a limited range in relation to social infrastructure, it does provide the fundamental social services essential to the establishment of a community. As the Village is largely central to both surrounding district centres and three regional centres, it has good access to a broad range of social facilities and services. It therefore considered that a Woodburn would be able to cope with an incremental development of identified rural residential lands.*

The subject land proposed for rezoning is situated within an area identified within the RRDS for closer rural settlement, and therefore contains inherent qualities rendering the land suitable for rural residential purposes. Accordingly, it are these qualities which have resulted in Council identifying the land for future rural residential development.

i. <u>Allotment Supply and Take up Justification to Proceed with the Western Sector of Woodburn Catchment District</u>

The Western Sector of the Woodburn Catchment District is a **Stage 1** release area within the Strategy as illustrated in Figure 6.2 of the RRDS and reproduced below in **Plate 5**.

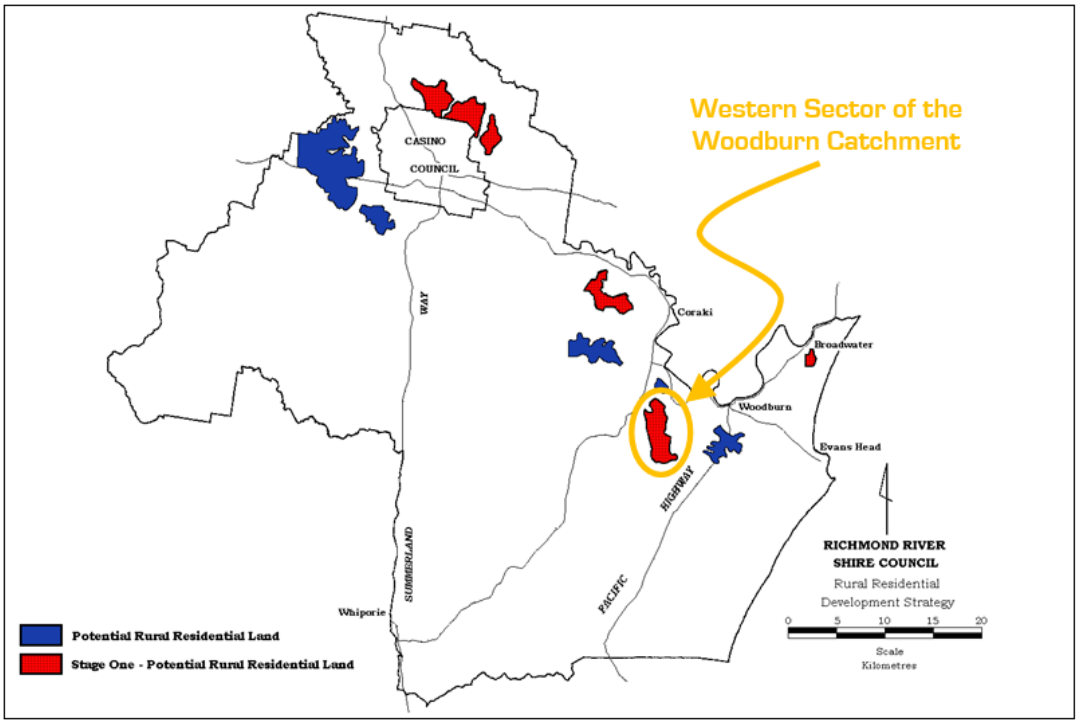


Plate 5 - RRDS Staging Plan
Source: Figure 6.2 of RRDS (March 1999)

Concerning supply and demand and take up rates, Section 3.3.2 of the RRDS provides the following commentary in respect to supporting the release of rural residential allotments within the subject catchment:

"Many parts of Woodburn are constrained by flooding and include prime horticultural and cane growing areas. Some rural residential lots can be purchased in the $40,000 to $50,000 range that has helped to increase the popularity of the area. The demand appears to be relatively strong which may reflect the lack of land availability closer to Evans Head. The demand for land includes one hectare and 1 – 10 hectare parcels.

Although there is good demand for rural residential lots there is little supply. It can therefore be assumed that latent demand is likely to be high in this area."

Section 3.4 of the Strategy further provides:

"The supply of rural residential lots in the Woodburn catchment district is limited, however discussions with real estate agents indicate that real demand for such real estate is buoyant.

The catchment analysis identified some potential development areas and it is recommended that development of such areas be encouraged to enable the supply of rural residential development within reasonable distance from the coast. It is recommended that 20% of the total allowed lots (8 lots) be provided per annum. All these lots should be 1-10 hectares.

Note that the Department of Urban Affairs and Planning have placed restrictions on the release of land for residential or rural residential which would require accessing the Pacific Highway to reach the service centre (Woodburn) of the catchment. Until a decision is made by the Roads and Traffic Authority to re-route the Pacific Highway and by-pass Woodburn, commitment to such areas identified south of the village at this point in time would only have long term potential"

In response to the restrictions placed by the previously known DUAP, the proposed lots would access Woodburn-Coraki Road and in-turn River Street to access Woodburn and will not require accessing the Pacific Highway for such purposes.

The timing of this Planning Proposal is justified upon review of Section 6 (section 6.1.3iii) of the RRDS in respect to 'Site Specific Issues' which states that *"The area to the west of Woodburn, on Reardons Lane, has the potential to be developed immediately"*

It is considered that this Planning Proposal is consistent with the objectives of the RRDS.

ii. <u>Richmond Valley Council Correspondence dated 8 April 2016</u>

We note that this is a revised Planning Proposal report that was initially lodged with Richmond Valley Council in 2015. Council correspondence issued to Newton Denny Chapelle dated 8 April 2016 raised issue with the supply and demand aspect of the development as follows:

"The proposal is over lots which are contained within the Richmond River Rural Residential Strategy 1999 (RRRRS 1999). Council's policy for acceptance of Planning Proposals for rezonings of Rural Residential nature must consider whether supply meets an appropriate demand. The (then) Department of Planning's endorsement of the Strategy was on the basis of having a maximum of a five (5) year supply available at any time. This equates to 18 lots demand per year or approximately 90 lots.

The Swan Bay Area has a number of rural residential development areas marketing lots for sale which presently satisfies demand beyond the required 5 year future demand. Council will accept and progress this Planning Proposal for Newman's Darke Lane property when demand has increased and supply has dwindled to under the 5 year supply."

In response to the above matter, NDC responded to RVC on 29 August 2016 which is contained within **Attachment 6** of this Planning Proposal. Based on Council's e-mail of 10 November 2016, the supply and demand matter has now been adequately addressed. Council's email response was as follows:

"Concerning the proposal to rezone land for Rural Residential development off Darke Land – '(Newman's) – having had discussions internally and following additional conversation with the Department (of 'Planning and Environment'), we see there is no reason to delay the processing of the Planning Proposal provided it can satisfy the other criteria outlined within the most recent correspondence."

Richmond Valley Growth Management Strategy (GMS)

The purpose of the Richmond Valley GMS is *"to support and guide the growth of both residential and employment land in the Richmond Valley."* The document states that the GMS will:

- *Provide evidence regarding the current and future projected demand for and supply of employment and residential land;*
- *Establish key principles to enable Council to plan for sustainable growth in the Richmond Valley;*
- *Provide clear direction regarding the location and priorities for managing growth of employment and residential land.*

One of the key principles of the GMS applies to residential growth, and in particular aims to deliver well-planned rural residential areas.

In regards to residential demand analysis, the GMS identifies the following key data for the Richmond Valley LGA:

- The population projections prepared in 2022 by the Department of Planning and Environment have predicted that the Richmond Valley will increase by 1,759 people over the next 20 years, bringing the total population of the LGA to 25,015 people by 2041.
- DPE forecast an implied dwelling demand of 1,552 new dwellings, which would bring the total number of dwellings in the LGA to 12,130 by 2041.
- The revised projections forecast that the Richmond Valley will instead increase by approximately 4,100 people over the next 20 years, bringing the total population of the LGA to 27,650 people by 2041.
- Correspondingly, the implied dwelling demand over the next 20 years is calculated at an additional 2,600 dwellings.
- These projections would suggest a total number of dwellings of approximately 13,550 by 2041.

The GMS also includes a residential supply analysis, and discusses the delivery of rural residential land to accommodate future housing supply. The GMS states that *"balancing the protection of our rural landscapes and amenity, while facilitating the delivery of large lot rural residential development in appropriate locations is a key consideration for Council."*

The GMS states that for the Woodburn locality, "*land for rural residential development will further be delivered around Reardons Lane in Swan Bay. This land contains existing zoned R5 - Large Lot Residential land."*

The Planning Proposal is consistent with the Richmond Valley Growth Management Strategy. The land is identified within the Reardons Lane precinct as illustrated earlier in **Plate 5** which is reproduced below in **Plate 6**. The proposal will deliver additional housing to service the implied dwelling demand over the next 20 years.

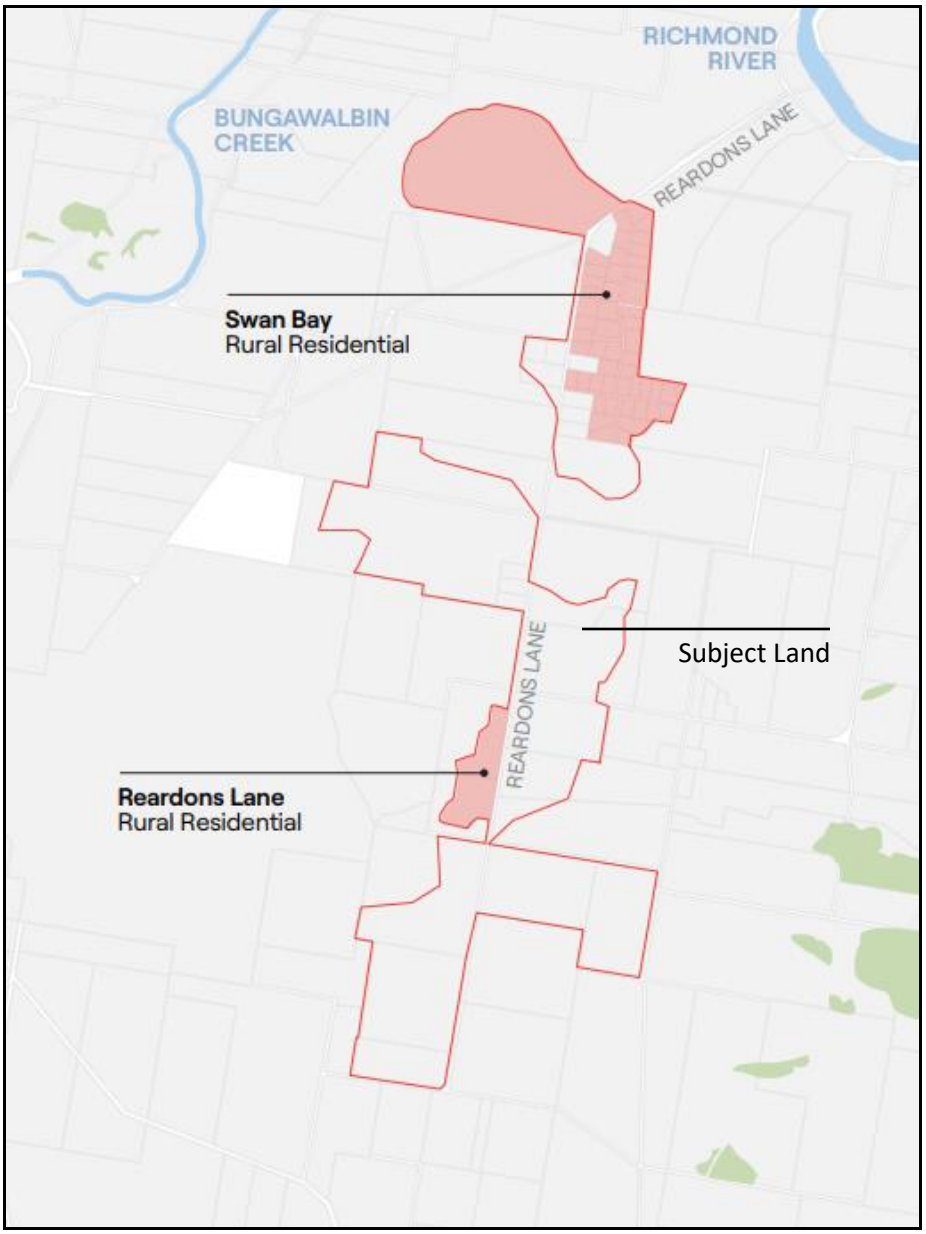


Plate 6 - The subject land is identified within the Richmond Valley Growth Management Strategy (Source: Figure 16 of the Richmond Valley Growth Management Strategy)

Richmond Valley Council Local Strategic Planning Statement (LSPS)

The LSPS outlines the Richmond Valley Local Government Area's (LGA) town planning priorities and strategic direction to address planning and development issues of importance to a vibrant and sustainable future. This LSPS gives effect to the former North Coast Regional Plan 2036, by implementing the relevant directions and actions at a local level.

The LSPS identifies priorities for the Richmond Valley LGA, and short, medium and long-term actions to help deliver on these priorities and vision for the future.

In summary, 8 Planning Priorities are identified within the LSPS, with those relevant to the Planning Proposal addressed below:

Planning Priority 1 – Have Well Planned and Designed Space to Grow

The proposal is consistent with Directions 2.1, 3.1, 24.1, and 24.2 of the former NCRP as submitted above, and therefore is consistent with Planning Priority 1.

Planning Priority 2 – Align Development, Growth and Infrastructure

The proposal is consistent with Directions 11.1, and 11.3 of the former NCRP as submitted above, and therefore is consistent with Planning Priority 2.

Planning Priority 5 – Create Resilient Communities

The proposal is consistent with Direction 3.1 of the former NCRP as submitted above, and therefore is consistent with Planning Priority 5.

Planning Priority 6 – Celebrate our Heritage

The proposal is consistent with Directions 18.1 and 18.2 of the former NCRP as submitted above, and therefore is consistent with Planning Priority 6.

Planning Priority 7 – Protect Productive Agricultural Land & Significant Resources

The proposal is consistent with Directions 11.1, and 11.3 of the former NCRP as submitted above, and therefore is consistent with Planning Priority 7.

Richmond Valley 2040 Community Strategic Plan

The Richmond Valley 2040 Community Strategic Plan (CSP) provides a 10 year outlook and defines the community priorities and aspirations. The CSP identifies the community's long-term goals and priorities over at least the next 10 years.

The document states that based on the key principles and values identified by the community, the strategic planning already completed, and the feedback Council received during the consultation, Council developed four key directions for the CSP. These directions create the framework for the objectives, strategies and actions that will help to deliver the goals and priorities, and include:

1. Strengthening our role in the region
2. Creating great places to live
3. Protecting our unique environment
4. Delivering for our community

The CSP includes a range of community objectives and a list of strategies to achieve those objectives. The current Planning Proposal is not considered to be antipathetic to the objectives and / or implementation of the intent of the CSP as the proposal seeks to provide additional rural residential land to accommodate the future growth of Richmond Valley LGA. In this regard, the proposal is directly in response to Objective #2 *'Establish the Richmond Valley as a Regional Growth Centre'.* This objective identifies strategies to deliver more housing, and states the following:

Providing rural-residential opportunities:

Not everyone wants to live in a town and rural-residential is a popular option for those seeking a tree-change. Our long-term plans provide for these opportunities to be developed in a sustainable way, ensuring there is access to services and employment within a reasonable distance of rural residential estates.

5. Is the Planning Proposal consistent with any other applicable State and regional studies or strategies?

Council has recently prepared a number of local strategic planning documents as referenced above under Question 4. It is assumed that consultation was undertaken between Council and relevant Government agencies in preparing these documents, and that they take into consideration the applicable State or regional studies or strategies. Conversely, it is assumed

that State or regional studies or strategies are consistent with Council's adopted local strategies.

NSW Housing Strategy, Housing 2041

The NSW Housing Strategy sets out a 20 year vision for housing in NSW, setting out the Government's goals and ambitions for future housing that meets the current needs of residents. The Strategy embodies the Government's goals and ambitions to deliver better housing outcomes, including housing in the right locations, and housing that suits diverse needs and housing.

The Planning Proposal will positively contribute to the achievement of the objectives of Housing 2041, by enabling land to be rezoned which will ultimately increase housing supply and diversity. The development of the land for housing will assist in addressing the implied dwelling demand identified within the Richmond Valley GMS.

Making it Happen in the Regions: Regional Development Framework

The Regional Development Framework sets a framework to provide appropriate services and infrastructure in regional NSW. The Frameworks seeks to support growing regional centres and to identify and activate economic potential across regional NSW, so as to improve economic outlook and activate local economies.

In regards to putting the Framework into practice, it focuses on ensuring regional economic growth can be captured through implementing the following programs:

- Improved regional structures to facilitate regional development;
- Building the evidence-base for investment in regional development;
- Attracting investment and co-investment;
- Capability building.

The Planning Proposal relates to the rezoning of land to assist in the delivery of additional housing in the Richmond Valley LGA. The proposal is not considered to be antipathetic to the aims and intent of the Regional Development Framework.

NSW State Infrastructure Strategy 2022-2042

The State Infrastructure Strategy (SIS) is updated every 5 years, and sets out a 20-year infrastructure investment plan for the NSW Government which places strategic fit and economic merit at the centre of investment decisions.

The SIS assesses infrastructure problems and solutions, whilst also providing recommendations to best grow the State's economy, enhance productivity and improving living standards for the NSW community.

The Planning Proposal relates to the rezoning of land to assist in the delivery of additional housing in the Richmond Valley LGA. The proposal is not considered to be antipathetic to the aims and intent of the SIS. In this regard, the following points are provided:

- The lots will be self sufficient with regards to water supply for potable and fire-fighting purposes (via rainwater storage tanks), and on-site wastewater systems for the disposal of wastewaters;
- A future subdivision estate will have an available road connection to Reardons Lane. A traffic and access report may be prepared and submitted if required at the Development Application stage;
- Consultation will be required to be undertaken with the relevant authorities to ensure power supply, and telecommunications, are adequate to meet the needs of the development at cost to the proponent;
- The proposal will enable residents to have access to Casino, Woodburn, and Evans Head which provide services and facilities including retail services, financial services, Council offices, recreational opportunities, educational and childcare services, health services, industrial services, and good transport infrastructure.

Urban Design Guide for Regional NSW

The Urban Design Guide provides guidance in the design, planning, and development of the built environment across regional NSW. Seven urban design strategies are identified for regional NSW, these include:

- Engage with the history and culture of places;
- Integrate with the natural environment and landscape;
- Revitalise main streets and town centres;
- Prioritise connectivity, walkability, and cycling opportunities;
- Balance urban growth;
- Increase options for diverse and healthy living;
- Respond to climatic conditions and their impacts.

This Planning Proposal has been informed by various specialist technical reports, whilst positively responding to applicable local strategies as addressed under Question 4, and regional strategy as addressed under Question 3. The Planning Proposal is not considered to be antipathetic to the seven urban design strategies identified for regional NSW.

6. Is the Planning Proposal consistent with applicable State Environmental Planning Policies?

The Planning Proposal is consistent with the provisions of applicable State Environmental Planning Policies. An assessment of the project against these policies is provided within **Attachment 7**.

7. Is the Planning Proposal consistent with applicable Ministerial Directions (s. 9.1 directions) or key government priority?

Comment: The Planning Proposal is consistent with the provisions of applicable S9.1 Ministerial Directions. An assessment of the project against these requirements is provided at **Attachment 8.**

Section C – Environmental, Social and Economic Impact

8. Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected because of the proposal?

A draft flora and fauna assessment was prepared for the site by James Warren & Associates Pty Ltd (November 2008) which was based upon the initial preliminary subdivision and road layout. An updated Biodiversity Assessment may be prepared and submitted if required at the Development Application stage.

The previous draft assessment that was completed involved the following components:

- Mapping and ground truthing vegetation units and determining their conservation status;
- Searching for and recording Threatened and Regionally significant plant species;
- Determining the suite of Threatened fauna that occurs in the locality;
- Assessing habitat provided by the site in relation to adjacent habitat and making an assessment of the corridor value of the site;
- Addressing statutory requirements including State Environmental Planning Policy No. 44 (SEPP 44 – Koala Habitat Protection), Section 5A of the Environmental Planning & Assessment Act (1979) and the Commonwealth EPBC Act (1999).

The study area within the assessment was defined as the subject site and any proximate areas that may be affected by the proposed development. For the purpose of the assessment the study area included surrounding sugar cane farms to the east, and adjoining forested land to the south, west, and north.

With respect to site survey, the report found that five vegetation communities were identified and eighty-five (85) plant species were recorded. However no Threatened species or Endangered Ecological Communities were identified. No Rare or Threatened Australian Plants (ROTAP – Briggs & Leigh 1995) or Significant (Sheringham & Westaway 1995) species were recorded.

The following key conclusions were reached within the draft report:

- No threatened flora species were identified.
- Fauna surveys recorded two (2) species of amphibian, six (6) reptile species, sixty-two (62) bird species and five (5) mammal species. One Threatened species was recorded, the Comb-crested jacana.
- The proposed rezone will result in minor impacts on native flora and fauna on the Subject site as most of the land to be utilised by the Proposed future development is on land that has already been cleared and is currently used for agriculture.

- A Section 5A assessment was completed for twenty (20) Threatened fauna species considered possible occurrences in the Study area over time. The assessment concluded that the impacts of the Proposed rezone and any future development of the site would be unlikely to result in the local extinction of any of these species. A Species Impact Statement is not required.
- A SEPP 44 assessment concluded that the site does not contain core Koala habitat. A Koala Plan of Management is not required.
- An assessment under the Commonwealth Environment Protection and Biodiversity Act (1999) concluded that the Proposed rezone and any future development of the site will not have a significant impact on any matters of National Environmental Significance. Commonwealth assessment of the proposal is therefore not required.

The following additional comments are provided:

- As addressed earlier, High Environmental Value land identified within the former North Coast Regional Plan 2036 is located adjacent to the edge of Darke Lane being the southern border of the property. Future dwelling development within the lots will be clear of the HEV mapped land.
- The Planning Proposal has been reviewed by the NSW DPE BCD, and they have no further comments on biodiversity for the Planning Proposal.
- The Biodiversity Offsets Scheme Entry Threshold Tool (BOSET) is a test used to determine when it is necessary to engage an accredited assessor to apply the Biodiversity Assessment Method to assess the impacts of a proposal. The subject land is not mapped as containing areas of biodiversity on the NSW Government Biodiversity Values Map and Threshold Tool (accessed 3/2/21). The BOSET tool was again accessed (08/04/24) and does not identify the area to be rezoned to R5 Large Lot Residential as containing mapped biodiversity values.
- RVC Intramaps identifies Terrestrial Biodiversity located adjacent to the edge of Darke Lane being the southern border of the property. Future dwelling development within the lots will be clear of the Terrestrial Biodiversity mapped land.

9. Are there any other likely environmental effects of the Planning Proposal and how are they proposed to be managed?

A range of environmental assessment reports have been completed for the Planning Proposal and form attachments to this report. It is noted that these sub-consultant reports addressed a larger area as part of the initial Planning Proposal that was lodged. However, the area proposed for rezoning has now reduced in size as a result of removing those parts of the land affected by a high flood hazard (H5 and H6) in the Probable Maximum Flood event.

Potential impacts are identified and discussed as follows:

a. Soils - Acid Sulfate Soils & Contamination

Acid Sulfate Soils

The subject lands are identified as containing a combination of Class 3 & 5 Acid Sulfate Soils on RVLEP 2012 Acid Sulfate Soils mapping as illustrated in the below **Plate 7.**

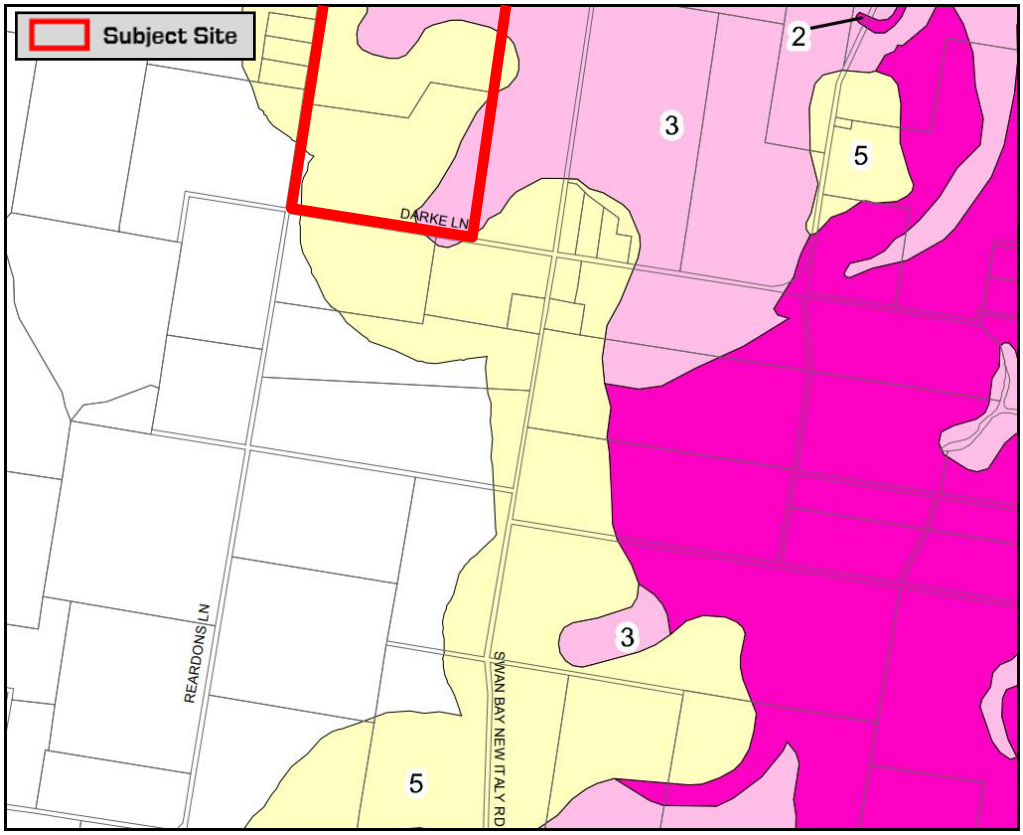


Plate 7: RVLEP 2012 Acid Sulfate Soils Mapping
(Source: RVLEP 2012)

Reference should be made to the Acid Sulfate Soil Assessment prepared by Tim Fitzroy & Associates as contained within **Attachment 9**. The assessment concludes the following:

"The revised development footprint has been reduced to elevated portions of the subject site such that the proposed works will not disturb acid sulfate soils (see Attachment A ASS Risk Map and Conceptual Site Plan). As a consequence, ASS has not been identified as an impediment to the Planning Proposal to be submitted to Richmond Valley Council (RVC) for the establishment of a 43 Lot Rural Residential Subdivision at the subject site."

Contamination

A preliminary site contamination report has been prepared by Tim Fitzroy & Associates and is contained within **Attachment 10**. The report concludes that *"Based on the outcomes of this PSI there is no impediment to approval of Planning Proposal for the proposed rezoning from RU1 Primary Production to R5 Large Lot Residential. Further investigation in accordance with the EPA sampling guidelines is required prior to the issue of a subdivision certificate for large lot residential use."*

b. Bushfire

Current mapping obtained from Richmond Valley Council indicates that the land is mapped as being bushfire prone (see **Plate 8**).

A bushfire assessment report has been completed by Bushfire Certifiers and is contained within **Attachment 3**.

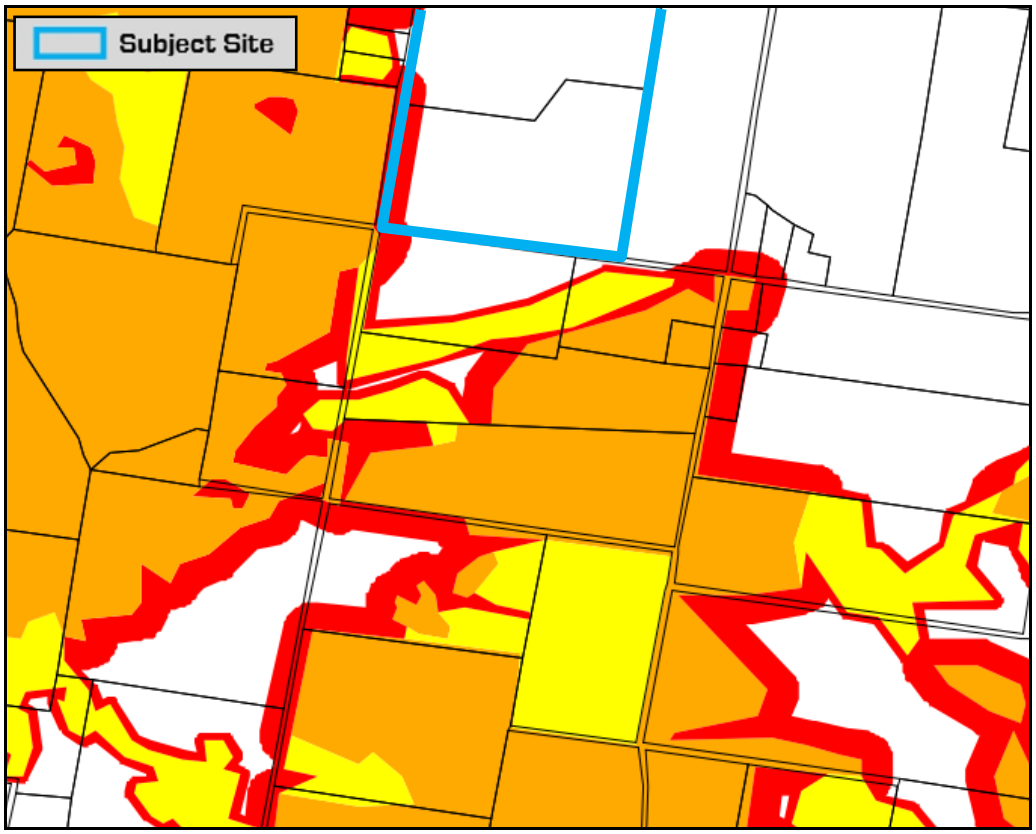


Plate 8: Richmond Valley Council Bushfire Mapping
(Source: Richmond Valley Council website)

c. Buffer Areas (Land Use Conflict)

The introduction of rural residential land uses within a rural area interface may contribute to the creation of conflicting land use issues.

To assess the potential of land use conflict from the proposed rural residential development with surrounding land uses, a Land Use Conflict Risk Assessment has been prepared by Tim Fitzroy & Associates and can be found within **Attachment 4**.

The LUCRA assessed the risk from the proposed development and buffers required to reduce the risk of future land use conflict impacts. The LUCRA concluded that the subject site was suitable for the proposed development subject to the recommendations provided within Section 5 of the report. Recommendations with regard to vegetation buffers can be implemented into a future subdivision lot layout at the Development Application stage.

Moonimba Quarry (previously Robinsons Quarry) was approved by Richmond Valley Council under DA2015.0069 for an 'Extractive Industry to 90,000m^3 per annum and Importation of Fill to 30,000m^3 per annum'. The quarry site is located on Lot 193 DP 755603 – Bungawalbin Whiporie Road, Bungawalbin which is located to the west of the land subject to this Planning Proposal.

A review of the Noise Impact Assessment completed by Greg Alderson & Associates (Report No. 06193_NIA_Rev D) identified a range of best management practices with respect to operational noise to minimise noise emissions of the quarry expansion, and also various mitigation measures to reduce impacts of road traffic noise in respect to properties along Reardons Lane.

d. Cultural Heritage

Previous Consultants working on the project (Harrison Shepherd Pty Ltd) engaged Bogal Local Aboriginal Land Council to be involved in an Aboriginal Heritage Assessment for the proposed rezoning. The correspondence from Bogal Aboriginal Land Council to Harrison Shepherd Pty Ltd is contained within **Attachment 5**.

The assessment concluded that due to disturbance caused from past and present land activities such as slashing, ploughing and cane farming, the area assessed didn't offer much hope of finding anything of cultural significance at ground level, and therefore Bogal LALC has no objections to the proposed rezoning.

A more recent search of AHIMS by NDC (**Attachment 5**) did not identify any Aboriginal sites or places within 50 metres of the subject lands.

The Richmond Valley LEP 2012 mapping does not identify the subject lands as containing a heritage item.

e. Soil Landscapes & Effluent Disposal

An on-site wastewater land capability assessment has been prepared by Tim Fitzroy & Associates which is contained within **Attachment 2** of this report, and identifies the feasibility of a subdivision being serviced with on-site wastewater for future dwellings. The report concludes the following:

Based on the site and soil assessment and in consideration of:

- *Australian/New Zealand Standard 1547:2012;*
- *Richmond Valley Council's Onsite Sewage and Wastewater Management Strategy (2017); and*
- *Environment & Health Protection Guidelines On-Site Sewage Management for Single Households (1998)*

it is our view that the proposed smaller allotments (7,500m^2 to 10,000m^2) at the subject site has the capacity to effectively assimilate low tech secondary effluent generated from 3, 4 and 5 bedroom dwellings.

f. Landscape and Visual Value

The landscape and visual character of the locality is rural and rural residential. The predominant land uses comprise cattle grazing activities, sugar cane cropping, rural residential development, rural dwellings, forest vegetation, rural industry and a quarry.

Due to the fact that the area is identified as being potentially available rural residential land within the RRDS, the landscape and visual character of the Reardons Lane locality is being substantially transformed and developed for rural residential purposes. Farming land has been transformed and characterised by dwelling houses and associated domestic buildings/structures on rural residential lots with domestic type landscaping.

As provided earlier, the proposal strengthens, builds on and is clustered with the existing R5 Large Lot Residential Precinct already approved and established within the Reardons Lane locality.

The subject land is not considered to be highly sensitive or significant in the local visual context. The subject land is nearby land that has been rezoned for rural residential purposes within the Reardons Lane, Swan Bay precinct. The site's location and attributes are consistent with the southerly expansion of the Reardons Lane rural residential precinct. The rezoning will align with the intent and identified locations of the Richmond Valley GMS for rural residential development.

The size of the allotments to be created are such that there will be substantial land available for site landscaping (including domestic gardens and planting of larger trees) in a similar manner to other rural residential estates within the LGA.

g. Stormwater Drainage and Water Quality

A stormwater management plan will be required to be submitted with the Development Application.

The SMP will identify the implementation of the stormwater management measures to achieve the stormwater and sensitive urban design objective of minimising impacts of development on the natural water cycle i.e. WSUD. Measures to be adopted will typically include:

- Installation of rainwater tanks;
- Provision of grass buffers to main gully flow paths;
- Swales in road reserves where grades permit;
- Utilisation of existing farm dam;
- Utilisation of water saving devices within dwellings;
- Implement erosion and sediment controls during construction.

h. Flooding

The 1 in 100 year flood level for the site is 5.4 metres AHD as previously advised by Council. All indicative dwelling sites within the lots are located above this flood level as illustrated on **NDC Plan 4**.

As addressed in Section 1.4, BMT have completed a Qualitative Flood Impact and Risk Assessment (FIRA) which is contained within **Attachment 12**. The report concludes that *"the FIRA was based on the simple assessment approach in accordance with the FIRA guideline LU01 (DPE, 2023). The assessment was conducted based on an understanding of existing flood behaviour from the recently completed Richmond River Flood Study (RVFS) (BMT, September 2023)."*

Whilst Section 5 summarises the key findings of the FIRA, the report concludes that *"Overall, the proposed concept subdivision plan (incorporating the proposed flood risk treatment options) is considered to be compatible with the flood hazard."*

In accordance with the Gateway Determination conditions, the Planning Proposal has removed those parts of the land affected by a high flood hazard (H5 and H6) in the Probable Maximum Flood event.

i. Coastal Hazards

The proposed rural residential development is not located within a coastal zone defined by Chapter 2 of SEPP Resilience and Hazards 2021.

j. Agriculture

The initial Planning Proposal lodged with Council in 2015 was for a total of 77 lots. As outlined in Section 1.4 of this Planning Proposal a number of issues were raised by NSW DPI which have now been addressed through direct consultation between NDC and the DPI. This has resulted in a significant reduction in the area of land proposed to be rezoned.

Agricultural land class in regards to the Planning Proposal has been addressed earlier in **Table 5** against the NCRP 2041. In this regard the following points are provided:

- The Planning Proposal does not propose to rezone State Significant farmland identified within the Northern Rivers Farmland Protection Project Final Map 2005.
- The Planning Proposal does not propose to rezone Regionally Significant farmland identified within the Northern Rivers Farmland Protection Project Final Map 2005.
- The Planning Proposal does not propose to rezone areas of mapped Class 3 prime agricultural land.

To address land use conflict and the proposed development, reference should be made to the LUCRA report prepared by Tim Fitzroy & Associates contained within **Attachment 4**. Recommendations with regard to vegetation buffers can be implemented into a future subdivision lot layout at the Development Application stage.

An Agricultural Assessment was previously completed by John Allen & Associates with the most recent assessment dated 30/11/2017 contained within **Attachment 11** of this report. This assessment is included within this Planning Proposal for reference purposes, noting that further consultation has since been completed between NDC and the NSW DPI to resolve the concerns raised by the DPI.

k. Geotechnical Assessment

Geotechnical assessment can be completed post gateway if conditioned as part of the Gateway Determination, or alternatively at the development application stage. This assessment should be completed to confirm the suitability of the land for future residential development within the area proposed to be rezoned to R5 Large Lot Residential. The assessment will need to take into consideration the areas around the farm dam that have been subject to previous filling.

10. How has the Planning Proposal adequately addressed any social and economic effects?

The rezoning of the land for rural residential purposes will have positive social and economic effects, and in particular the development of the land for housing will assist in addressing the implied dwelling demand identified within the Richmond Valley GMS. The community benefit associated with the proposed development will be found in the provision of additional housing to service the future population needs of the Richmond Valley LGA.

The additional following social and economic benefits will be provided:

- **Creation of local employment opportunities through new jobs and multiplier effect on the local economy –** The construction of the subdivision and future dwelling houses will provide an increase in local employment opportunities that will have flow-through effects through tradespeople to suppliers and capacity for increased retail expenditure.
- **Increase in housing supply and choice –** The creation of additional lots will permit the construction of additional dwellings which may be either owner occupied or leased thereby contributing to the housing stock within the western sector of the Woodburn catchment.

- **Demand for community services in the locality –** It is envisaged that the future residential occupation of any lots created will increase the demand for services in the locality by virtue of the resultant increase in population. However, the development site is readily accessible and proximate to Casino, Woodburn, and Evans Head that contain a diverse range of community facilities as well as retail, administrative, education, health, sporting, open space and transport services. Services are also discussed within Question 10 of this Planning Proposal report.

No social impacts are envisaged in regard to cultural heritage matters having regard to the information provided above within this Planning Proposal under Question 8 – d. Cultural Heritage.

Section D – State and Commonwealth Interests

11. Is there adequate public infrastructure for the Planning Proposal?

a. Sewer

The subject site does not have connection to Council's reticulated sewer supply. As identified above, a wastewater feasibility assessment has been prepared by Tim Fitzroy & Associates which is contained within **Attachment 2** of this report, which identifies the feasibility of a subdivision being serviced by on-site wastewater systems.

b. Water

Reticulated water services are not available in the locality. Under the circumstances, water storage tanks will be provided to each future dwelling house in order to harvest roof water as the primary means of providing a domestic potable water supply and also water for fire-fighting purposes.

c. Electricity Supply

Consultation will be required to be undertaken with the relevant authority to ensure power supply is adequate to meet the needs of the development at cost to the proponent.

d. Telecommunications

Consultation will be required to be undertaken with the relevant authority to ensure

telecommunication capacity is adequate to meet the needs of the development at cost to the proponent.

e. Roads

A future subdivision estate will have an available road connection to Reardons Lane. A traffic and access report may be prepared and submitted if required at the Development Application stage.

The FIRA prepared by BMT within **Attachment 12** recommends the provision of a secondary emergency access road above the PMF flood level at the South West corner of the site. The exact location is to be determined at the development application stage.

12. What are the views of State and Federal public authorities and Government agencies consulted in order to inform the Gateway Determination?

The Gateway Determination in **Attachment 14** specifies consultation requirements with regards to relevant Public authorities/organisations.

Part 4 Maps

The following changes are proposed to the mapping within the Richmond Valley Local Environmental Plan 2012.

i. **Lot Size Map (Sheet LSZ-009 & LSZ-010)** – Application of a 7,000m^2 minimum lot size for the area of land proposed to be rezoned in accordance with **NDC Plan 4**;

ii. **Land Zoning Map (Sheet LZN-009 & LZN-010) –** Application of an R5 – Large Lot Residential Zone in accordance with **NDC Plan 4**.

iii. **Dwelling Opportunity Map –** Remove proposed R5 zoned land in accordance with **NDC Plan 4**.

This Planning Proposal includes a locality plan and aerial photo which clearly identifies the subject site.

Part 5 Community Consultation

The Gateway Determination contained within **Attachment 14** specifies the duration and extent of public exhibition for the Planning Proposal. Pursuant to the NSW DPIE Local Plan Making Guidelines (August 2023), the Planning Proposal will be publicly exhibited for 20 working days in line with a 'standard application'.

The Gateway Determination has confirmed that there is no requirement for a public hearing to be held.

Part 6 Project Timeline

Plan Making Step	Estimated Completion
Council Resolution	TBC
Gateway Determination	TBC
Update of Planning Proposal	TBC
Government Agency Consultation	TBC
Review of Planning Proposal in response to Government Agency Feedback	TBC
Public Exhibition	TBC
Submissions Assessment	TBC
Post-exhibition Evaluation	TBC
Council adopt Planning Proposal	TBC
Submission of Endorsed LEP to DPIE for finalisation	TBC
Anticipated date plan is made (if delegated)	TBC
Forwarding of LEP Amendment to DPIE for notification (if delegated)	TBC

REFERENCES

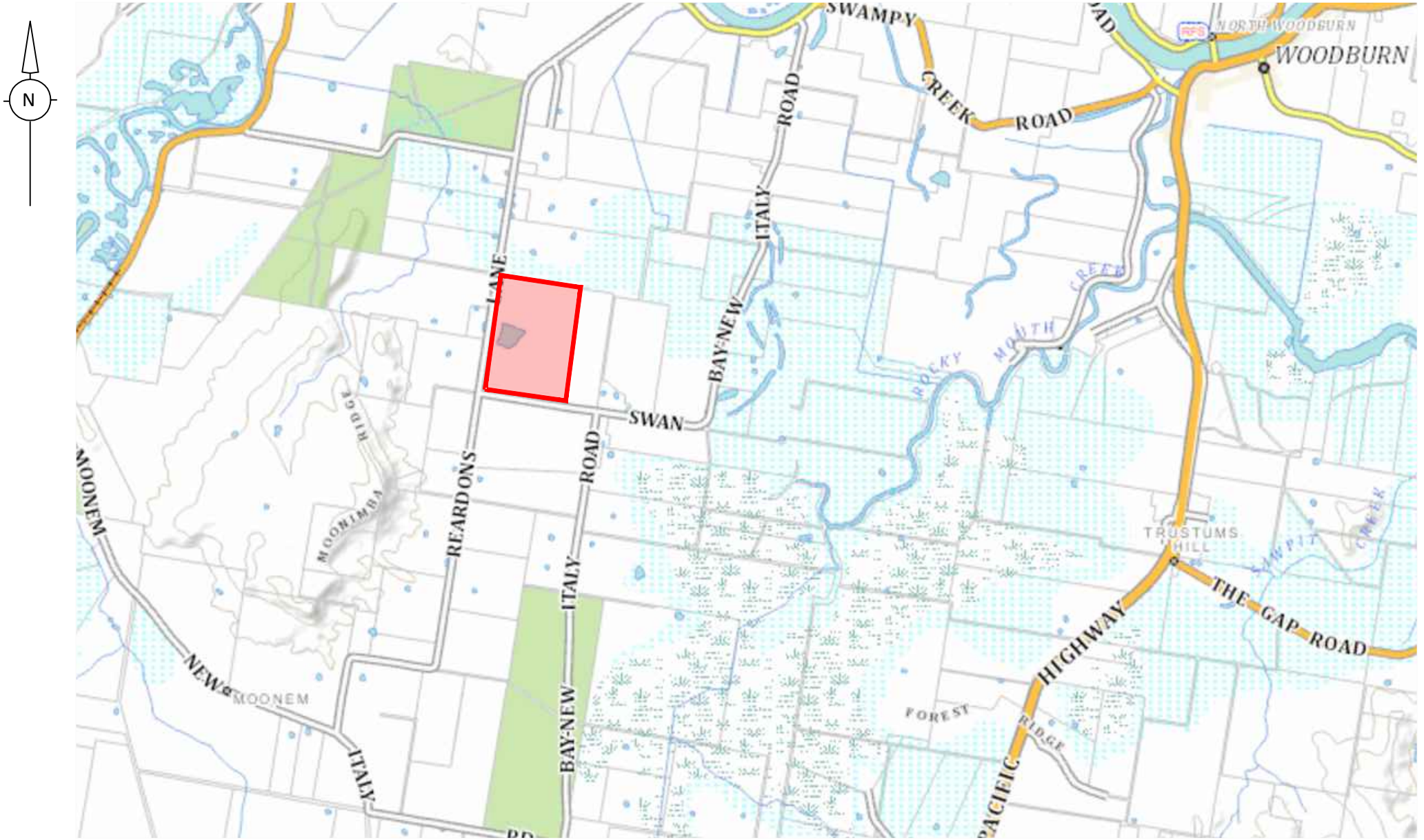
- NSW DPIE: Local Environmental Plan Making Guideline (August 2023)
- North Coast Regional Plan 2036
- North Coast Regional Plan 2041
- Richmond River Shire Council Rural Residential Development Strategy (March 1999).
- Richmond Valley Growth Management Strategy
- Richmond Valley Local Strategic Planning Statement (LSPS)
- Richmond Valley 2040 Community Strategic Plan

Part 6 – Project Timeline

Table 3. Estimated timeline for preparing amending Local Environmental Plan

Milestone	Timeline	
	Start	Finish
Gateway determination		21 June 2024
Anticipated timeframe for the completion of required technical information	24 June 2024	30 Aug 2024
Timeframe for government agency consultation	18 Sept 2024	21 Oct 2024
Commencement and completion dates for public exhibition period	18 Sept 2024	20 Oct 2024
Timeframe for consideration of submissions	21 Oct 2024	1 Nov 2024
Report to Council post Exhibition	4 Nov 2024	19 Nov 2024
Date of submission to the Department to finalise the LEP	NA	
Timeframe for drafting of LEP*	25 Nov 2024	20 Dec 2024
Anticipated date RPA will make the plan (under delegation)**		23 Dec 2024

* Subject to obtaining DPHI Drafting Opinion (LEP Map amendments only)
** Subject to DPHI Notifying LEP Amendment



LEGEND:

SITE BOUNDARY

SOURCE PLAN: www.maps.six.nsw.gov.au - accessed 03.07.14

k:\jobs\2014\14227 - newman\planning\planning plans\ndc plans\cad files\14227 - newman - plan 1 location plan.dwg - plan 1 - location plan

Newton Denny Chapelle
Surveyors Planners Engineers
Email: office@newtondennychapelle.com.au
LISMORE 31 Carrington St. Lismore 2480 PH: 6622 1011
CASINO 100 Barker St. Casino 2470 PH: 6662 5000
ABN: 86 220 045 469

PLAN 1 - LOCATION

CLIENT: N. NEWMAN

LOCATION: LOT 832 & 833 IN DP847683
REARDONS LANE
SWAN BAY NSW (REV B)

DATE: 08.02.2022 REF: 14/227

SCALE: nts (A4) DRAWN: CD

REV	DATE	AMENDMENT
B	07.02.22	DAM AREA DETAIL UPDATED
C	08.04.24	LOT 831 REMOVED FROM DETAILS
D		
E		
F		

SOURCE PLAN: www.maps.six.nsw.gov.au - accessed

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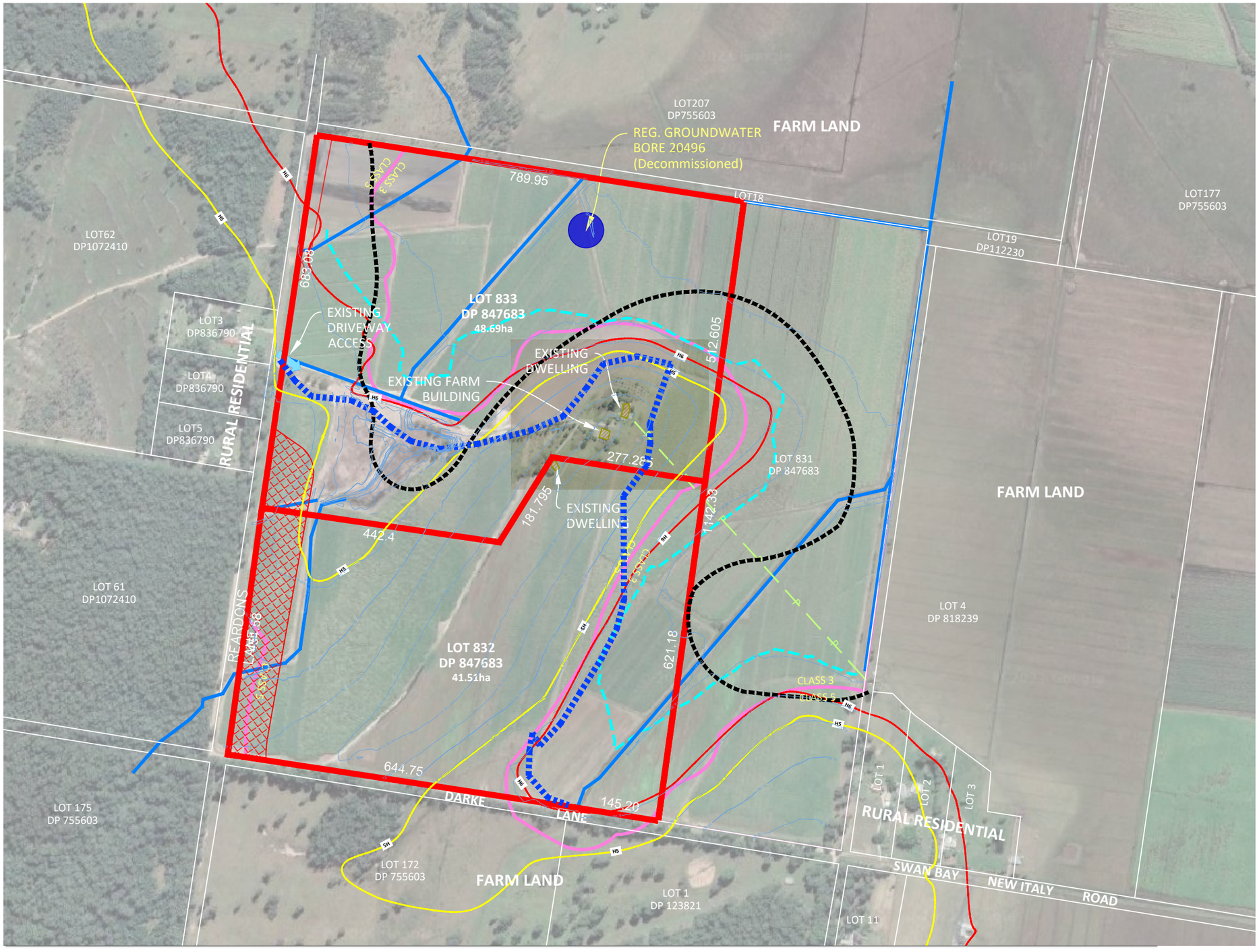
Newton Denny Chapelle
Surveyors Planners Engineers
Email: office@newtondennychapelle.com.au
LISMORE 31 Carrington St. Lismore 2480 PH: 6622 1011
CASINO 100 Barker St. Casino 2470 PH: 6662 5000
ABN: 86 220 045 469

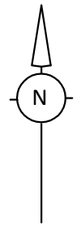
PLAN 2 - DETAIL SURVEY

CLIENT: N. NEWMAN

LOCATION: LOT 832 & 833 IN DP847683
REARDONS LANE
SWAN BAY NSW

DATE: 08.02.2022 REF: 14/227
SCALE: 1 : 7500 @ A3 DRAWN: CD





0 75 150 225 300 375

1cm = 75m
Scale 1:7500 (A3)

LEGEND

- CANE CROPS
- BUSHFIRE PRONE LAND
- REG GROUND WATER BORE
- POWER LINES
- APPROX. RL 5.4m AHD (1 IN 100 YEAR FLOOD LINE)
- ACID SULPHATE SOIL CLASS LINE
- DRAINAGE LINES (CANE DRAINS)
- EXISTING LOT BOUNDARY
- PRIME AGRICULTURAL LAND - CLASS 3
- REGIONALLY SIGNIFICANT FARMLAND
  SOURCE:
  Northern Rivers Farmland Protection Project
  Final Map 2005 (Section 117(2) Direction)
- CONTOURS

PROBABLE MAXIMUM FLOOD EVENT

- H5 - PEAK FLOOD HAZARD
- H6 - PEAK FLOOD HAZARD

NOTE:
This preliminary layout has been completed in accordance with the instructions provided by Mr Newman.
In this respect preliminary desktop data has been used to form this layout. The final layout is subject to the completion of a detailed survey & engineering plans. Accordingly, the conclusions reached within this report may be modified by the author upon the completion of the final design plans & site inspection. Newton Denny Chapelle accepts no responsibility for any loss or damage suffered, however so arising, to any person or corporation who may use or rely on this report.

REV	DATE	AMENDMENT
D	07/02/2022	RURAL RES. LINE ADDED
E	08/04/2024	LOT 831 REMOVED
F	26/08/2024	PEAK FLOOD HAZARD DETAILS ADDED
G		
H		
I		

SOURCE PLAN: www.maps.six.nsw.gov.au - accessed 02.07.14

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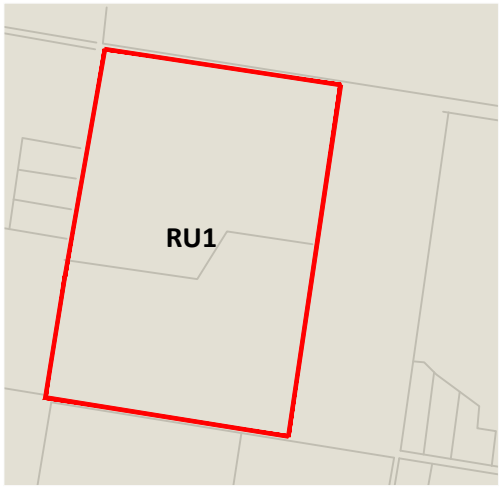
Newton Denny Chapelle
Surveyors Planners Engineers
Email: office@ndc.com.au
LISMORE 31 Carrington St. Lismore 2480 PH: 6622 1011
CASUARINA Shop 8/480 Casuarina Way. Casuarina 2487
ABN: 86 220 045 469

PLAN 3 - SITE ANALYSIS

CLIENT: N. NEWMAN REV F

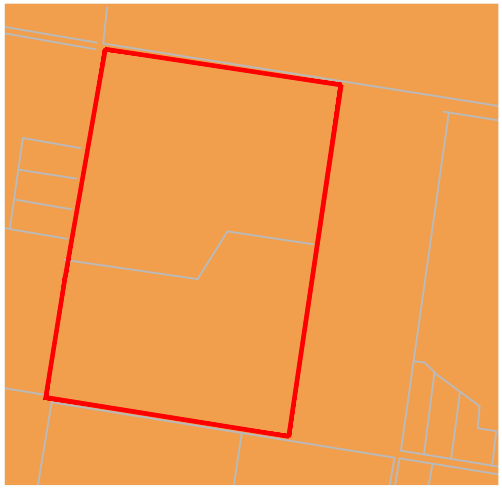
LOCATION: LOT 832 & 833 IN DP 847683
REARDONS LANE
SWAN BAY NSW

DATE: 08.02.2022 REF: 14/227
SCALE: 1 : 7500 @ A3 DRAWN: CD



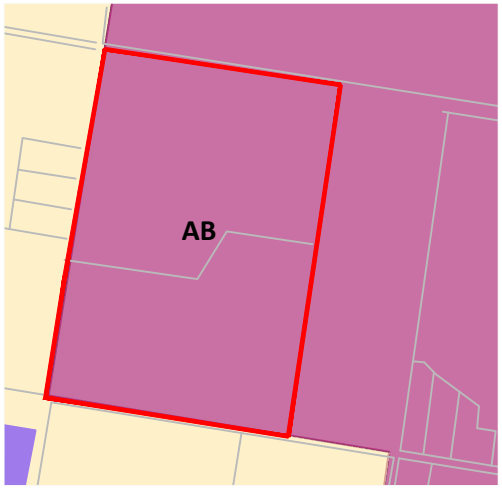
EXISTING LAND ZONING MAP

RU1 Primary Production



EXISTING DWELLING OPPORTUNITY

Dwelling Opportunity



EXISTING LOT SIZE MAP

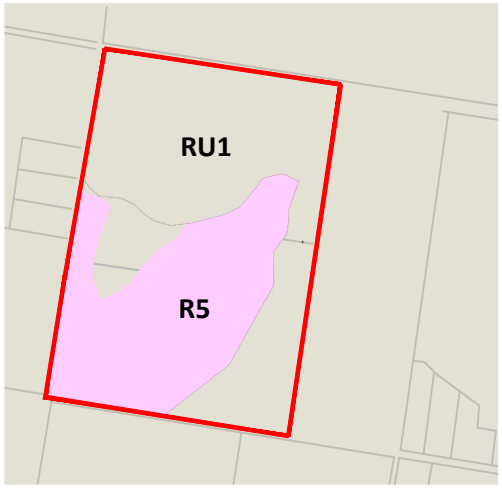
AB 40ha

RICHMOND VALLEY LOCAL ENVIRONMENTAL PLAN 2012 MAPPING

SITE BOUNDARY

SOURCE PLAN:
www.legislation.nsw.gov.au - accessed 17.12.15

- Lot size map - sheet LSZ- 009 & 010
- Land zoning map - sheet LSZ- 009 & 010
- Dwelling Opportunity map - sheet LSZ- 009 & 010

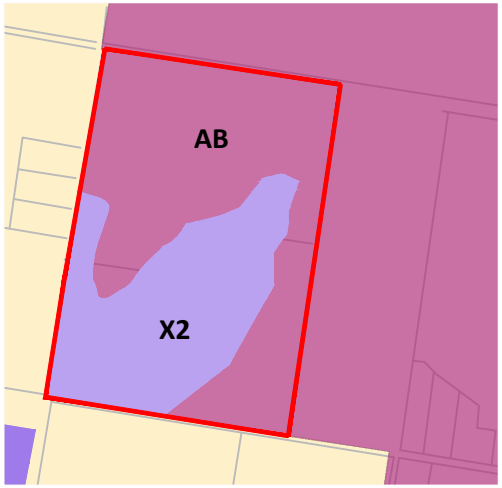


PROPOSED LAND ZONING MAP

RU1 Primary Production R5 Large Lot Residential

PROPOSED DWELLING OPPORTUNITY

Dwelling Opportunity



PROPOSED LOT SIZE MAP

X2 7000m² AB 40ha

REV	DATE	AMENDMENT
A	17/12/2015	
B	13/07/2016	ZONE BDY
C	08/02/2022	ZONE BDY UPDATED
D	08/04/2024	LOT 831 REMOVED
E	26/08/2024	ZONE BDY UPDATED

Newton Denny Chapelle
Surveyors Planners Engineers
Email: office@newtondennychapelle.com.au
LISMORE 31 Carrington St. Lismore 2480 PH: 6622 1011
CASINO 100 Barker St. Casino 2470 PH: 6662 5000
ABN : 86 220 045 469

PLAN 4 - LEP MAPPING

CLIENT: N. NEWMAN REV E

LOCATION: LOT 832 & 833 IN DP847683
REARDONS LANE
SWAN BAY NSW

DATE: 08.02.2022 REF: 14/227
SCALE: nts DRAWN: CD

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PLAN FORM 2

Plan Drawing only to appear in this space

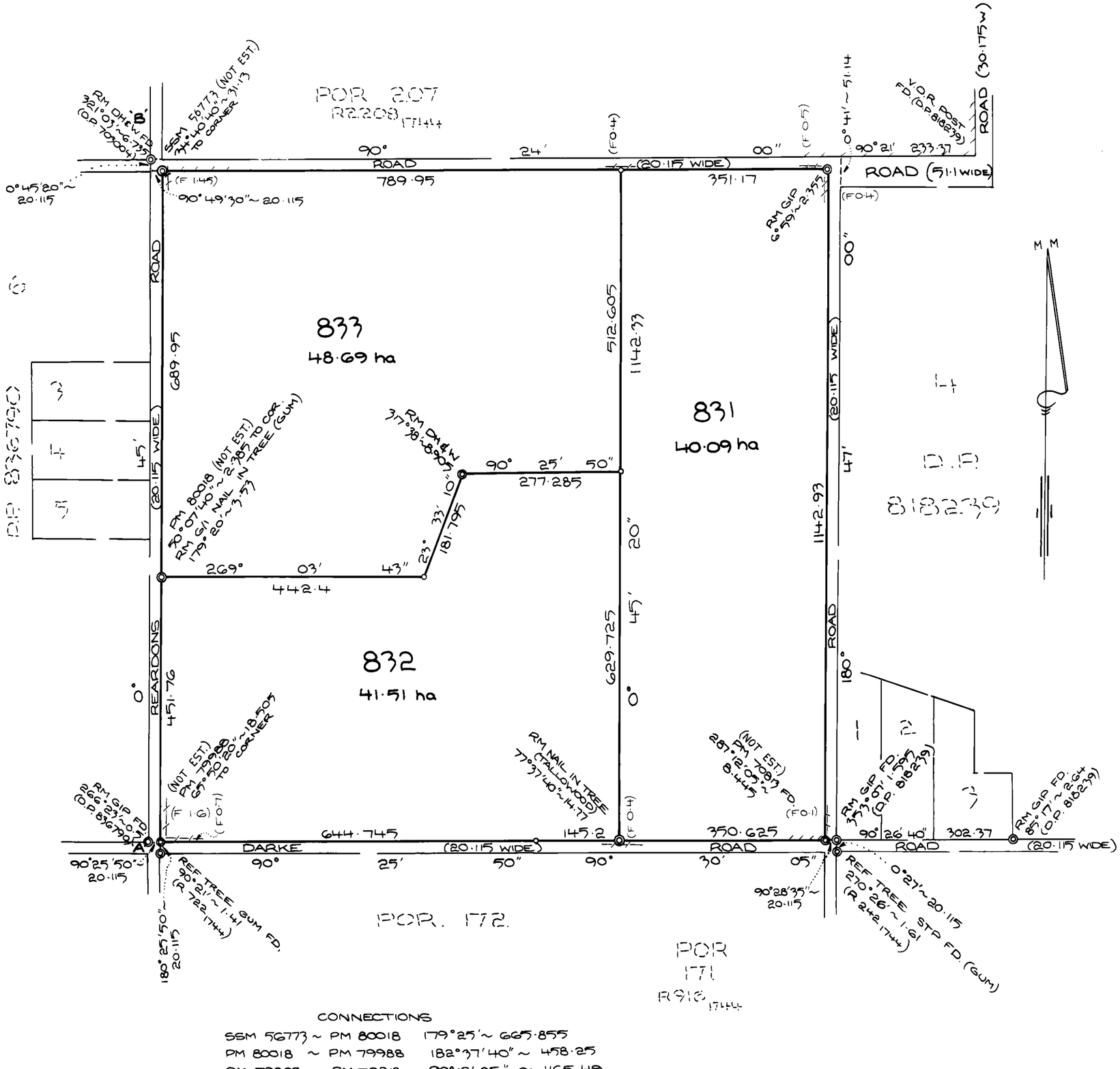
*OFFICE USE ONLY

DP 847683 *

SIGNATURE AND SEALS ONLY.

K. M. Boyce

K. M. Boyce



Registered: 10-3-1995

C.A.: Nº 25/1994 OF 17-10-1994

Title System: TORRENS

Purpose: SUBDIVISION

Ref. Map: PARISH *

Last Plan: R 242.1744

PLAN OF SUBDIVISION OF PORTION 83

Lengths are in metres. Reduction Ratio 1:5 000

LGA RICHMOND RIVER

Locality: SWAN BAY

Parish: BUNGAWALBIN

County: RICHMOND (G)

This is sheet 1 of my plan in ~~sheets.~~ (Delete if inapplicable).

I, ANTHONY JOHN DENNY OX7779

of WALKER & NEWTON 186 MOLES - WORTH ST LISMORE.

a surveyor registered under the Surveyors Act 1929, hereby certify that the survey represented in this plan is accurate, has been made in accordance with the Survey Practice Regulation 1990 and was completed on 15/7/1994

Signature A.J. Denny

Surveyor registered under Surveyors Act. 1929.

AZIMUTH 'A' ~ 'B'

Plans used in preparation of survey/~~compilation~~.

D.P. 596639	D.P. 703004
D.P. 340922	R 2208 1744
D.P. 829180	R 242 1744
D.P. 810497	R 891 1744
D.P. 836790	R 916 1744
D.P. 818239	

PANEL FOR USE ONLY for statements of intention to dedicate public roads, to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants.

P.M. STATUS CHECKED IN L.T.O. 6-3-1995 DATE

WOODINO

N 0 0 3 A I A

Crown Lands Office Approval

PLAN APPROVED .....
Authorised Officer

Land District .....

Paper No. .....

Field Book .....pages.....

Council's Certificate

I hereby certify that —

(a) the requirements of the Local Government Act, 1919 (other than the requirements for the registration of plans), and

*~~(b) the requirements of †Part 3 Division 2 of the Water Board Act 1987, or †Part 5 Division 7 of the Hunter Water Board (Corporatisation) Act 1991~~

have been complied with by the applicant in relation to the proposed SUBDIVISION (Insert 'new road', 'subdivision' or 'consolidated lot') set out herein

Subdivision No. 25/1994

Date 17th October, 1994

(Signature) .....
General Manager/~~Authorised Person~~

Council File No. 15-1-45 (D/A 58/92)

* This part of certificate to be deleted where the application is only for a consolidated lot or the opening of a new road or where the land to be subdivided is wholly outside the areas of operations of the Water Board and the Hunter Water Corporation Ltd.

† Delete if inapplicable.

SURVEYOR'S REFERENCE: 94/171 (CHECKLIST.)

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

Onsite Wastewater Land Capability Assessment

Planning Proposal for a 43 Lot Rural Residential Subdivision Lots 831,832 & 833 DP 847683 Reardon's Lane Swan Bay

HEALTH SCIENCE ENVIROMENTAL EDUCATION
ENVIRONMENTAL AUDITOR

Onsite Wastewater Land Capability Assessment

Planning Proposal for a 43 Lot Rural Residential Subdivision Lots 831,832 & 833 DP 847683 Reardon's Lane Swan Bay

Prepared for: Envirosafe Products Property Pty Ltd
Version: Final
Date: 10 February 2022
Job No. 90/2021_osms
Tim Fitzroy & Associates
ABN: 94120188829
ACN: 120188829

environmental

Tim Fitzroy

Environmental Health Scientist
Environmental Educator
Environmental Auditor

61 Pine Avenue
East Ballina NSW 2478
T | 02 6686 5183
M | 0448 483 837
tim@timfitzroy.com.au
www.timfitzroy.com.au

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1. Introduction

Tim Fitzroy & Associates has been engaged by Envirosafe Products Pty Ltd to undertake a Land Capability Assessment for on-site wastewater disposal to accompany for a potential future rural residential subdivision at Lots 831, 832 and 833, DP 847683 Reardons Lane Swan Bay. This report has been prepared to accompany a planning proposal to Richmond Valley Council.

The purpose of the Planning Proposal is to change the town planning provisions applying to Lots 831, 832, 833 DP 847683 to rezone part of the land presently zoned RU1 – Primary Production to R5 – Large Lot Residential in accordance with the provisions of the Richmond Valley Local Environmental Plan 2012. The Planning Proposal also seeks to amend the minimum lot size map to permit the creation of lots with minimum lot sizes of 0.75ha and 1.49ha within the area to be rezoned.

The land to which this Land Capability Assessment relates has an area of approximately 131 hectares and is located on the corner of Reardons Lane and Darke Lane Swan Bay. The bulk of the land is under sugar cane cultivation. A series of cane drains and road crisscross the site. Site improvements include two free standing dwellings and a series of sheds

The planning proposal and subsequent subdivision will result in the development of 43 rural residential allotments ranging in size from 0.75 to 1.49 hectares plus residual land.

The subject lands are adjoined by farmland to the north, east and south and rural residential properties to the west and south east. The two existing dwelling are serviced by a septic tank and absorption trenches.

This report:

- has been prepared in response to a request by Richmond Valley Council to provide a specialised report demonstrating the soil type and structure can support OSMS on smaller lots (< 1ha). RVC advised that it is generally required that OSMS proposed for the site aims to be of a 'low-tech' design to reduce the cost and ongoing difficulties which may be experience with maintaining 'higher-tech' systems.
- details the results of site inspection of the property undertaken by *Tim Fitzroy & Associates* 11 January 2017;
- provides a description of the site and its environs; and
- provides an assessment of the capacity of the proposed smaller lots (< 1ha) at the subject site to assimilate treated on-site site wastewater and
- identifies the pertinent issues to be considered for the installation of on-site wastewater management systems.

Conceptual On site wastewater have been developed in accordance with the Australian / New Zealand Standard™ *On-site Domestic Wastewater Management* (AS/NZS 1547:2012) and in consideration of the Richmond Valley Council's Onsite Sewage and Wastewater Management Strategy 2017. Designs have been prepared based on

either a three bedroom or a four bedroom dwelling house, a series of standard secondary treated wastewater systems for the proposed smaller lots (< 1ha).

2. Site Description

2.1 Site Description

The subject lands are described in Real Property terms as Lots 831, 832 and 833, DP 847683. The property has an area of approximately 131ha. The bulk of the land is under sugar cane cultivation. A series of cane drains and road crisscross the site. Site improvements include two free standing dwellings and a series of sheds.

The land is composed of three ridges with gentle slopes, one along Reardon's Lane, the second running roughly north-east through the centre of the proposed subdivision, and the third on the eastern boundary. An access road exists on this central ridge, from which the land slopes gently to the drainage lines to the east and west. Other than a Reardon's series of pine trees, the remaining land has been cleared and cultivated for growing sugar cane.

A site locality diagram shows the subject site is provided in **Illustration 2.1**. A proposed rural residential subdivision plan is located **Illustration 2.2**, while site photographs can be found in **Appendix A**.

2.2 Topography, Soils and Geology

The relief of the majority of the smaller allotments site varies between 14m and 8m AHD. Slopes on the site are in the range of 6% to 1%.

The site is mostly within the sedimentary landscape (Jurassic Walloon shales and sandstones) while the drainage lines in the north east corner in the lower area reflect Quaternary alluvial soil.

2.3 Groundwater

A search of Natural Resources Atlas of NSW (www.nratlas.nsw.gov.au) reveals that there Bore GW20496 on the subject site. Water bores immediately to the north are shown in **Illustration 2.3**. Bore GW20496 is in the Quaternary Alluvium with shallow groundwater while two other bores are in the sedimentary landscape have standing water at 6 – 8 m below the surface.

Discussions with the property owner Mr Noel Newman (pers. com 30 January 2017) confirmed that Bore GW20496 was decommissioned in 2002. Given the medium to heavy clays in the subsoil, low application of effluent in the surface soil the risk to groundwater contamination is negligible. A surface water storage captures runoff from the western portion of the subdivision and from the areas to the western side of Reardon's Land.

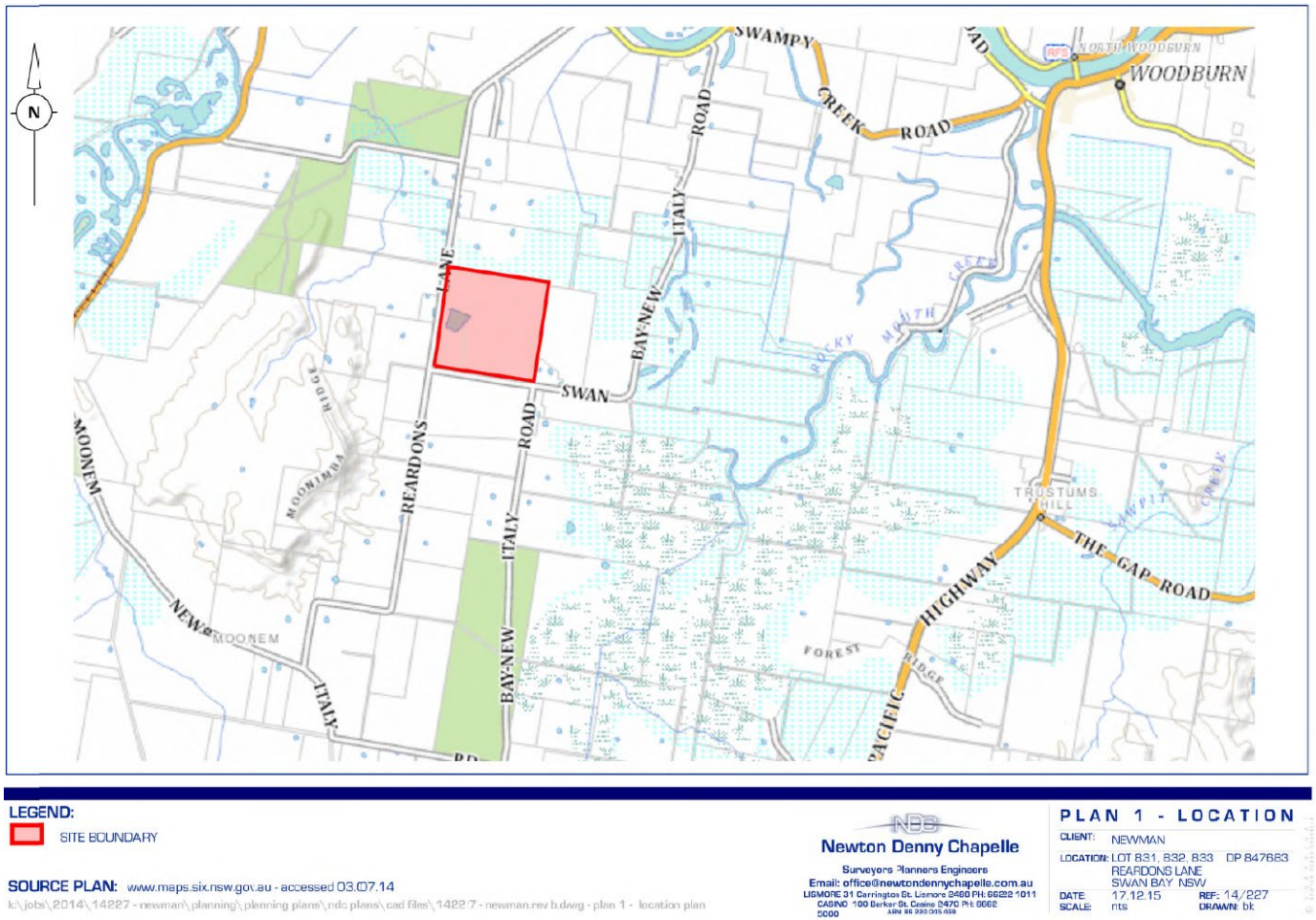
2.4 Environmentally Sensitive Area

The small dam along the western boundary could provide habitat for birds and aquatic species. As the soil around the dam is of a high clay content with exceptionally strong phosphorus sorption capacity, there is almost no risk of phosphorus leaching from the adjoining lots into the water.

Small amounts of nitrogen are not a concern as cyanobacteria have an ability to mobilise atmospheric nitrogen, and natural decomposition of grasses and aquatic plants contribute to nitrogen in the water column. The drainage lines are conduits off-site and setback distances of 10 metres from these channels are recommended. Again, the risk of phosphorus leaching is minute.

Water in the subsoil soils is so slow moving (lateral and vertical permeability) that the risk of pathogen transport is negligible, provided the effluent is discharged into the surface soil (loam).

Illustration 2.1 Site Locality Plan



2.5 Proposed Development

The proposed development would comprise of:

- 43 rural residential allotments (ranging from 0.75 to 1.49 hectares); and
- a residual lot.

The 43 rural residential lots will be Torrens title. A conceptual plan of the proposed sub division plan is provided in **Illustration 2.2**.

Illustration 2.2 Conceptual Subdivision Plan

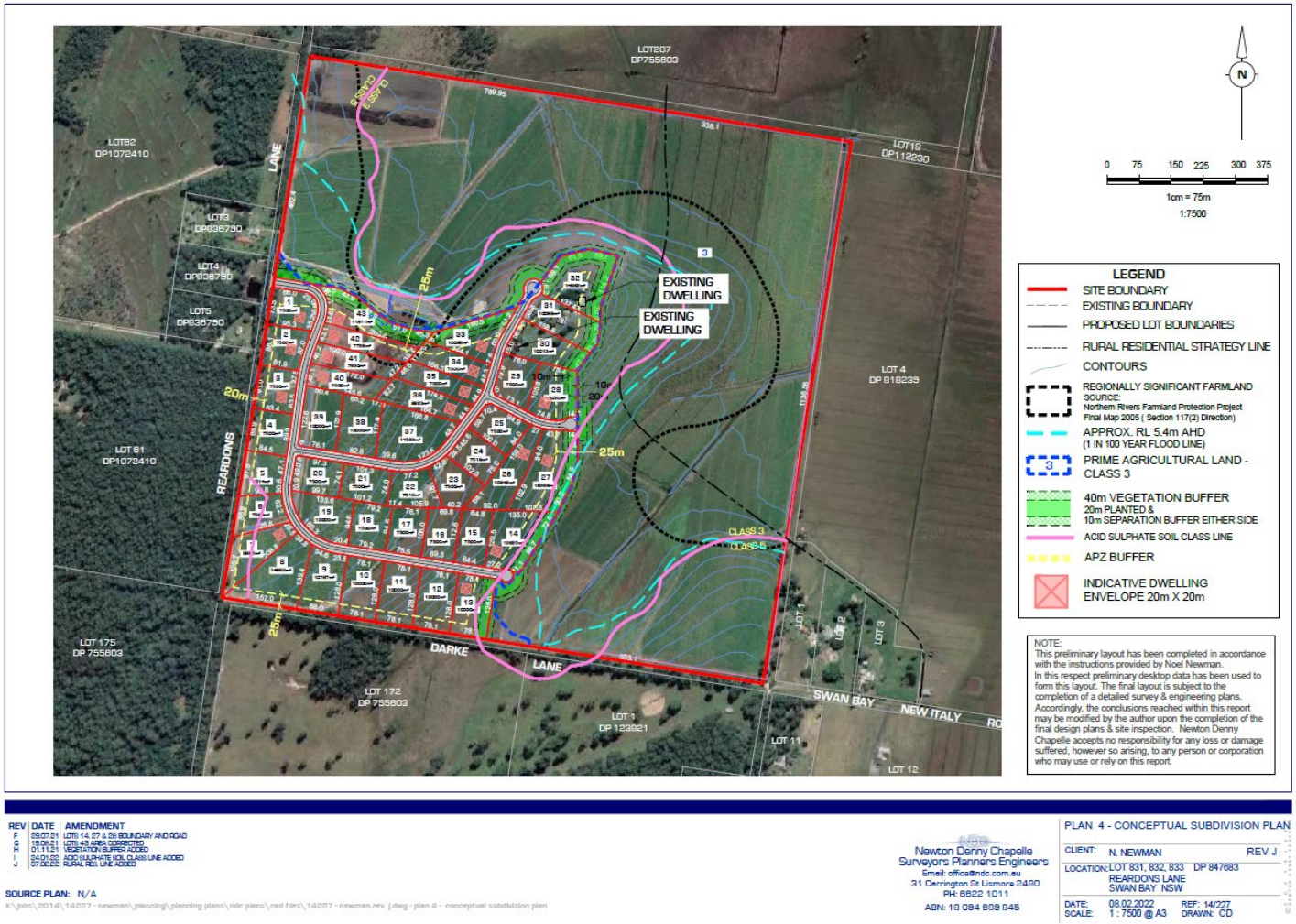


Illustration 2.3 **Groundwater Bores**

3. Site Soil Investigations

3.1 Site Inspection

3.1.1 Site Assessment

A s site assessment of the smaller lots (<1ha) was undertaken on 20 January 2017 by Tim Fitzroy. A site plan detailing the proposed lot layout is provided in **Illustration 2.1.**

A Site Analysis map including drainage features and the locations of surrounding registered groundwater bores is provided in **Appendix B**.

The subject land is characterised by gently sloping lands with slopes between 3% and 7 %, draining from higher landscape along the road easement towards the east. The land is primarily cultivated cane land, that has been extensively cleared and cultivated for many decades. There are no rocks or rocky outcrops visible on the subject land.

Drainage lines are predominantly surface drainage ditches – constructed for cane cultivation and designed to reduce the potential for the soils to remain saturated for long periods. There are no areas within the proposed subdivision that require protection for environmental values and future use as rural-residential will ultimately see increased tree and shrub cover from its current status.

A preliminary desktop study of the subject land incorporated an investigation of existing data on geology, groundwater, topography, aerial photography and climate data. A series of 7 boreholes were established with a small excavator site as typifying the topographical position in relation to soil profiles within the locations of the proposed smaller lots (<1ha) for the purpose of discharge of domestic wastewater by an appropriate means. The soil profiles were examined and samples taken for laboratory analysis. The locations of the pits are shown in **Illustration 3.1.**

Soil samples were:

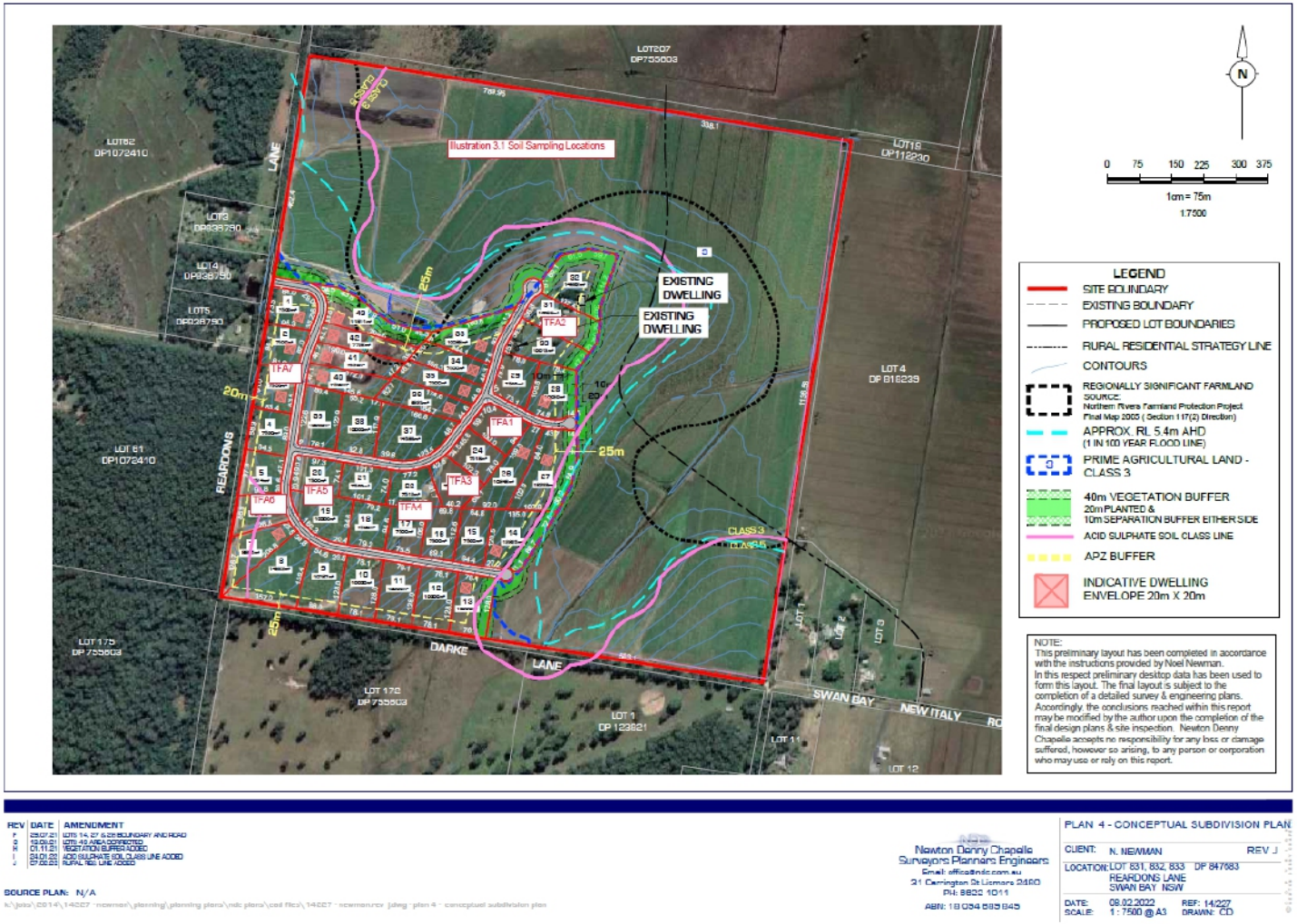
- collected from the A and B horizons to a depth of 1.2m below ground level; and
- analysed at the Environmental Analysis Laboratory Lismore for the following parameters:
    - moisture, pH(CaCl2), EC, Total Dissolved Salts (TDS) (calculation); Exchangeable Sodium, Potassium, Calcium, Magnesium, Aluminium, Hydrogen, Exchangeable Sodium Percentage, Cation Exchange Capacity; Phosphorus Sorption Capacity; Modified Emerson Aggregate Test (MEAT); Texture Full, bulk density and Sodicity

Table 3.1 details the site features assessed and the likely limitations for on-site wastewater disposal. There are no significant site limitations as detailed below.

Table 3.1 Site Assessment

Site Feature	Condition/Comments	Limitation
Climate	*Summer temperatures:* 17 – 29 °C *Winter temperatures:* 8 – 21 °C	none none
Slope Angle	Slopes on the site are in range of 3% to 9%.	none
Slope Shape	The slope shapes are generally concave.	none
Aspect	Varies from East to North to West	none
Exposure	Wind exposure will generally be good.	none
Boulders / Floaters / Rock Outcrops	Floaters or rock outcrops were not evident	none
Buffer Distances	*Permanent watercourses*: >100m *Intermittent watercourses:* >40m *Groundwater wells:* >250m (approx. 50m*) *Property boundaries, driveways and buildings:* >6m up-gradient and >12m down-gradient to existing infrastructure. *** Groundwater well was decommissioned in 2002 but remains on Office of Water data base**	none minor moderate pathogen die off calculation conducted none
Run-on and Upslope Seepage	run-on or seepage will not significantly impact the irrigation areas.	Minor ensure stormwater diversion provided above proposed dispersal areas
Flooding Potential	Flooding is not considered an issue due to the elevation of the smaller lots (<1ha).	none
Site Drainage	No visible signs of poor drainage were observed. The soil texture analysis indicates poor permeability	major
Vegetation indicating Waterlogging	No evidence in Land Application Areas	none
Fill	No evidence of fill onsite	none
Is there sufficient land area available for:	*Application systems (including buffer distances):* sufficient area is available for the proposed land application. *Reserve application system (including buffer distances):* sufficient area is available for a reserve application area.	none none
Erosion / Mass Movement	No evidence of mass movement or significant erosion was evident.	none

Illustration 3.1 Soil Sampling Locations



3.1.2 Soil Assessment

A total of 14 soil samples were obtained from test holes in the vicinity of the proposed small allotments (ranging from 0.75 to 1ha) at various locations across the subject site. Soils were obtained at various depths to approximately 1.2m deep for qualitative analysis.

The soils of the site are described as the Jurassic Walloon Coal Measures consisting of Shales, sandstones and coal. These soils are medium, silty and heavy clays.

Table 2 Soil Assessment

Soil Feature	Comments	Limitation
Soil structure	Strong to moderately structured	refer to features below
Soil texture	**TFA 1A – TFA 4A & TFA7A** Horizon A - Medium Clay **TFA 1B – TFA 4B & TFA7B** Horizon B – Heavy Clay **TFA5A & 5B** Horizon A - Heavy Clay Horizon B – Silty Clay **TFA6A & 6B** Horizon A - Heavy Clay Horizon B – Heavy Clay	refer to features below
Soil Colour	Dark brown topsoil and subsoil Yellow speckled	not applicable
Depth to bedrock or hardpan (m)	Estimated >1.2 metres	minor
Depth to high soil water table (m)	Estimated >5.0 metres	minor
Permeability category	Indicative permeability (K_{sat}) of 0.06-0.5m/day (Based on Table 5.1 in AS/NZS 1547:2012 for strongly structured medium to heavy clay soils)	major
Dispersiveness	Meat Emerson Aggregate Test Class 3 Non dispersive (see **Appendix C**)	minor
Hydraulic loading recommended for soil absorption system	15 mm/week DIR (based on Table 4.2A4 in AS/NZS 1547:2012 for strongly structured medium to heavy clay soils)	moderate
Coarse fragments (%)	Less than 10%,	minor

The soils are typically duplex in nature, that is predominately a medium clay horizon over a medium to heavy clay B horizon. The heavy clay texture of the B horizon makes the soil unsuitable for traditional trenches as the permeability is extremely low and effective drain fields would be in excess of 120 m making even distribution very difficult; consuming large areas of each lot for effluent disposal; and negating any potential for reuse of the effluent.

Fourteen soil horizons were sampled for chemical and physical properties and phosphorus sorption capacity. The results of those tests are tabled in **Appendix C**. Two examples of the soil profiles are given in **Appendix A.**

The soils are low in calcium, and generally slightly low in exchangeable sodium percentage (ESP) being below the ideal value of 6% in all but 2 samples. It should not be construed that because the ESP is in the main <6% that the soils are unsuitable for domestic effluent application since the levels of sodium are generally low and there is no dispersion in the soils. ESP in the surface soil is acceptable.

The surface soils are water stable (do not slake in water), and the subsoils slake slightly which is simply a reflection of the low organic matter at depth. Increasing the calcium in the soil by dressing with lime will not only add essential calcium to the soil but elevate the pH to more desirable levels around pH ca 6. The effluent irrigation area will need to be dressed with lime at the rate of about 0.5 kg/m2 at least every two years.

None of the soil horizons is saline and unlikely to lead to any detrimental increase in salinity because of the high clay content of the soil. It is expected that sufficient rainfall will leach salts from the root zone. Typical surface soil was a water stable medium clay, about 300 to 400 mm deep overlying medium/heavy clay subsoils. There was no well-defined A2 horizon in the soil profiles, although in places a shallow non-bleached A2 may have existed but its influence was considered negligible.

The subsoil was poorly structured to massive and expected permeability was very low. There was no indication of long term saturation in any horizon. Soil permeability was assessed from the field texture in accordance with AS/NZS 1547:2012. The soils were dried and sieved to minus 2 mm prior to testing.

The soil profiles were assessed as suitable only for surface or subsurface irrigation of effluent.

The phosphorus sorption capacity of the soil is extremely high. conservatively adopting a figure of 12,000kg/ha for P sorption and effluent produced at the rate of 1000 litres per day and a 15 mg/L phosphorus concentration over an area of 480 m2, the soil would take about 105 years to meet the soil's sorption capacity for that area. Thus, the potential loss of phosphorus from any of the lots is negligible.

The nitrogen loading from a septic tank + reedbed is about 20 mg/L. At the loading rates identified in eth model for a 3,4 and 5 bedroom dwelling over a 5,000m2 nitrogen is readily absorbed and is not a limiting factor for effluent dispersal

3.1.3 Flood Potential

The smaller allotments are to be located between 16 and 8 m AHD. All the smaller allotments are located above the 1:100 flood level.

3.1.4 Local Metrology

The average annual rainfall recorded at Ballina Weather Station is 1,742.2mm, with the highest rainfall falling in February to March, while the driest months are from August to October. Temperatures range from a lowest average minimum14.2 C to a highest average maximum of 24.4 C.

4. Wastewater Management

4.1 Wastewater Management

4.1.1 Overview

A conceptual onsite wastewater management system* has been prepared for each of the following future development scenarios at the subject site:

- A three bedroom dwelling;
- A four bedroom dwelling; and
- A five bedroom dwelling

*It is noted that allotments will be serviced by roof water supply. Onsite waste water hydraulic loadings are based on 120 litres per person per day which equates to roof water supply with standard water saving devices installed.

The conceptual onsite wastewater management system has been designed to achieve the following general objectives:

1. Protection of public health: applied effluent is to be assimilated in the soil profile and remain beneath the soil surface. No effluent resurfacing is to occur.
2. Ecologically Sustainable Beneficial Reuse: design is to maximise assimilation of nutrients and pathogens within the land applications areas.
3. Neutral or Beneficial Impact Test: design is to produce a sustainable net beneficial of neutral impact over the long term.

To achieve the objectives listed above, the following analyses have been completed:

1. Evaluation of predicted wastewater generation for the nominated scenarios;
2. Conceptual design of system to public health standards (AS/NZS 1547, 2000); NSW EPA (2005) and the Richmond Valley Council's Onsite Sewage and Wastewater Management Strategy;
3. Assessment of local site and soil conditions; and
4. Assessment of nutrient assimilation

4.1.2 Potential Secondary Treatment Systems

As required by RVC (2017) a minimum secondary treatment is required for new on site wastewater systems. RVC advised that it is generally required that OSMS proposed for the site aims to be of a 'low-tech' design to reduce the cost and ongoing difficulties which may be experience with maintaining 'higher-tech' systems.

Given the nature of the subsoil conditions and low tech options the following contemporary secondary treatment option have been included in the scenarios consisting of a:

- Baffled septic tank + outlet filter + reedbed + sub surface irrigation (septic tank sizes shown in Table 4.1)
- Baffled septic tank + outlet filter + sand filter+ sub surface irrigation (SSI)

Table 4.1 Septic Tank Sizes

	House Size		
	3 bedrooms	**4 bedrooms**	**5 bedrooms**
Septic tank size for combined grey/blackwater systems (Litres)	3,000	4,500	5,000

4.1.3 On site wastewater Modelling

Given the smaller lot sizes range from 7,500m^2 to 10,000m^2 a series of assessments of the required LAA's has been undertaken based on secondary treated effluent for two *average* lot sizes:

- 7,500 m^2
- 10,000 m^2

To assess the land capability to assimilate effluent on site each of the *lot size* scenarios have been assessed using Richmond Valley Council's OSMS Design Model (Disposal Area Calculator). The resultant LAA for each *average lot* when utilising one of the potential secondary treatment system and Compost with separate greywater treatment with are provided in **Table 4.2**.

Table 4.2 Wastewater Modelling

Dwelling	**Lot Size (m^2)**	**Treatment**	**LAA (m^2)**
3 bedrooms	7,500	St + rb + ssi	**277**
3 bedrooms	10,000	St + rb + ssi	**277**
3 bedrooms	7,500	CT + ST	**186**
3 bedrooms	10,000	CT + ST	**186**
4 bedrooms	7,500	St + rb + ssi	**369**
4 bedrooms	10,000	St +rb+ ssi	**369**
4 bedrooms	7,500	CT + ST	**247**
4 bedrooms	10,000	CT + ST	**247**
5 bedrooms	7,500	St + rb + ssi	**461**
5 bedrooms	10,000	St + rb + ssi	**461**
5 bedrooms	7,500	CT + ST	**309**
5 bedrooms	10,000	CT + ST	**309**

The results indicate, as expected, that there is sufficient land available on the proposed smaller lots utilising low tech secondary treated effluent to allow wastewater to be effectively assimilated on each of the nominated allotments.

As shown in Table 4.2 Land Application Areas for secondary treated effluent dispersal range for smaller lots (<1ha) range from:

- **277m^2 for a 3 bedroom dwelling; 369m^2 for a 4 bedroom dwelling to 461 m^2 for a 5 bedroom dwelling;**
- **and in the case of failure provides a sufficient reserve area for wastewater dispersal.**

For spilt blackwater/greywater systems utilising compost toilet and septic tanks for greywater treatment on smaller lots (<1ha) dispersal areas range from:

- **186m^2 for a 3 bedroom dwelling; 247m^2 for a 4 bedroom dwelling to 309 m^2 for a 5 bedroom dwelling**

Examples of the model outcomes are provided in **Appendix D**.

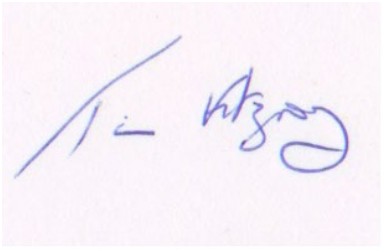
5 Conclusions and Recommendations

Based on the site and soil assessment and in consideration of

- Australian/New Zealand Standard 1547:2012;
- Richmond Valley Council's Onsite Sewage and Wastewater Management Strategy (2017); and
- Environment & Health Protection Guidelines *On-Site Sewage* Management for Single Households (1998)

it is our view that the proposed smaller allotments (7,500m2 to 10,000m2) at the subject site has the capacity to effectively assimilate low tech secondary effluent generated from 3, 4 and 5 bedroom dwellings.

This report has been prepared by Tim Fitzroy of *Tim Fitzroy & Associates.*



Tim Fitzroy
Environmental Health Scientist
Environmental Auditor

References

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RVC, 2017a. *On-site Sewage Management and Wastewater Management Strategy*. Richmond Valley Council. 2017.

RVC, 2017b. *Richmond Valley Council OSMS Design Model (Disposal Area Calculator)*.

DLG, 1998. *Environment and Health Protection Guidelines, On-site Sewage Management for Single Households*. Contributions from Department of Local Government, Environment Protection Authority, Department of Health, Department of Land and Water Conservation, and Department of Urban Affairs and Planning. February 1998.

Copyright and Usage

A Photographs

Photo 1 Looking east towards TFA6

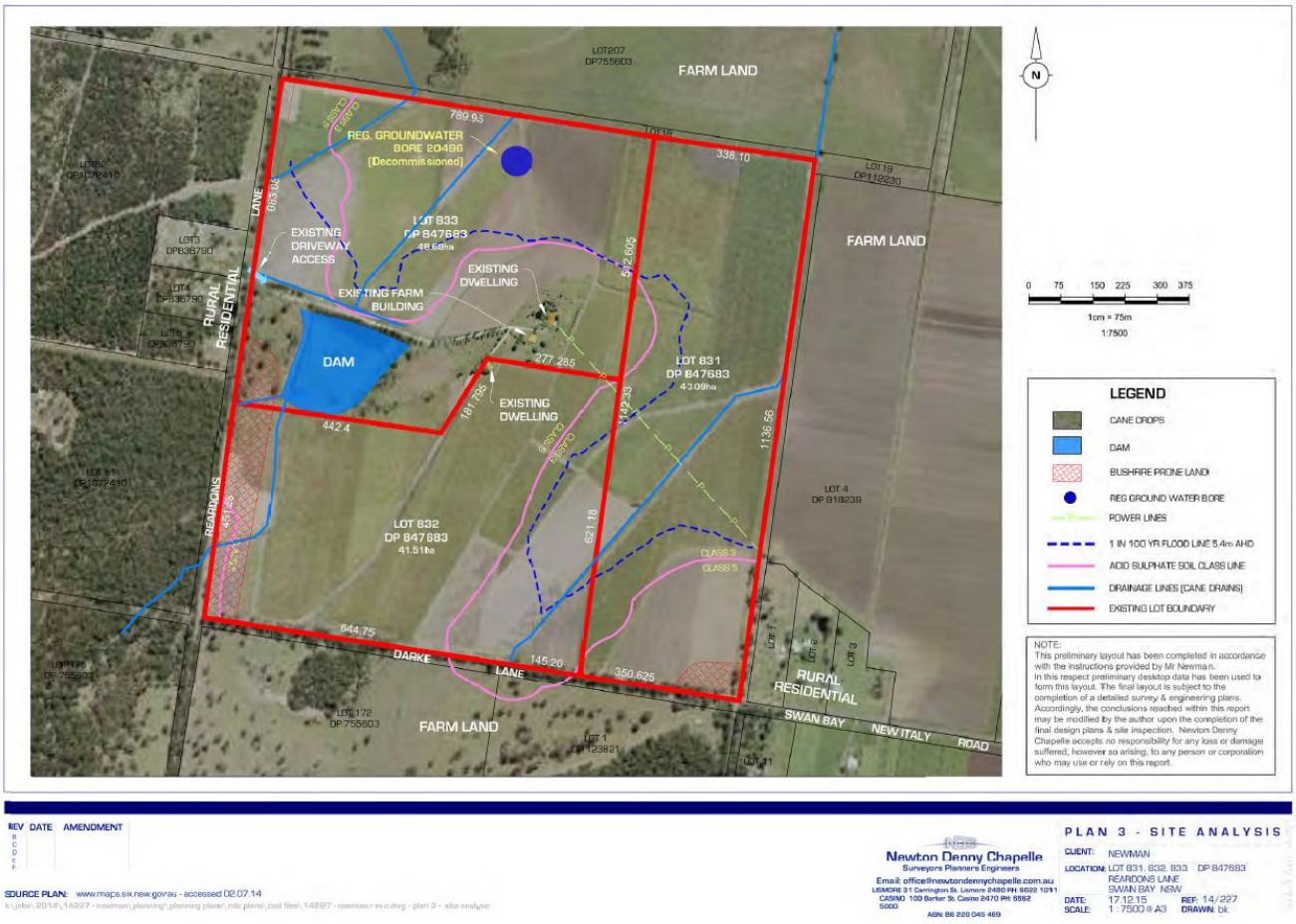
Photo 2 TFA 1 Excavation

Surface: 1-200mm, crumb to small sub-angular blocky, dull brown loam, non-saline, acid pH of low calcium and potassium, water stable aggregates, good permeability
B1 horizon: 200-500 mm, poor structure, no mottles, red clay loam,
B2 horizon: 500 - >1000, poorly structured to massive, brown medium clay of moderate bulk density (1270 kg/m3), , extremely low calcium, some yellow colours from geology, some red and grey mottles, poor permeability
No water in hole

Photo 3 TFA 3 Excavation

Surface: 1-200mm, crumb to small sub-angular blocky, dull brown loam, non-saline, acid pH of low calcium and potassium, water stable aggregates, good permeability
B1 horizon: 200-500 mm, poor structure, no mottles, dull brown, clay loam,
B2 horizon: 500 - >1000, poorly structured to massive, brown medium clay of moderate bulk density (1270 kg/m3), , extremely low calcium, some yellow colours from geology, some red and grey mottles, poor permeability
No water in hole

B Site Analysis Plan



C Laboratory Results

WASTEWATER DISPOSAL SOIL ASSESSMENT

14 samples supplied by Tim Fitzroy & Associates on 11th January, 2017 - Lab Job No. F5991
Analysis requested by Tim Fitzroy. - **Your Project: 70/2016 Newman Swan Bay**
(52 Alston Ave ALSTONVILLE NSW 2477).

	SITE 1 TFA 1A	SITE 2 TFA 1B	SITE 3 TFA 2A	SITE 4 TFA 2B	SITE 5 TFA 3A	SITE 6 TFA 3B	SITE 7 TFA 4A	SITE 8 TFA 4B	SITE 9 TFA 5A	SITE 10 TFA 5B	SITE 11 TFA 6A	SITE 12 TFA 6B	SITE 13 TFA 7A	SITE 14 TFA 7B
Job No.	*F5991/1*	*F5991/2*	*F5991/3*	*F5991/4*	*F5991/5*	*F5991/6*	*F5991/7*	*F5991/8*	*F5991/9*	*F5991/10*	*F5991/11*	*F5991/12*	*F5991/13*	*F5991/14*
Description	Medium Clay	Medium Clay	Medium Clay	Heavy Clay	Medium Clay	Heavy Clay	Medium Clay	Heavy Clay	Heavy Clay	Silty Clay	Heavy Clay	Heavy Clay	Medium Clay	Heavy Clay
Moisture Content (% moisture)	17	20	25	26	21	25	20	22	23	33	22	19	23	21
Lab. Bulk Density (tonne/m3)	1.18	1.08	1.06	1.11	1.14	1.22	1.12	1.33	1.25	0.86	1.40	1.19	1.27	1.39
Modified Emerson Aggregate Test (SAR 5 Solution) note 12	MEAT Class 3 note 12	MEAT Class 3 note 12	MEAT Class 3 note 12	MEAT Class 3 note 12	MEAT Class 3 note 12	MEAT Class 3 note 12	MEAT Class 3 note 12	MEAT Class 3 note 12	MEAT Class 3 note 12	MEAT Class 3 note 12	MEAT Class 3 note 12	MEAT Class 3 note 12	MEAT Class 3 note 12	MEAT Class 3 note 12
Soil pH (1:5 $CaCl_2$)	4.39	4.12	4.71	3.93	4.19	3.87	4.38	3.92	3.90	5.77	4.71	4.72	4.25	3.82
Soil Conductivity (1:5 water dS/m)	0.034	0.030	0.029	0.033	0.026	0.052	0.026	0.046	0.073	0.179	0.669	0.068	0.036	0.042
Soil Conductivity (as EC_e dS/m) note 10	0.292	0.258	0.249	0.284	0.224	0.447	0.224	0.396	0.628	1.539	5.753	0.585	0.310	0.361
Native NaOH Phosphorus (mg/Kg P)	26	5	34	4	18	4	17	2	3	776	3	32	15	6

Residual phosphorus remaining in solution from the initial phosphate phosphorus														
Initial Phosphorus concentration (ppm P)	30	30	30	30	30	30	30	30	30	30	30	30	30	30
72 hour - 3 Day (ppm P)	7.32	11.76	6.58	3.79	4.26	5.60	5.90	7.20	9.84	19.78	13.25	18.76	10.60	12.63
120 hour - 5 Day (ppm P)	6.93	11.19	6.28	3.10	4.00	5.20	5.37	6.64	9.62	19.54	13.21	18.67	10.15	12.01
168 hour - 7 Day (ppm P)	4.38	10.43	5.58	3.22	3.52	4.91	5.33	6.46	9.28	17.87	11.86	18.25	9.69	11.56
Equilibrium Phosphorus (ppm P)	3.23	9.66	5.08	2.61	3.13	4.45	4.82	5.88	8.97	17.13	11.41	18.04	9.13	10.84

EXCHANGEABLE CATIONS														
Calcium (cmol+/Kg)	1.65	0.20	3.11	0.31	2.03	0.51	2.32	0.18	0.07	7.63	2.68	2.86	1.14	0.19
kg/ha	739	90	1393	139	909	228	1039	81	31	3418	1201	1281	511	85
mg/kg	330	40	622	62	406	102	464	36	14	1526	536	572	228	38
Magnesium (cmol+/Kg)	1.67	2.58	2.29	2.60	1.91	3.79	1.88	4.37	3.03	5.71	10.56	4.08	1.58	6.43
kg/ha	456	705	626	711	522	1036	514	1194	828	1560	2886	1115	432	1757
mg/kg	204	315	279	317	233	462	229	533	370	697	1288	498	193	784
Potassium (cmol+/Kg)	0.19	0.06	0.13	0.10	0.13	0.18	0.12	0.17	0.11	1.34	0.20	0.24	0.11	0.15
kg/ha	166	52	114	87	114	157	105	149	96	1171	175	210	96	131
mg/kg	74	23	51	39	51	70	47	66	43	523	78	94	43	59
Sodium (cmol+/Kg)	0.17	0.28	0.26	0.67	0.40	1.18	0.28	1.03	1.09	0.49	4.53	0.49	0.35	2.19
kg/ha	88	144	134	345	206	608	144	531	562	252	2334	252	180	1128
mg/kg	39	64	60	154	92	271	64	237	251	113	1042	113	81	504
Aluminium (cmol+/Kg)	1.82	6.81	0.96	9.56	5.40	16.29	3.02	14.94	13.53	0.40	0.91	0.71	3.18	11.54
kg/ha	367	1373	194	1927	1089	3284	609	3012	2728	81	183	143	641	2326
mg/kg	164	613	86	860	486	1466	272	1345	1218	36	82	64	286	1039
Hydrogen (cmol+/Kg)	0.74	3.20	0.21	3.27	0.97	0.00	0.72	0.00	0.00	0.00	1.12	0.43	1.29	8.93
kg/ha	17	72	5	73	22	0	16	0	0	0	25	10	29	200
mg/kg	7	32	2	33	10	0	7	0	0	0	11	4	13	89
ECEC (effective cation exchange capacity)(cmol+/Kg)	6.2	13.1	7.0	16.5	10.8	22.0	8.3	20.7	17.8	15.6	20.0	8.8	7.7	29.4
Exchangeable Calcium %	26.4	1.5	44.7	1.9	18.7	2.3	27.8	0.9	0.4	49.0	13.4	32.5	14.9	0.6
Exchangeable Magnesium %	26.8	19.6	32.9	15.7	17.6	17.3	22.5	21.1	17.0	36.7	52.8	46.3	20.7	21.8
Exchangeable Potassium %	3.0	0.5	1.9	0.6	1.2	0.8	1.4	0.8	0.6	8.6	1.0	2.7	1.4	0.5
Exchangeable Sodium % (ESP)	2.7	2.1	3.7	4.1	3.7	5.4	3.4	5.0	6.1	3.1	22.7	5.6	4.6	7.4
Exchangeable Aluminium %	29.2	51.9	13.8	57.9	49.8	74.2	36.2	72.2	75.9	2.6	4.6	8.1	41.6	39.2
Exchangeable Hydrogen %	11.9	24.4	3.0	19.8	8.9	0.0	8.6	0.0	0.0	0.0	5.6	4.9	16.9	30.3
Calcium/ Magnesium Ratio	0.99	0.08	1.36	0.12	1.06	0.13	1.23	0.04	0.02	1.34	0.25	0.70	0.72	0.03

Notes:
1: ECEC = Effective Cation Exchange Capacity = sum of the exchangeable Mg, Ca, Na, K, H and Al
2: Exchangeable bases determined using standard Ammonium Acetate extract (Method 15D3) with no pretreatment for soluble salts. When Conductivity ≥0.25 dS/m soluble salts are removed (Method 15E2).
3. ppm = mg/Kg dried soil
4. Inattu P determined using 0.1 M NaOH and shaking for 24 hrs before determining phosphate
5. Soils were crushed using a ceramic grinding head and mill; five 1g subsamples of each soil were used to which 40ml of 0.1M NaCl with Xppm phosphorus was added to each. The samples were shaken on an orbital shaker
6. Exchangeable sodium percentage (ESP) is calculated as sodium (cmol+/Kg) divided by ECEC
7. All results as dry weight DW - soils were dried at 60C for 48hrs prior to crushing and analysis.
8. Phosphorus Capacity method from Ryden and Pratt, 1980.
9. Aluminium detection limit is 0.05 cmol+/Kg; Hydrogen detection limit is 0.1 cmol+/Kg. However for calculation purposes a value of 0 is used.
10. For conductivity 1 dS/m = 1 mS/cm = 1000 µS/cm; EC_e conversions: sand loam 14, loam 9.5; clay loam 8.6; heavy clay 5.8
11. 1 cmol+/Kg = 1 meq/100g
12. MEAT Method from On-site Sewage Management Guidelines using the SAR5 solution. **MEAT Class 1:** Worked bolus material disperses; **Class 2:** Aggregates disperse (cloud solution); **Class 3:** Aggregates slake; **Class 4:** No change to aggregate- non-dispersive.

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....

D Examples of Modelling Scenarios

	RVC On-site Wastewater Model (Single Rural Households) OSmodel170115.xls *Printed 20-12-2021*	Default	User-defined
Client	Envirosafe		
Address	Reardons Lane Swan Bay		
Site	Block size (m2)		7,500
	Buffer (m) from land application area t stream	>100	
	Water (L/p.d) from Roof water harvesting	120	
	Persons		7.5
	☐ Internal wastewater sources split? ☐ Multiple households? How many?		
Wastewater components/system	Toilet ☑		
	Bathroom ☑		
	Laundry ☑		
	Kitchen ☑		
	Total wastewater flow (L/d) [needs caution if user-defined]	900	
Treatment system	Secondary: Reed bed - BOD 20mg/L		
	Nitrogen removal %	68%	
	Wetted depth of reed bed (m)	0.5	
	Maximum N allowed to go down from system (kg/yr)	15.00	
Land application	Land application type Subsurface drip irrigation		
	Design depth of root zone (mm)	300	
Soil information	Morand code (examples) Duplex Soils= ck		
	Phosphorus sorption (kg/ha.m)	8000	
	Depth to water table or bedrock (for P calcs) (m)		3
	Texture/structure Med. to heavy clays - strong. Structure		
	DIR (mm/d)	3.875	
Area calculations	Hydraulic area (m2) (or override with SSI industry estimate)	460.3	
	Nitrogen area (m2) [allowing export of 13.42 kg/yr]	0.0	
	Phosphorus area (m2)	92.9	
	Required land application area (m2)	**460.3**	
	Reed bed area (m2) and HRT (d)	29.3	6.5
	Reed bed outlet BOD (mg/L and TN% removal	≤20.0	68.0%

RVC On-site Wastewater Model (Single Rural Households) OSmodel170115.xls
Printed 20-12-2021

		Default	User-defined
Client	Envirosafe		
Address	Reardons Lane Swan Bay		
Site	Block size (m2)		7,500
	Buffer (m) from land application area t stream	>100	
	Water (L/p.d) fron Roof water harvesting	120	
	Persons		6
	☐ Internal wastewater sources split? ☐ Multiple households? How many?		
Wastewater components/system	Toilet ☐		
	Bathroom ☑		
	Laundry ☑		
	Kitchen ☑		
	Total wastewater flow (L/d) [needs caution if user-defined]	489.6	
Treatment system	Secondary: Reed bed - BOD 20mg/L		
	Nitrogen removal %	56%	
	Wetted depth of reed bed (m)	0.5	
	Maximum N allowed to go down from system (kg/yr)	15.00	
Land application	Land application type Subsurface drip irrigation		
	Design depth of root zone (mm)	300	
Soil information	Morand code (examples) Duplex Soils= ck		
	Phosphorus sorption (kg/ha.m)	8000	
	Depth to water table or bedrock (for P calcs) (m)		3
	Texture/structure Med. to heavy clays - strong. Structure		
	DIR (mm/d)	3.875	
Area calculations	Hydraulic area (m2) (or override with SSI industry estimate)	246.8	
	Nitrogen area (m2) [allowing export of 13.42 kg/yr]	0.0	
	Phosphorus area (m2)	44.6	
	Required land application area (m2)	**246.8**	
	Reed bed area (m2) and HRT (d)	11.9	4.8
	Reed bed outlet BOD (mg/L and TN% removal	≤20.0	56.2%

	RVC On-site Wastewater Model (Single Rural Households) OSmodel170115.xls *Printed 20-12-2021*	Default	User-defined
Client	Envirosafe		
Address	Reardons Lane Swan Bay		
Site	Block size (m2)		7,500
	Buffer (m) from land application area t stream	>100	
	Water (L/p.d) from Roof water harvesting	120	
	Persons		7.5
	☐ Internal wastewater sources split? ☐ Multiple households? How many?		
Wastewater components/system	Toilet ☐		
	Bathroom ☑		
	Laundry ☑		
	Kitchen ☑		
	Total wastewater flow (L/d) [needs caution if user-defined]	612	
Treatment system	Secondary: Reed bed - BOD 20mg/L		
	Nitrogen removal %	56%	
	Wetted depth of reed bed (m)	0.5	
	Maximum N allowed to go down from system (kg/yr)	15.00	
Land application	Land application type Subsurface drip irrigation		
	Design depth of root zone (mm)	300	
Soil information	Morand code (examples) Duplex Soils= ck		
	Phosphorus sorption (kg/ha.m)	8000	
	Depth to water table or bedrock (for P calcs) (m)		3
	Texture/structure Med. to heavy clays - strong. Structure		
	DIR (mm/d)	3.875	
Area calculations	Hydraulic area (m2) (or override with SSI industry estimate)	308.5	
	Nitrogen area (m2) [allowing export of 13.42 kg/yr]	0.0	
	Phosphorus area (m2)	55.7	
	Required land application area (m2)	**308.5**	
	Reed bed area (m2) and HRT (d)	14.8	4.8
	Reed bed outlet BOD (mg/L and TN% removal	≤20.0	56.2%

	RVC On-site Wastewater Model (Single Rural Households) OSmodel170115.xls *Printed 20-12-2021*	Default	User-defined
Client	Envirosafe		
Address	Reardons Lane Swan Bay		
Site	Block size (m2)		10,000
	Buffer (m) from land application area t stream	>100	
	Water (L/p.d) from Roof water harvesting	120	
	Persons		7.5
	☐ Internal wastewater sources split? ☐ Multiple households? How many?		
Wastewater components/system	Toilet ☑		
	Bathroom ☑		
	Laundry ☑		
	Kitchen ☑		
	Total wastewater flow (L/d) [needs caution if user-defined]	900	
Treatment system	Secondary: Reed bed - BOD 20mg/L		
	Nitrogen removal %	68%	
	Wetted depth of reed bed (m)	0.5	
	Maximum N allowed to go down from system (kg/yr)	15.00	
Land application	Land application type Subsurface drip irrigation		
	Design depth of root zone (mm)	300	
Soil information	Morand code (examples) Duplex Soils= ck		
	Phosphorus sorption (kg/ha.m)	8000	
	Depth to water table or bedrock (for P calcs) (m)		3
	Texture/structure Med. to heavy clays - strong. Structure		
	DIR (mm/d)	3.875	
Area calculations	Hydraulic area (m2) (or override with SSI industry estimate)	460.3	
	Nitrogen area (m2) [allowing export of 14.25 kg/yr]	0.0	
	Phosphorus area (m2)	92.9	
	Required land application area (m2)	**460.3**	
	Reed bed area (m2) and HRT (d)	29.3	6.5
	Reed bed outlet BOD (mg/L and TN% removal	≤20.0	68.0%

	RVC On-site Wastewater Model (Single Rural Households) OSmodel170115.xls *Printed 20-12-2021*	Default	User-defined
Client	Envirosafe		
Address	Reardons Lane Swan Bay		
Site	Block size (m2)		10,000
	Buffer (m) from land application area t stream	>100	
	Water (L/p.d) from Roof water harvesting	120	
	Persons		6
	☐ Internal wastewater sources split? ☐ Multiple households? How many?		
Wastewater components/system	Toilet ☐		
	Bathroom ☑		
	Laundry ☑		
	Kitchen ☑		
	Total wastewater flow (L/d) [needs caution if user-defined]	489.6	
Treatment system	Secondary: Reed bed - BOD 20mg/L		
	Nitrogen removal %	56%	
	Wetted depth of reed bed (m)	0.5	
	Maximum N allowed to go down from system (kg/yr)	15.00	
Land application	Land application type Subsurface drip irrigation		
	Design depth of root zone (mm)	300	
Soil information	Morand code (examples) Duplex Soils= ck		
	Phosphorus sorption (kg/ha.m)	8000	
	Depth to water table or bedrock (for P calcs) (m)		3
	Texture/structure Med. to heavy clays - strong. Structure		
	DIR (mm/d)	3.875	
Area calculations	Hydraulic area (m2) (or override with SSI industry estimate)	185.1	
	Nitrogen area (m2) [allowing export of 14.25 kg/yr]	0.0	

	Phosphorus area (m2)	44.6	
	Required land application area (m2)	**185.1**	
	Reed bed area (m2) and HRT (d)	11.9	4.8
	Reed bed outlet BOD (mg/L and TN% removal	≤20.0	56.2%

Bushfire Certifiers

t: 02 6687 7461
f: 02 6687 6295

4/57 Ballina Street / PO Box 375
Lennox Head NSW 2478

info@bushfirecertifiers.com.au
www.bushfirecertifiers.com.au

ABN: 95 104 451 210
BCA Check Pty Ltd trading as Bushfire Certifiers

BUSH FIRE ASSESSMENT REPORT

PROPOSED REZONING

Lot 831, 832 & 833 DP 847683

395 Reardons Lane, Swan Bay

Prepared for: Mr Noel Newman

Date: 8 December 2021

Reference: 21/231 amended

BCA Check Pty Ltd t/as Bushfire Certifiers
4/47A Ballina Street Lennox Head NSW 2478
PO Box 375 LENNOX HEAD NSW 2478

ABN 95104451210
T: 02 66877461, F: 02 66876295, E: info@bcacheck.com.au

Peter Thornton MFireSafeEng
Principal
BPAD-L3 Accredited Practitioner No. 14867

DOCUMENT				
Revision	**Date**	**Description**	**Prepared**	**Authorised**
A	01.12.2021	Draft rezoning report	Peter Thornton	Peter Thornton
B	08.12.2021	Final rezoning report	Peter Thornton	Peter Thornton
C	12.02.2022	Slight plan amendment.	Peter Thornton	Peter Thornton

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Bushfire Certifiers have been engaged to prepare a bushfire assessment report for the proposed rezoning of existing agricultural land at Lot 831, 832 and 833 DP 847683, 395 Reardons Lane, Swan Bay for purposes of a future residential subdivision.

The assessment has been undertaken in accordance with Planning for Bushfire Protection 2019 (PBP2019). The study will be used to establish the site is suitable for residential rezoning, and has been prepared for referral and consultation with the NSW Rural Fire Service as a means of demonstrating compliance with the *Environment Planning and Assessment Act 1979* Section 9.1, Ministerial Direction 4.4, and Planning for Bush Fire Protection 2019.

The Study has determined the proposed rezoning is appropriate in the bush fire hazard context. Bush fire mitigation and management measures for the future development can be adequately addressed, subject to the recommendations within this report, with the proposal having the ability to comply with PBP2019.

The indicative allotment layout with proposed minimum lot sizes are considered appropriate to accommodate the required Asset Protection Zones (APZ's) and access requirements subject to the performance solutions within this report for residential dwellings within the future subdivision.

The assessment of the existing public road network for emergency access and egress from the subdivision does not form part of our professional expertise, as this information would be provided via a traffic report. In this regard a recommendation has been made for a qualified and experienced person to assess the capabilities of the existing public road network (traffic report), it being noted that an additional emergency access/egress point will be required onto Reardons Lane with the alternate emergency route to be via Darkes Lane or another alternate egress/access route.

The indicative subdivision layout provides for 43 residential lots ranging from 7500m^2 and a large residual lot currently supporting sugar cane plantation.

A number of bushfire planning controls have been recommended to reduce the risk from bushfire attack to an appropriate level having regard to the proposed development and the nature of the locality. The bushfire assessment assumes the Fire Danger Rating (FDI) of 80 for the subject property in accordance with PBP 2019 and AS 3959-2018 for future non-special fire protection development with exception to some variations in Table 6.8b PBP2019 e.g. B&B's. The rezoning report provides recommendations to demonstrate the

land can meet the bushfire prevention measures of PBP 2019 and Ministerial Direction 4.4, with recommendations including-

- Setbacks from bushfire hazard vegetation (Asset Protection Zones).
- Fuel management within APZ's.
- Access and egress from the proposed allotments via an appropriate well designed road system to support evacuation and fire fighting demands.
- Underground electricity and gas services.
- Compliant water supplies.

Further bushfire assessment will be required at the time of development application for subdivision to accurately determine required APZ's, road requirements, and landscaping provisions to achieve compliance with standards for subdivisions in NSW given there may be opportunities to provide performance solutions to arrive at varied acceptable outcomes. A summary of the strategic bushfire study is provided in Table 1.

Table 1: Summary Strategic Bush Fire Study (Table 4.2.1 PBP 2019).

ISSUE	DETAIL	ASSESSMENT CONSIDERATIONS	COMMENT
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.	The bush fire hazard in the surrounding area, including vegetation, topography and weather.	Addressed in bushfire report. Minimum required APZ setbacks capable of complying with PBP2019. Rezoning suitable.
		The potential fire behaviour that might be generated based on the above.	Addressed in bushfire report. Rezoning suitable.
		History of bush fire in the area.	The area has a history of bushfires although specific information not available at the time of reporting. Rezoning suitable.
		Potential fire runs into the site and the intensity of such fire runs.	The fire runs from the west and south through forest are extensive. Existing public roads act like perimeter roads for access to the hazard. Intermittent sugar cane growth and some minor land use conflict planting proposed

			having minimum fire runs to the east and north. Fire intensity will not be as significant as from the potential forest fires from the west and south. Adequate setbacks and access have been demonstrated in the report to comply with the performance criteria of PBP2019. Rezoning suitable.
		The difficulty in accessing and suppressing a fire, the continuity of bush fire hazards or the fragmentation of landscape fuels and the complexity of the associated terrain.	Existing public roads provide access to the forest bushfire hazard allowing to opportunity to back burn if safe to do so. Rezoning suitable.
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.	The risk profile of different areas of the development layout based on the above landscape study.	Rezoning suitable.
		The proposed land use zones and permitted uses.	Rezoning suitable.
		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 located in lower risk areas of the site).	Rezoning suitable.
		The impact of the siting of these uses on APZ provision.	Rezoning suitable.
Access and egress	A study of the existing and proposed road networks both within and external to the masterplan area or site layout.	The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile.	Traffic engineer or statement of environmental effects required to demonstrate compliance of the existing public road network – alternate emergency egress required.
		The location of key access routes and direction of travel.	As above re: traffic engineer.
		The potential for development to be isolated in the event of a bush fire.	Based on a satisfactory traffic report confirming two egress/access routes, the development will not be considered

			'isolated'. The rezoning will create a continuation of previous subdivisions to the north. Rezoning suitable.
Emergency services	An assessment of the future impact of new development on emergency services.	Consideration of the increase in demand for emergency services responding to a bush fire emergency including the need for new stations/brigades.	NSW RFS and NSW Fire and Rescue to comment with Integrated development referral.
		Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency.	Rezoning suitable based on water supply complying with PBP2019 for future dwellings.
Infra-structure	An assessment of the issues associated with infrastructure and utilities.	The ability of the reticulated water system to deal with a major bush fire event in terms of pressures, flows, and spacing of hydrants.	No reticulated supply.
		Life safety issues associated with fire and proximity to high voltage power lines, natural gas lines etc.	Rezoning suitable
Adjoining land	The impact of new development on adjoining landowners and their ability to undertake bush fire management.	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.	Proposal will result in a reduction of the current bushfire hazard to adjoining properties.

1.0 INTRODUCTION

1.1 Purpose

This Strategic Bush Fire Report has been prepared to address bushfire risk and mitigation measures in relation to the proposed rezoning for residential purposes. The report makes comment on areas relating to Planning for Bushfire Protection 2019 and further comment where there may be a need for other suitably qualified professionals or organisations to assess and comment. The proposal has been assessed against the requirements of Planning for Bushfire Protection Guidelines (NSW RFS 2019).

The purpose of the strategic bush fire study is to avoid high risk areas, ensure that zoning is appropriate to allow for adequate emergency access, egress, and water supplies, and to ensure future compliance with this PBP is achievable. The Study provides an assessment as

to whether new development is appropriate in the bush fire hazard context, and the implications of future development for bush fire mitigation and management.

1.2 Location

The site incorporates Lots 831, 832 and 833 DP 847683, 395 Reardons Lane, Swan Bay. Lot 833 currently supports an existing dwelling. The site is located within a rural locality approximately 10km to the south-west of the village of Woodburn located on the NSW North Coast at an approximate AHD of 10m.

The Richmond River flood plain adjoins the site to the north and east. Extensive upslope forest vegetation is located to the west of the site beyond Reardons Lane, including Noonimba Ridge at an approximate AHD of 180m. The existing property being subject to the re-zoning application is predominantly cleared gently undulating horticultural cropping land.

The development site is bounded by Darke Lane and agricultural land to the south connecting to Swan Bay New Italy Road further to the east, Reardons Lane and forest vegetation to the west, and an unformed road reserve and horticultural land to the north as shown in Figures 1 and 2. Public access to the site is proposed via the existing road network via Reardons Lane from the north and from the south via Swan Bay New Italy Road/Darkes Lane. Table 2 provides a summary of the existing site and bushfire hazard.

Table 2 - Existing site description

Parameter	**Description**
Local Gov. area	Richmond Valley Council.
Property Description	Lots 831, 832 & 833 DP 847683, 395 Reardons Lane, Swan Bay.
Proposal	Rezoning – Existing zoning RU1 primary production, proposed zoning RU5 large residential lots.
Drawings	Newton Denny Chapelle, Plan 4 – Conceptual Subdivision Plan, Ref. 14/227, Rev H dated 11.11.2021.
Site area	Total site area approx. 129ha, approximately 44ha subject to rezoning.
Water supply	On-site static water supply proposed, no reticulated supply.
Designated Bushfire Prone Land	Hazard to the proposed residential rezoned land is existing forest to the west of Reardons Lane, grassland and forest to the south of Darke Lane. Proposed revegetation buffer on-site. The existing horticultural use on the residual allotment has been assessed as hazard vegetation. No designated mapped bushfire hazard within the site.
Rural Fire Service	Woodburn RFS located within 10km by road from the subject site. Lower River RFS located within 11km by road from the subject site. West Coraki RFS located within 15km by road from the subject site. Coraki RFS located within 15km by road from the subject site.

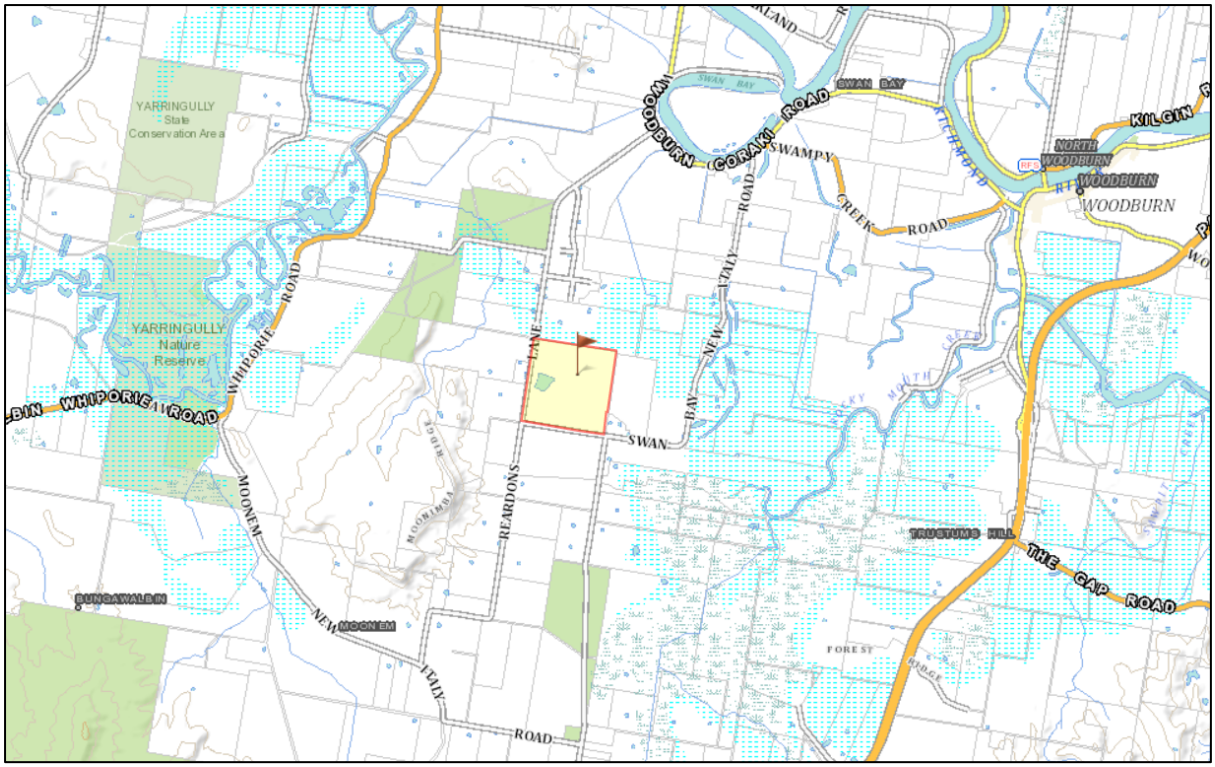


Figure 1 - Location of the subject site. Source: NSW Gov Six maps

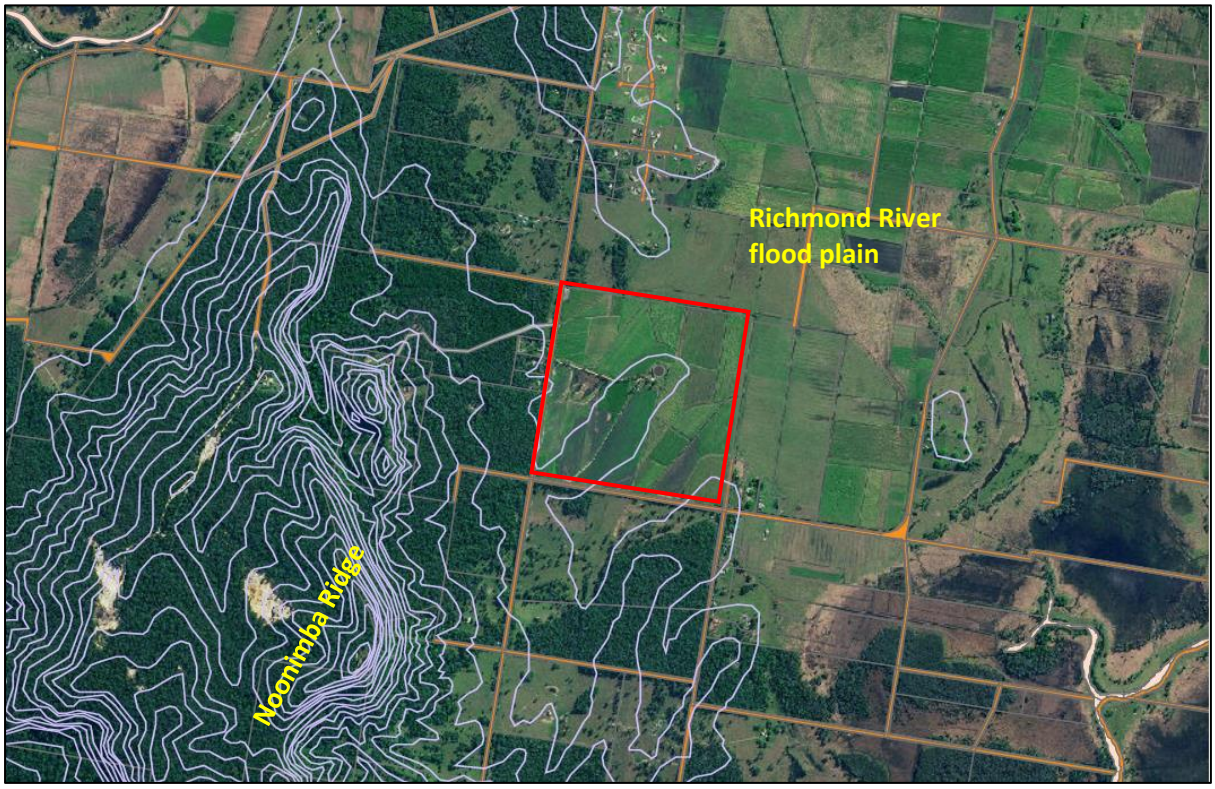


Figure 2 - Aerial view of the site and surrounding area. Source: NSW Gov. spatial map viewer

1.3 Legislation

1.3.1 Environmental Planning and Assessment Act

Appropriate consideration of bush fire hazards for the proposed rezoning is required by the *Environmental Planning and Assessment Act 1979* Section 9.1(2), and Direction 4.4 Planning for Bushfire Protection. Clause 4.4.1 of PBP 2019 requires consideration of Direction 4.4 in the Strategic Bush Fire Study at the initial planning stage in accordance with Clause 4.2 of PBP. Consultation with the RFS will require consideration of a bush fire assessment to demonstrate compliance with the Direction and PBP2019. The broad principles which apply to the strategic analysis include-

- Ensuring land is suitable for development in the context of bush fire risk;
- Ensuring new development on bushfire prone land will comply with PBP;
- Minimising reliance on performance-based solutions;
- Providing adequate infrastructure associated with emergency evacuation and firefighting operations; and Facilitating appropriate ongoing land management practices.

The applicant has advised the wish to provide this study with the development application for complete assessment via an integrated referral.

1.3.2 Rural Fires Act

Future residential subdivision will be assessed under Section 100B of the *Rural Fires Act 1997*, and a Bush Fire Safety Authority (BFSA) must be obtained from the NSW Rural Fire Service (RFS). In this regard a Bushfire Assessment Report will be required when an application for subdivision is proposed, indicating compliance with Planning for Bushfire Protection 2019, in accordance with the requirements of Clause 44 of the Rural Fires Regulation. This report has assessed the indicative subdivision layout, and provided recommendations, in order to demonstrate a configuration of the rezoned land has the capability of complying with PBP2019.

This report does not consider the following legislation. In this regard this report should be read in conjunction with the Statement of Environmental Effects submitted with the development application to ensure full compliance has been adequately demonstrated.

- State Environmental Planning Policy (Koala Habitat Protection) 2019;
- Biodiversity Conservation Act 2016 (NSW);
- Local Land Services Act 2013 (NSW);
- Land Management (Native Vegetation) Code 2017 (NSW);
- National Parks and Wildlife Act 1974 (NSW);
- Environmental Protection and Biodiversity Conservation Act 1999 (Cwlth).

1.3.3 Planning for Bushfire Protection Guidelines 2019

The objectives of PBP are to-

a. Afford buildings and their occupants protection from exposure to a bush fire;
b. Provide for a defendable space to be located around buildings;
c. Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
d. Ensure that appropriate operational access and egress for emergency service personnel and occupants is available;
e. Provide for ongoing management and maintenance of bush fire protection measures;
f. Ensure that utility services are adequate to meet the needs of firefighters.

The relevant bush fire protection measures outlined in chapters 5-8 of PBP 2019 have been considered to ensure future development can comply with PBP where appropriate. An indicative development layout has been provided to allow assessment of the suitability of the land for the proposed residential development and to demonstrate required APZs can be met on site. The indicative allotment layout with proposed minimum lot sizes is considered appropriate to accommodate the APZs within the future residential subdivision.

Having regard to public road access via the existing public road network, a traffic report will be required to assess the capacity of the alternate egress routes north and south along Reardons Lane and then to the east to Swan Bay New Italy Road. A satisfactory assessment and consideration of any recommendations will be required by NSW Rural Fire Service prior to issue of a Bush Fire Safety Authority or RFS advice to the consent authority.

The proposed access roads within the site are understood to be future public roads. In this regard a performance solution has been applied to demonstrate a perimeter road is not required to the north and east of the proposed rezoning site. The existing public roads of Reardons Lane and Darke Lane will form defacto perimeter roads allow access for emergency service to the primary bushfire hazards (forest) where actions such as back burning etc are more likely.

A performance solution is also applied to the internal roads exceeding 200m in length and being dead end roads. The site is shown to be accessed though a single access point from Reardons Lane however a secondary access (or emergency access at the least) will be required to Reardons Lane or at other locations to address the scenario of the current indicative access being cut in a bushfire event e.g. car crash, falling tree, bottlenecking or other obstruction hindering access and egress to and from the locality.

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

2.0 PROPOSED REZONING

The purpose of the Planning Proposal is to change the town planning provisions applying to Lots 831, 832, 833 DP 847683 to rezone part of the land presently zoned RU1 – Primary Production to R5 – Large Lot Residential in accordance with the provisions of the Richmond Valley Local Environmental Plan 2012.

The Planning Proposal also seeks to amend the minimum lot size map to permit the creation of lots with minimum lot sizes of 7 500m^2 within the area to be rezoned.

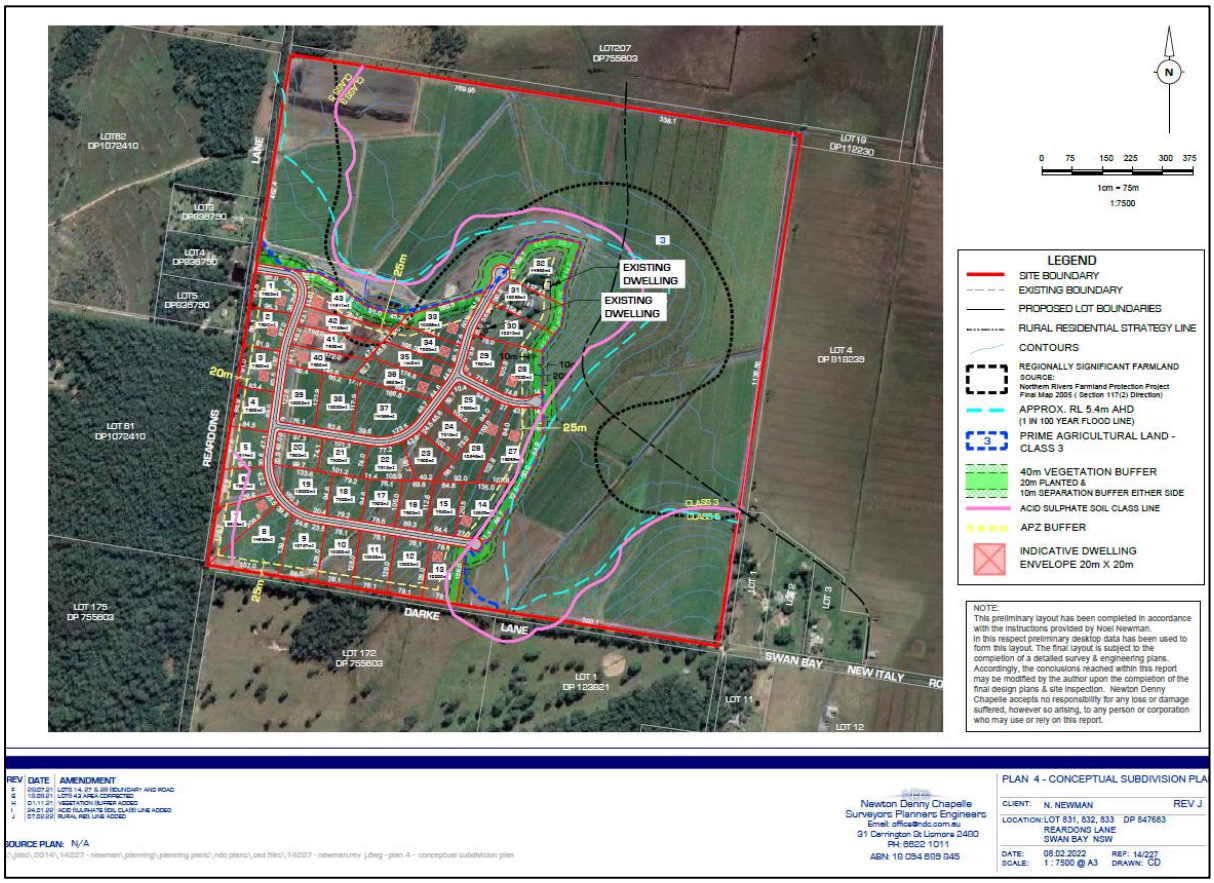


Figure 3 – Indicative subdivision rezoning demonstrating adequacy of land for rezoning.

3.0 STRATEGIC BUSH FIRE STUDY (TABLE 4.2.1 PBP 2019)

3.1 Bush fire landscape assessment

A bush fire landscape assessment has been undertaken to consider 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.

3.1.1 *The bush fire hazard in the surrounding area, including vegetation, topography and weather.*

Topography

The proposed rezoning for rural residential purposes is located on a gently undulating site dominated by a low central ridge (10 AHD) falling to the Richmond River flood plains to the north and east. The flood plain is dominated by sugar cane cropping. Beyond the site to the west is a forested range rising to approximately 180m AHD forming the dominate bushfire hazard impacting the site, together with grasslands to the south of the site on the adjoining agricultural grazed land.

Hazard vegetation

The bushfire prone mapping in Figure 4 identifies the subject site as being bushfire prone. Aerial mapping and inspection of the site reveals that the bushfire prone land map is considered reasonably accurate with respect to the current bushfire hazard off-site, except for the grassland hazard to the south which is unmapped, and the sugar cane cropping to the north and east which is unmapped. Table 3 and Figure 6 summarises the bushfire hazard assessment.

The forest vegetation to the west is located on an upslope and is located on the western side of Reardons Lane. There are minimal trees on the eastern side of the Reardons Lane road reserve which would not be a continuation of the primary bushfire hazard. As such, when a future dwelling is specifically assessed pursuant to s4.14 or s4.15 of the Environmental Planning and Assessment Act 1979, the hazard is likely to be assessed from the western side of Reardons Lane road reserve.

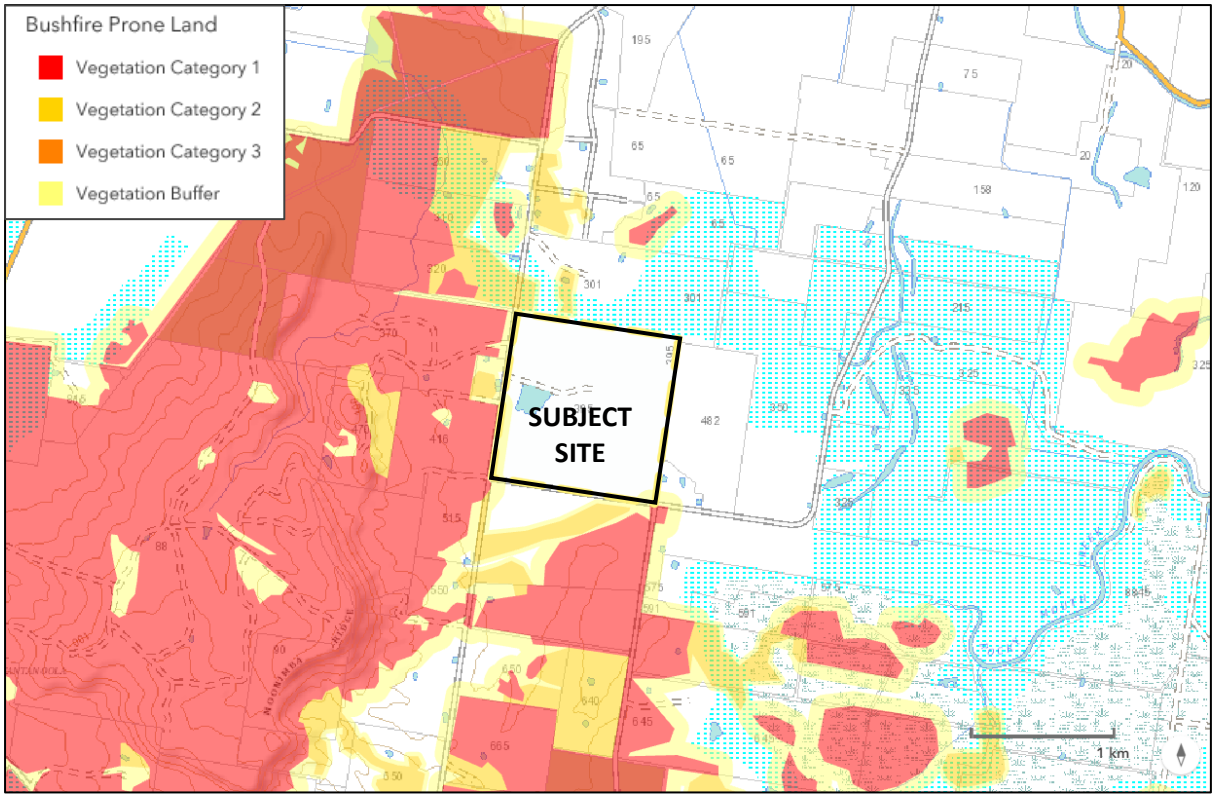


Figure 4 - Bushfire Prone Land Map Source: NSW planning portal 27.11.21

Photo 2 - Forest vegetation to the west of Reardons Lane

To the north and east of the proposed rezoning are areas to be replanted as an agriculture buffer (LUCRA). The plantings will be 20 metres wide with a 10 metre non-vegetated buffer each side of the plantings, marked in green on the indicative subdivision plan.

Existing sugar cane is located to the north and east of the vegetative and non-vegetative buffer. The plantings will be various species consistent with forest classification as no short fire run is possible given that it is considered continuous with the sugar cane despite the 10-metre buffer.

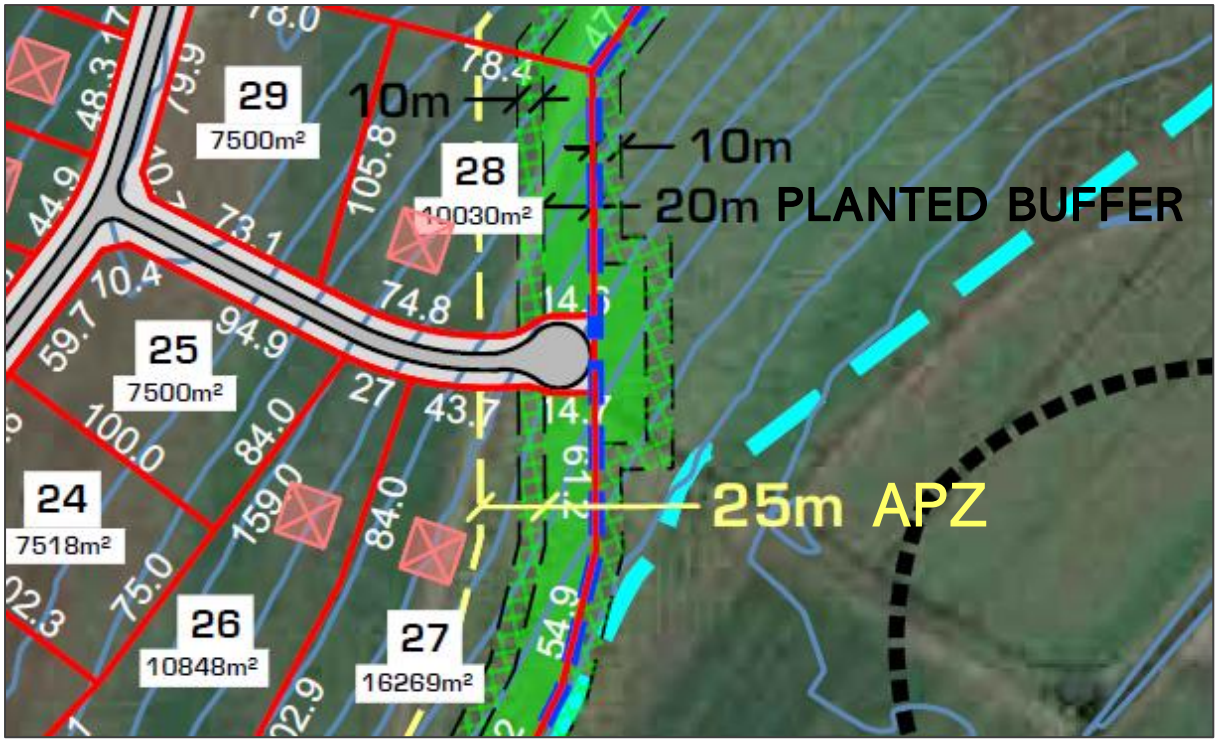


Figure 5: Example of agricultural buffer with 10m either side of proposed plantings

To the south of the site is forest vegetation located on a slight downslope. The small, isolated stand of forest has an area of approximately 2ha and is separated from the western forest by 200m.

Large areas of grazed grassland surround the forest on the southern side of Darke Lane. The forest vegetation on the northern side of Darke Lane has been included in the assessment given there are some trees on the northern side of the road reserve however some areas on the northern side of the road reserve could be assessed as non-hazard. As such, when a dwelling is specifically assessed pursuant to s4.14 or s4.15 of the *EP&A Act,* the hazard may, in areas, be assessed from the southern side of Darke Lane.

It is noted, this assessment is considered conservative and there may be opportunity with the preparation of a development application for subdivision to provide performance solutions or qualification of fire behaviour to reduce the asset protection zones subject to NSW RFS concurrence.

Photo 3 – Single row of trees along Darke Lane to the south.

Photo 4 – Grassland and forest vegetation to the south of Darke Lane.

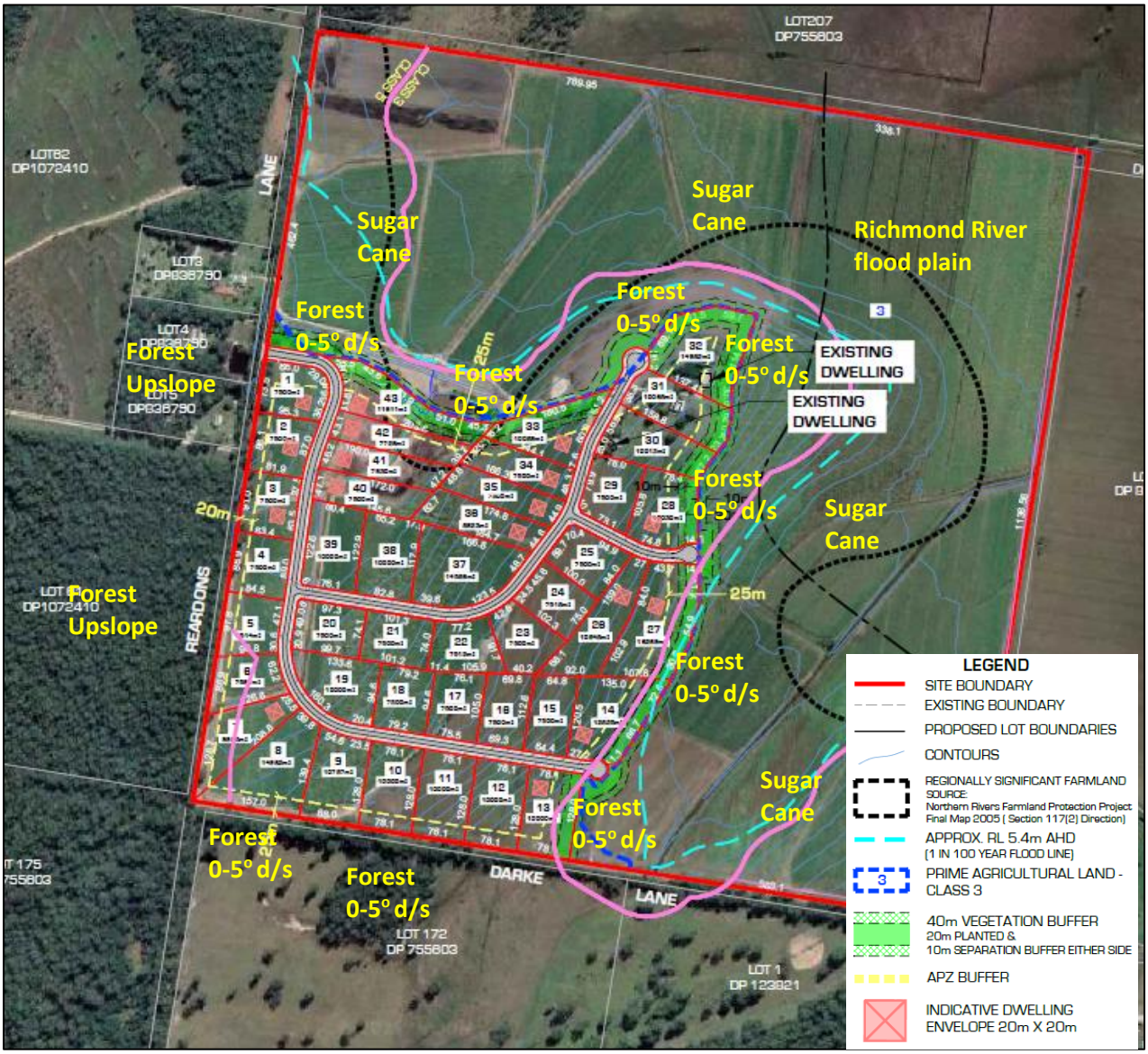


Figure 6 - Bushfire threat analysis and indicative subdivision layout.

The slope and vegetation analysis are summarised in Table 3 based on the proposed lot configuration. There are no building envelopes shown on the plan apart from those shown on the bushfire hazard interface to demonstrate a future subdivision can adequately support the minimum required asset protection zones. It is noted there is scope for future performance solutions to reduce the asset protection zones in some locations at subdivision stage and with NSW RFS concurrence.

The bushfire prone land mapping (Figure 4) does not map the existing sugar cane cropping or future replanting buffer. These areas have been considered with the APZ's as described in Table 2. The APZs in Table 3 are considered conservative purely to demonstrate in the worse-case scenario that the indicative subdivision layout is adequate for rezoning purposes.

Weather
Bushfire weather indicates and FDI of 80 which is considered appropriate.

3.1.2 *The potential fire behaviour that might be generated based on the above.*

The assessment assumes the bushfire attack scenario on a day a Fire Danger Rating (FDI) of 80 in accordance with PBP 2019. The bushfire prone land mapping is not completely accurate in that the mapping does not capture the horticultural cropping areas or grassland hazard, both on the site and adjoining the site, although the mapping appears to be recently completed and these areas have not been mapped as a bushfire hazard. The narrow 20m wide replanting buffer also requires consideration.

The site inspection however identified the vegetation most impacting the site to be forest vegetation. In this regard given the application is for rezoning a conservative assessment has been undertaken on the basis this vegetation along the perimeter of the site is taken as forest vegetation. The principal forest hazard to the west being on an upslope with added disconnection from the existing public road will result in a conservative approach.

3.1.3 *Any history of bushfire in the area.*

The area has a history of fires although there was no evidence found of localised bushfire information at the time of report. The site however is subject to a credible bushfire event particularly from the west, southwest and northwest separated by Reardons Lane and Darke Lane.

3.1.4 *Potential fire runs into the site and the intensity of such fire runs.*

Extensive fire runs from the west, southwest, northwest, and south have the potential to impact the subject rezoning area it being noted that Reardons Lane and Darke Lane are located between the subject property and the primary hazards. The road reserve currently support negligible fuels loads and would not be inconsistent with inner and outer protection zone specifications.

To the north and east there is annual cropping of sugar cane will limit the potential fire run from the north and east, together with the narrow fire run from the 20m wide proposed replanted buffer. The bushfire risk from the north and east is not as significant as that from the west and south.

3.1.5 *The difficulty in accessing and suppressing a fire, the continuity of bush fire hazards or the fragmentation of landscape fuels and the complexity of the associated terrain.*

Reardons Lane and Darke Lane will act like a perimeter road allowing fire fighters access to the western and southern bushfire hazards. The lower bushfire fire hazard from the north and east do not warrant dedicated perimeter roads with access available through the large residential allotments which are required to have an accessible static water supply when a dwelling is proposed and assessed pursuant to s4.14 or s4.15 EP&A Act 1979. The terrain does not present any specific limitations to bushfire suppression. Static water supply will be provided on each allotment.

3.2 Land use assessment

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

3.2.1 *The risk profile of different areas of the development layout based on the above landscape study.*

The subject property has a similar bushfire risk to previously approved subdivisions to the north along Reardons Lane. The perimeter allotments have sufficient area to incorporate on-site APZ's commensurate to the risk. All allotments will be required to be managed as APZ's.

A primary consideration relates to the adequacy of the existing public road network having capacity to provide access for emergency services whilst occupants are potentially evacuating in the opposite direction. In this regard a traffic report will be required as part of the survey and RFS considerations.

3.2.2 *The proposed land use zones and permitted uses.*

The permitted uses of the R5 Large Lot Residential Zone are:

> *Bed and breakfast accommodation, Boat launching ramps, Boat Shed, Community facilities, Dual occupancies, Dwelling houses, Emergency services facilities, Environmental protection works, Exhibition homes, Farm buildings, Flood mitigation works, Group homes, Home-based child care, Home businesses, Home industries, Information and education facilities, Jetties, Kiosks, Oyster aquaculture, Pond-based aquaculture, Recreation areas, Roads, Roadside stalls, Signage, Tank-based aquaculture, Water recreation structures.*

It is the intent following rezoning to subdivide the site into 43 rural residential lots with an additional residual allotment to remain as primary production.

The sites are considered suitable for single or multi dwelling housing, however some Special Fire Protection Purpose development such as Group homes and educational facilities will need to be capable of achieving sufficient asset protection zone widths within the allotments as required by Table A.1.12.1 of PBP 2019 generally being 67m without the use of performance solutions which may reduce this distance. There are several sites where compliance is capable of being achieved if such uses were proposed at subdivision stage.

Table A1.12.1

Minimum distances for APZs – SFPP developments (≤10kW/m², 1200K)

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	38	47	57	69	81
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	67	79	93	100	100
Grassy and Semi-Arid Woodland (including Mallee)	42	50	60	72	85
Forested Wetland (excluding Coastal Swamp Forest)	34	42	51	62	73
Tall Heath	50	56	61	67	72
Short Heath	33	37	41	45	49
Arid-Shrublands (acacia and chenopod)	24	27	30	34	37
Freshwater Wetlands	19	22	25	28	30
Grassland	36	40	45	50	55

Figure 7 – Table A 1.12.1 PBP2019 (Special Fire Protection Purpose developments).

Single or multi dwelling (Class 1a – BCA) development must be capable of having the asset protection zone widths required by Table A1.12.3 PBP2019. In this regard the indicative subdivision plan provided in this report has demonstrate with the most conservative assessment the rezoning can support development in accordance with PBP 2019.

It is noted however there is considered merit to reduce the demonstrate asset protection zones in some areas with a performance solution report at subdivision application stage.

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 8 – Table A1.12.3 PBP2019 residential development.

3.2.3 *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. Not locating high risk development in hazardous areas of the site.*

There are no areas of the site at significantly higher risk from bushfire due to topography or access arrangements. The required APZ's will be an appropriate risk mitigation measure to address the proximity to the bushfire hazard for the proposed rezoning.

3.2.4 *The impact of the siting of these uses on APZ provision.*

The limited site area and proximity to the bushfire hazard may limit some SFPP uses due to the APZ requirements although most will be capable of complying. The proposed allotment layout provides for sufficient lot size for required APZ's for single dwellings on individual allotments.

3.3 Access and Egress

This section provides comment on the existing and proposed road networks both within and external to the masterplan area or site layout.

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

The existing public road network in the vicinity of the site is to be assessed by a competent person and confirmation provided via a traffic report demonstrating the existing public road network, based on the potential volumes of traffic, can support the increased volumes of traffic in the event of a bush fire emergency.

The new internal public access road network is required to comply with PBP2019. The following matters have been identified as requiring further design consideration at subdivision stage to meet the requirements of PBP2019 for rural residential subdivisions.

- Perimeter roads are required for residential subdivisions of three or more allotments. Perimeter roads are required to be through roads, and these are required to be linked to the internal road system at an interval of no greater than 500m. Performance solution proposed.

- Subdivisions of three or more allotments are required to have more than one access in and out of the development. An additional access road is required into and out of the development. Amended plans required.

- All roads are required to be through roads. Dead end roads are not recommended, but if unavoidable, are not more than 200m in length, incorporate a minimum 12m outer radius turning circle, and are clearly sign posted as a dead end. Performance solution proposed for dead end road greater than 200m in length.

- Non-perimeter roads are required to be through roads, and these are required to be linked to the internal road system at an interval of no greater than 500m. Performance solution and amended plans required.

A detailed assessment against PBP2019 is provided in Section 7 of this report.
Some variations may be appropriate and will be assessed via performance assessment at subdivision stage.

Property access roads will be required to comply with PBP2019 with turning head requirements to be assessed at DA stage for future dwelling construction. Each proposed allotment has sufficient area for turning head requirements.

3.3.2 *The location of key access routes and direction of travel.*

There are a number of access and egress routes available which include traveling north and south along Reardons Lane, and east along Darke Lane and Swan Bay New Italy Road. The

existing public road network is to be assessed by a competent person and confirmation provided via a traffic report that the existing and proposed road network, based on the potential volumes of traffic, are capable of supporting the increased volumes of traffic in the event of a bush fire emergency.

3.3.3 *The potential for the development to be isolated in the event of a bushfire.*

The development is located in a rural area, and there is potential for the egress route to be impacted by fire. A second egress route from the proposed subdivision to the existing public road system is required to ensure access/egress is always available away from the existing bushfire hazard. Existing access road Reardons Lane is a through road.

3.4 Emergency Services

This section provides an assessment of the future impact of new development on emergency services.

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

The proposed development is within 15km by road of four NSW Rural Fire Service Brigades. The increase in population is consistent with rural residential development in the area. Future Rural Fire Service Brigades to be assessed where necessary at subdivision stage.

3.4.2 *Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency.*

The proposal is considered to have negligible impact for emergency services to carry out fire suppression in a bush fire emergency. The existing public roads will act as perimeter roads providing a defendable space between the subdivision and the off-site hazards.

3.5 Infrastructure

This section provides an assessment of the issues associated with infrastructure and utilities.

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

Reticulated town water supply is not available. On-site static supplies will be available once dwellings are constructed.

3.5.2 *Life safety issues associated with fire and proximity to high voltage power lines, natural gas lines etc.*

Underground power transmission lines proposed. All new power lines should be located underground in accordance with PBP2019. The site is understood not to be serviced by reticulated natural gas.

3.6 Adjoining land

This section provides comment on the impact of new development on adjoining landowners and their ability to undertake bush fire management.

3.6.1 *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.*

It is considered by developing the land for residential purposes and applying compliant asset protection zones and landscaping requirement together with construction standards to the buildings, the development will decrease the fuel loads currently impacting adjacent development.

4.0 PLANNING FOR BUSHFIRE PROTECTION 2019

4.1 Asset Protection Zones

Aerial mapping and inspection of the site reveals the bushfire prone land map is not completely accurate in respect to the current bushfire hazard. Inspection of the subject property was undertaken and bushfire assessment conducted within 140m beyond the boundary of the development area with a detailed assessment in Section 3 of this report.

Asset Protection Zones are areas established and maintained to ensure that bushfire fuels are progressively reduced between the development and the bushfire hazard. An asset protection zone incorporates an Inner Protection Area (IPA) having reduced fuel loadings of approximately 3t/ha.

The assessment establishes that future residential development will require asset protection zones. The proposed future residential subdivision must comply with the APZ criteria for infill developments Section 5.3.1 and Table 5.3a of PBP2019 which states:

- APZs are provided in accordance with Table A1.12.2 or A1.12.3 PBP 2019 based on the FFDI.
- APZs are to be managed in accordance with Appendix 4 (of PBP 2019).
- APZs are wholly within the boundaries of the development site.
- APZ are located on lands with a slope less than 18 degrees.

A future dwelling on the proposed lots is capable of being sited to receive ≤29kW/m^2 and is to be assessed in accordance with s4.14 at Development Application stage. Table 3 provides a summary of Asset Protection Zone requirements with plans provided in Appendix A providing a visual representation of required APZ's within the rezoning site.

Table 3: Summary of Preliminary Asset Protection Zones required

Lot nos.	Aspect	Vegetation	Slope	APZ for 29kW/m^2
1-8	West	Forest	upslope	20 metres – contained within the property
7-13	South	Forest	0-5° downslope	25 metres – Contained within the property
13-14, 27-28 & 30-32	East	Forest	0-5° downslope	25 metres – Contained within the property
1, 43, 33, 31 & 32	North	Forest	0-5° downslope	25 metres – Contained within the property
Lots 1-43	Overall	Overall	Overall	All Lots 1-43 are to be managed as asset protection zones

All Lots 1-43 are to be managed as asset protection zones

The plans show compliant building envelopes can be supported on the future allotments in conjunction with the recommended asset protection zones based on the worst-case scenario and without performance solution reporting. It is noted temporary APZ's may be required should the future subdivision be staged.

Existing Dwelling - Upgrade Assessment

The existing dwelling is not located on bushfire prone land, however, as there are revegetation works within 100 metres of the dwelling, it will be required to be upgraded to improve ember protection. This is to be achieved by enclosing or covering all openings with a non-corrosive metal screen mesh with a maximum aperture of 2mm. Where applicable, this includes openable windows, vents, weepholes (excluding under window weepholes) and eaves. External doors are to be fitted with draft excluders. These upgrade measures are

capable of being included in the bushfire report at the time of subdivision. The lot will be maintained as an IPA except for the revegetation works onsite.

5.0 CONSTRUCTION STANDARDS AND OTHER PLANNING CONTROLS

The land available for the required asset protection zones can be applied to future dwellings demonstrating the 29kW/m^2 threshold is not exceeded as required by Table A1.12.3 PBP2019. The APZs shown will ensure that the future dwellings will not be within the forecast flame zone.

Future use of the rezoned land for residential purposes will require approval of an 'integrated' development application for subdivision under Section 91 of the *EP&A Act* requiring the issue of a s.100B Rural Fires Act bushfire safety authority, and development application/s for any dwellings under Section 4.14 of the *EP&A Act* requiring referral to the NSW Rural Fire Service. The indicative site plan may need to be amended at subdivision stage.

6.0 WATER AND UTILITY SERVICES PBP2019

6.1 Water Supply

Given a reticulated fire hydrant system is not proposed, a static water supply will be required for future dwellings. The static water supply will need to comply with Section 5.3.3 and Table 5.3c and 5.3d of Planning for Bushfire Protection 2019 at development application stage for a new dwelling as follows-

- static water and hydrant supply is to be provided for non-reticulated developments or where reticulated water supply cannot be guaranteed;
- static water supplies shall comply with Table 5.3d PBP2019;
- all above-ground water service pipes are metal, including and up to any taps; and
- above-ground water storage tanks shall be of concrete or metal.

On-site static water supply volume requirements for future dwellings are indicated in Table 4.

Table 4: Water supply for non-reticulated developments (Table 5.3d PBP2019)

Water supply requirements for non-reticulated developments (Table 5.3d PBP2019)	
Development type	**Water requirements**
Residential lots (<1000m^2)	5000L/lot
Rural residential lots (1000m^2 – 10000m^2)	10000L/lot
Large rural/lifestyle lots (>10000m^2)	20000L/lot
Multi-dwelling housing (including dual occupancies)	5000L/dwelling

6.2 Electricity Supply

New electrical transmission lines if required are to comply with Section 5.3.3 and Table 5.3c of Planning for Bushfire Protection 2019 as follows:

- where practicable, electrical transmission lines are underground; and
- 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 accordance with the specifications in ISSC3 *Guideline for Managing Vegetation Near Power Lines*.

6.3 Gas Services

Reticulated gas is not proposed. The development applications for future dwellings will provide details of the storage of gas to comply with Section 7.4 and Table 7.4a of Planning for Bushfire Protection 2019. Additional requirements of AS 3959-2018 will be addressed at DA stage for a future dwelling.

7.0 ACCESS Table 5.3b PBP 2019

7.1 General

The proposed public and property access roads will be required to comply with Table 5.3b Planning for Bushfire Protection 2019. It is noted temporary turnaround areas may be required to serve public roads should future subdivision be staged. In this regard any temporary turnaround will be required to comply with Table 5.3b of PBP2019.

Civil engineering plans will be required with a future development application for subdivision demonstrating turn around for a medium rigid vehicle can be achieved. Access requirements are discussed in Table 5. Items subject to a proposed performance solution are discussed in Section 7.2 of this report. These performance solutions are only one solution available for NSW RFS consideration of the rezoning however a future bushfire report accompanying a development application for subdivision will require a separate performance solution demonstrating compliance with the legislation and policy requirements at the time of application.

Table 5: Access table 5.3b PBP 2019 rural residential subdivisions

Performance criteria	**Acceptable solution - Access**	**Capable of compliance**
Access – General Requirements		
Firefighting vehicles are provided with safe, all-weather access to structures.	Property access roads are two-wheel drive, all-weather roads.	Capable of achieving compliance.
	Perimeter roads are provided for residential subdivisions of three or more allotments.	No perimeter roads to the north and east. Performance solution required.
	Subdivisions of three or more allotments have more than one access in and out of the development.	Additional emergency access road required into and out of the development. Amended plans required.
	Traffic management devices are constructed to not prohibit access by emergency services vehicles.	Capable of achieving compliance. To be addressed at subdivision stage.
	Maximum grades for sealed roads do not exceed 15^{o} and an average grade of not more than 10^{o} or other gradient specified by road design standards, whichever is the lesser gradient.	Capable of achieving compliance. Road design required at subdivision stage.
	All roads are through roads.	Performance Solution provided.
	Dead end roads are not recommended, but if unavoidable, are not more than 200m in length, incorporate a minimum 12m outer radius turning circle, and are clearly sign posted as a dead end.	Some roads greater than 200m in length. Performance Solution provided.
	Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road.	No perimeter roads proposed – see performance solution.
	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.	Second emergency access will be required from the subdivision. Reardons Lane passes by forest hazard to the west.
	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.	N/A

The capacity of access roads is adequate for firefighting vehicles.	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.	Capable of achieving compliance. Road design required at subdivision stage.
There is appropriate access to water supply.	Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression.	Street hydrants not proposed.
	Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - *Fire hydrant installations System design, installation and commissioning.*	Street hydrants not proposed.
	There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	Capable of achieving compliance. To be assessed at DA stage for dwelling construction.
Perimeter Roads		
Perimeter 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.	Perimeter roads are two way sealed roads.	Performance solution proposed. Existing public roads act as perimeter roads.
	Perimeter roads minimum 8m carriageway width kerb to kerb.	Traffic Engineer to comment on existing public roads serving as perimeter evacuation roads. No internal perimeter roads proposed. Performance solution prepared.
	Parking is provided outside of the carriageway width.	Road design to be assessed at subdivision stage.
	Hydrants are located clear of parking areas.	N/A
	Perimeter roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	Performance solution
	Curves of roads have a minimum inner radius of 6m.	Road design to be assessed at subdivision stage.
	The maximum grade road is 15^{o} and average grade of not more than 10^{o}.	Road design to be assessed at subdivision stage.
	Road crossfall does not exceed 3 degrees.	
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Road design to be assessed at subdivision stage.
Non-perimeter roads		
Non-perimeter access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	Minimum 5.5m carriageway width kerb to kerb.	Capable of achieving compliance. Road design to be assessed at subdivision stage.
	Parking is provided outside of the carriageway width.	Capable of achieving compliance. Road design to be assessed at subdivision stage.
	Hydrants are located clear of parking areas.	N/A

	Non-perimeter roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	Performance solution provided.
	Curves of roads have a minimum inner radius of 6m.	Capable of achieving compliance. Road design to be assessed at subdivision stage.
	The road crossfall does not exceed 3 degrees.	Capable of achieving compliance. Road design to be assessed at subdivision stage.
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Capable of achieving compliance. Road design to be assessed at subdivision stage.
Property access roads		
Firefighting vehicles can access the dwelling and exit the property safely.	Street hydrants are not proposed. The following requirements apply.	
	Minimum 4m carriageway width.	Capable of achieving compliance.
	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.	N/A
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches.	Capable of achieving compliance.
	Provide a suitable turning area in accordance with Appendix 3 PBP2019.	Capable of achieving compliance.
	Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress.	Capable of achieving compliance.
	The minimum distance between inner and outer curves is 6m.	Capable of achieving compliance.
	The crossfall is not more than 10 degrees.	Capable of achieving compliance.
	Maximum grades for sealed roads do not exceed 15^{o} and not more than 10^{o} for unsealed roads.	Capable of achieving compliance.
	Development comprising more than three dwellings has access by dedication of a road and not by right of way.	N/A
	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.	

The property access to the proposed subdivision will be provided by way of a proposed new public road network off Reardons Lane. The subdivision is located in a rural residential area with Reardons Lane, and Darkes Road effectively given direct access to the bushfire hazard for firefighting services similar to that of a perimeter road.

The 20m deep vegetation planting to the north and east for the purpose of addressing Land Use Conflict is not a significant hazard and access to the hazard will be available through the properties and via the road system. A perimeter road is not considered to be required given the minor nature of the hazard, conservative asset protection zones available and intermittent growth of the sugar cane plantations. A 10m wide non-vegetated buffer is provided on both sides of the 20m wide screen planting. A performance solution is provided for this component.

The subdivision is access via a single access point from Reardons Lane into the proposed subdivision. In this regard a performance solution has been prepared for the property and public road access to address the following four items of non-compliance with the following acceptable solutions of Table 5.3b of Planning for Bushfire Protection 2019.

1. *Perimeter roads are provided for residential subdivisions of three or more allotments;*

2. *All roads are through roads;*

3. *Dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length.*

4. *Non-perimeter roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m.*

An amended indicative subdivision layout will be required showing an alternate emergency access compliant with the internal road requirements of Table 5.3b of Planning for Bushfire Protection 2019 in relation to the following item.

5. *Subdivisions of three or more allotments have more than one access in and out of the development.*

7.2 Performance Solution No.1 – Access

The performance solution applied to the proposed public road network is due to several site specific and strategic factors being –

Acceptable Solution

- *Perimeter roads are provided for residential subdivisions of three or more allotments;*
- *All roads are through roads;*
- *Dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length.*

- *Non-perimeter roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m.*

Performance Solution

Firefighting vehicles are provided with safe, all-weather access to structures.

Trial Design

The new public road is to comply with Section 5.3.2 and Table 5.3b of Planning for Bushfire Protection 2019 except no perimeter roads are required, dead-end road permitted being greater than 200 metres in length with connective intervals greater than 500m as shown in Figure 3. Details of compliance will need to be provided with the bushfire report for a development application for subdivision.

Methodology and Discussion

The following methodology is both qualified and quantified based on the trial design to demonstrate compliance with the nominated performance criteria. In this regard the public road is located a sufficient distance to potentially receive lower levels of radiant heat on most of the roads to allow safe egress and staging for fire fighting. The following points are made to demonstrate compliance with the performance criteria.

- The indicative internal public roads will not be directly impacted by forest vegetation or travel by or through a bushfire hazard i.e. in close proximity to the road, thereby negating pinch point caused by falling trees etc however a second emergency access/exit point compliant with the internal road specifications of Table 5.3b PBP2019 will be required.

  The second emergency egress point is to allow access/egress to and from the future subdivision should the primary access be blocked in a bushfire event. The second can occur out to Reardons Lane however it would need to be located at the southern end of the rezoning land.

- The proposed allotments adjacent to the hazard are large, consistent with the zoning and will allow for fire fighters to access all elevations of future dwellings and the hazard through the proposed allotments. Given there is no reticulated water supply and no existing or proposed street hydrants, the fire fighting appliances will have

access to a static water supply adjacent to each dwelling when dwellings are constructed.

To the north and east of the land to be rezoned is a minor 20m deep replanted buffer zone to address Land Use Conflict requirements. Each side of the 20m planting is a 10m cleared buffer area which can form part of the required asset protection zones. The bushfire hazard further to the north and east is sugar cane plantations and whilst potentially a bushfire hazard, will be planted and harvested seasonally thereby reducing the overall bushfire risk should a risk matrix be applied.

There are potentially 9 properties interfacing this lesser bushfire hazard with three cul-der-sacs providing access to points along the interface and the opportunity given the large lots, for emergency services to access the property by compliance property access roads to a static water supply required once dwellings are approved. It is unlikely back burning or the like will be undertaken in these locations unlike that which may occur to the south and west. In turn, perimeter roads without street hydrants to the north and east are not considered essential for adequate bushfire interventions and the indicative internal road layout is considered to adequately meet the nominated performance criteria.

The existing public roads being Reardons Lane and Darke Lane are located directly adjacent to the primary bushfire hazards to the west and south of the subject property. The location of these public roads will act like a perimeter road particularly to the west, allowing fire brigade access directly to the hazard. Static water supplies will be available once the subdivision application has been approved with dwellings assessed pursuant to s4.14 and s4.15 PBP2019.

- The assessment considers the potential radiant heat received at the location of the internal public roads will be less than 10kW/m^2 which will allow fully protected firefighting personnel to withstand the radiant heat for short periods as shown in Figure 9. The public roads are mostly 100m from the primary hazard to the west and south and will essentially not be located on defined bushfire prone land.

  The internal public roads will only be passing by managed large residential allotments which are unlikely to be cut in a bushfire event when evacuation is undertaken early. Vast areas within the subdivision will be located well beyond defined bushfire prone land.

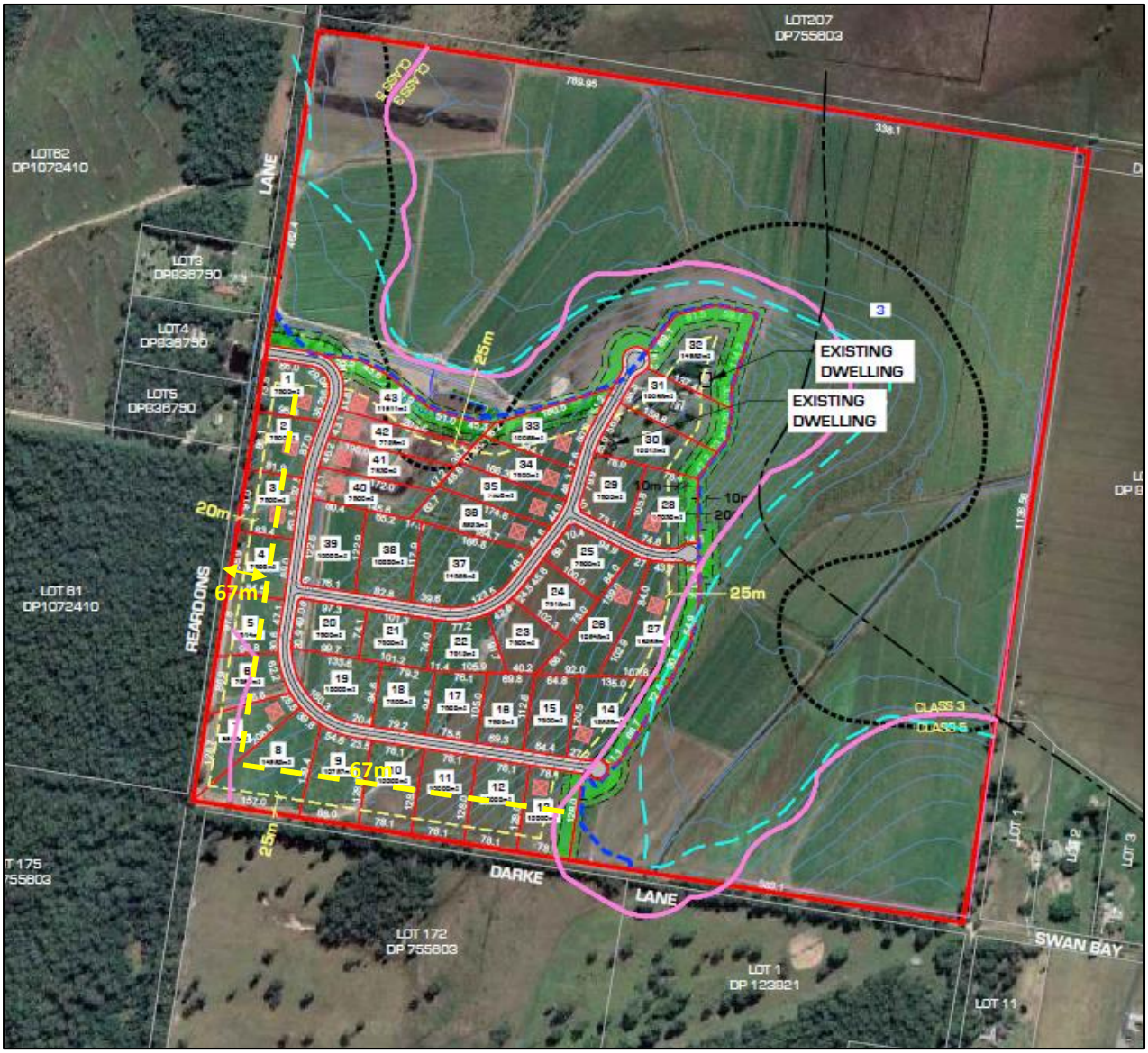


Figure 9: Thick yellow broken line indicates the internal roads are located outside the approximately 10kW/m^2 line pursuant to Table A1.12.1 where fire fighters in protective clothing can withstand radiant heat for short period of time.

The new public road is to comply with Section 5.3.2 and Table 5.3b of Planning for Bushfire Protection 2019 except no perimeter roads are required, and the dead-end road being greater than 200 metres in length are permissible. Details of compliance will need to be provided with the civil plans and approved by the consent authority prior to construction.

Performance solution conclusion

The study establishes that the public road will receive lower levels of radiant heat due to the distance from the bushfire hazard and due to the type of hazard being predominantly grassland and a small section of remnant. Fire fighters on the internal public roads will receive well below a forecast radiant heat level of 10kW/m^2 and likely to be closer to 2kW/m^2. The future dwellings will provide added shielding to further reduce the levels of radiant heat exposure.

The absence of the hazard adjacent to the public access road will also limit the risk of pinch points being created, adversely impacting the access/egress of residents and emergency services. Further, consideration has been given to the structure plan and the potential to have a second link road to Reardons Lane to the southwest.

The study concludes that the proposed public access road, subject to the recommendations in Section 1 of this report and commensurate to the bushfire risk will allow *'firefighting vehicles are provided with safe, all-weather access to structures'* and thereby satisfies the nominated performance criteria.

8.0 CONCLUSION

The study has determined the proposed rezoning is appropriate in the bush fire hazard context. Bush fire mitigation and management measures for the future development can be adequately addressed with the proposal having the ability to comply with PBP2019 subject to the recommendations within this report and proposed performance solutions to be prepared and assessed at subdivision development application stage. The indicative allotment layout with proposed minimum lot sizes are considered appropriate to accommodate the APZs within future subdivisions.

This report has been prepared for referral and consultation with the NSW Rural Fire Service as a means of demonstrating compliance with the EP&A Act 1979 s 9.1 and Ministerial Direction 4.4, and PBP 2019 as applicable to the proposed rezoning.

Disclaimer

This bushfire assessment report was prepared for the purposes of a submission with a rezoning development application to Richmond Valley Council relating to the R5 large residential lots zoning, as outlined in this report only and is not to be used for any other purpose or by any other person or Corporation. The report is not to be construed as a complete assessment of civil, hydraulic, ecological, traffic report or landscape plans but has been prepared to provide recommendations to inform a Bush Fire Safety Authority application only. BCA Check Pty Ltd accepts no responsibility for any loss or damage suffered howsoever arising to any person or Corporation who may use or rely on this report in contravention of the terms of this clause. The report is not to be used as an assessment tool for individual dwellings and is only to be used for the purpose of this subdivision and compliance with PBP2019. The report is to be referred to NSW RFS for the issue of a Bush Fire Safety Authority.

As identified in Planning for Bushfire Protection 2019 and the Building Code of Australia the report is to provide recommendations to reduce the risk of ignition and does not guarantee the complete protection of the building in the event of bush fire or that the building will not be adversely impacted upon.

Reporting has been based on the relevant Council and Rural Fire Service Guidelines however recommendations or suggestions given in this report are based on our site investigation at the time of reporting. In some cases site conditions may change dramatically within a few years due to rapid vegetation re-growth and invading weed species.

References

NSW Rural Fire Service and Planning NSW (2019), *Planning for bushfire protection, A guide for councils planners fire authorities developers and homeowners.* Rural Fire Service NSW Australia.

Standards Australia, (2018), AS3959 *Construction of buildings in bushfire prone areas,* Australian Standards, Sydney.

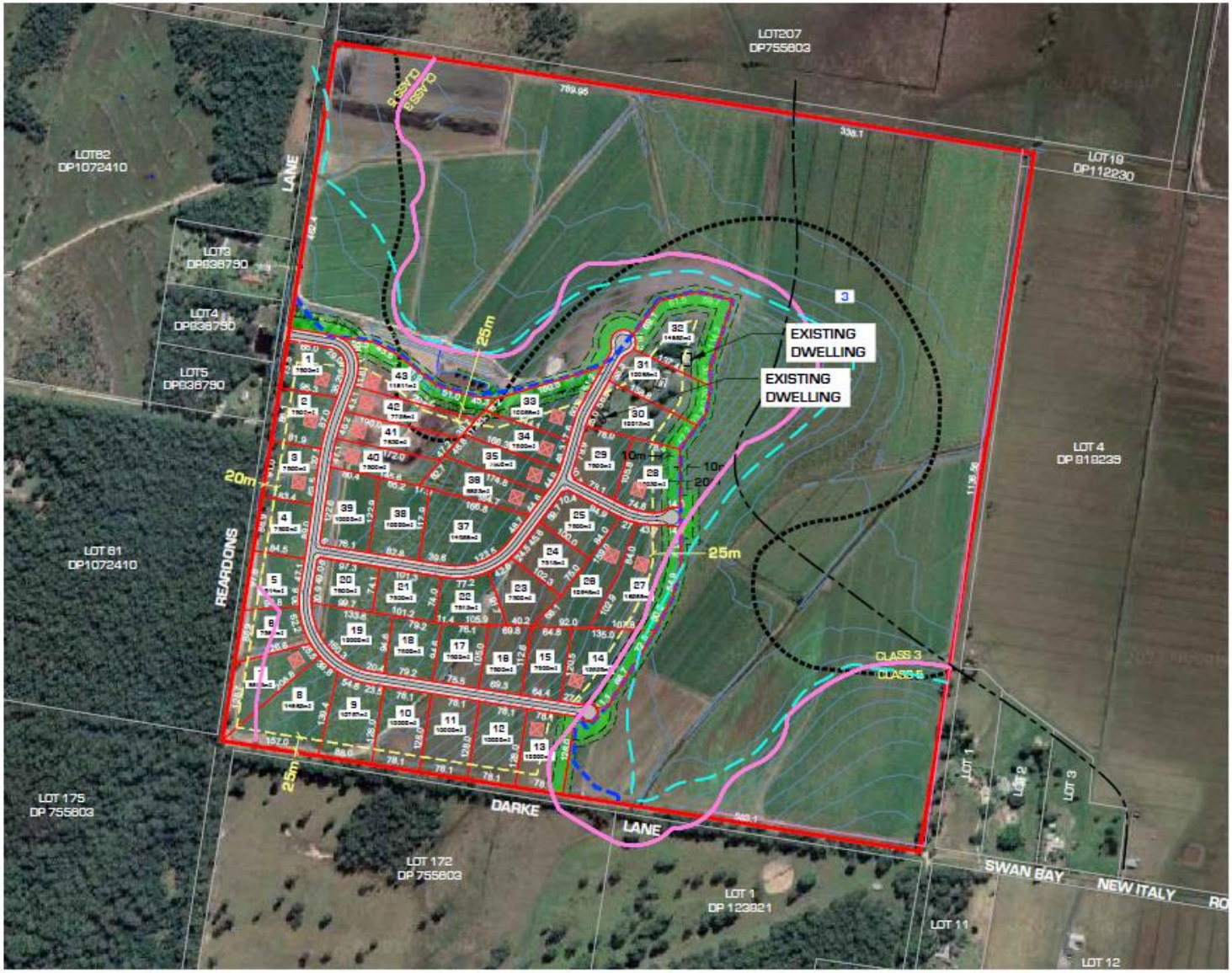
Cheney P and Sullivan A (2008), *Grassfires. Fuel, weather and fire behaviour* CSIRO.

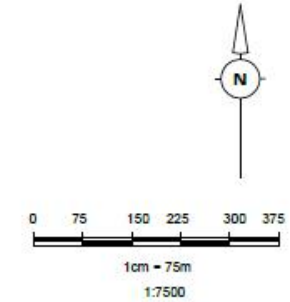
Legislation

Environmental Planning and Assessment Act 1979 and Regulations 2000. *New South Wales.* Parliamentary Counsel's Office, NSW Government Information Service.

Rural Fires Act 1997. *New South Wales.* Parliamentary Counsel's Office, NSW Government Information Service.

Rural Fires Regulation. *New South Wales.* Parliamentary Counsel's Office, NSW Government Information Service.





LEGEND

- SITE BOUNDARY
- EXISTING BOUNDARY
- PROPOSED LOT BOUNDARIES
- RURAL RESIDENTIAL STRATEGY LINE
- CONTOURS
- REGIONALLY SIGNIFICANT FARMLAND
  SOURCE:
  Northern Rivers Farmland Protection Project
  Final Map 2005 (Section 117(2) Direction)
- APPROX. RL 5.4m AHD
  (1 IN 100 YEAR FLOOD LINE)
- PRIME AGRICULTURAL LAND - CLASS 3
- 40m VEGETATION BUFFER
  20m PLANTED &
  10m SEPARATION BUFFER EITHER SIDE
- ACID SULPHATE SOIL CLASS LINE
- APZ BUFFER
- INDICATIVE DWELLING ENVELOPE 20m X 20m

NOTE:
This preliminary layout has been completed in accordance with the instructions provided by Noel Newman.
In this respect preliminary desktop data has been used to form this layout. The final layout is subject to the completion of a detailed survey & engineering plans.
Accordingly, the conclusions reached within this report may be modified by the author upon the completion of the final design plans & site inspection. Newton Denny Chapelle accepts no responsibility for any loss or damage suffered, however so arising, to any person or corporation who may use or rely on this report.

REV	DATE	AMENDMENT
F	29.07.21	LOTS 14, 47 & 28 BOUNDARY AND ROAD
G	19.08.21	LOT 43 AREA CORRECTED
H	01.11.21	VEGETATION BUFFER ADDED
I	24.01.22	ACID SULPHATE SOIL CLASS LINE ADDED
J	07.02.22	RURAL RES. LINE ADDED

SOURCE PLAN: N/A

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Newton Denny Chapelle
Surveyors Planners Engineers
Email: office@ndc.com.au
31 Carrington St Lismore 2480
PH: 6622 1011
ABN: 19 094 889 845

PLAN 4 - CONCEPTUAL SUBDIVISION PLAN

CLIENT: N. NEWMAN REV J

LOCATION: LOT 831, 832, 833 DP 847683
REARDONS LANE
SWAN BAY NSW

DATE: 08.02.2022 REF: 14/227
SCALE: 1 : 7500 @ A3 DRAWN: CD

Appendix B

Access Road Requirements PBP2019

5.3.2 Access

Intent of measures: to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.

Table 5.3b

Performance criteria and acceptable solutions for access for residential and rural residential subdivisions.

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
ACCESS (GENERAL REQUIREMENTS)	› firefighting vehicles are provided with safe, all-weather access to structures.	› property access roads are two-wheel drive, all-weather roads; › perimeter roads are provided for residential subdivisions of three or more allotments; › subdivisions of three or more allotments have more than one access in and out of the development; › traffic management devices are constructed to not prohibit access by emergency services vehicles; › 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; › all roads are through roads; › 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; › where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; › 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 › 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.
	› the capacity of access roads is adequate for firefighting vehicles.	› 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.
	› there is appropriate access to water supply.	› hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression; › hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - *Fire hydrant installations System design, installation and commissioning*; and › there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.

Table 5.3b *Continued*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
PERIMETER ROADS	› 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.	› are two-way sealed roads; › minimum 8m carriageway width kerb to kerb; › parking is provided outside of the carriageway width; › hydrants are located clear of parking areas; › are through roads, and these are linked to the internal road system at an interval of no greater than 500m; › curves of roads have a minimum inner radius of 6m; › the maximum grade road is 15 degrees and average grade of not more than 10 degrees; › the road crossfall does not exceed 3 degrees; and › a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
NON-PERIMETER ROADS	› access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	› minimum 5.5m carriageway width kerb to kerb; › parking is provided outside of the carriageway width; › hydrants are located clear of parking areas; › roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; › curves of roads have a minimum inner radius of 6m; › the road crossfall does not exceed 3 degrees; and › a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

Table 5.3b *Continued*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
PROPERTY ACCESS	› firefighting vehicles can access the dwelling and exit the property safely.	› 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: › minimum 4m carriageway width; › 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; › a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; › provide a suitable turning area in accordance with Appendix 3; › curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; › the minimum distance between inner and outer curves is 6m; › the crossfall is not more than 10 degrees; › maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and › 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.

Land Use Conflict Risk Assessment

Planning Proposal Lots 831, 832 and 833
DP847683
Reardons Lane Swan Bay

HEALTH SCIENCE ENVIROMENTAL EDUCATION
ENVIRONMENTAL AUDITOR

Land Use Conflict Risk Assessment

Planning Proposal Lots 831, 832 and 833 DP847683 Reardons Lane Swan Bay

Prepared for: Envirosafe Products Property Pty Ltd

Job No: 90/2021_lucra
Version: Final
Date: 10 February 2022
Tim Fitzroy & Associates
ABN: 94120188829
ACN: 120188829

environmental

Tim Fitzroy

Environmental Health Scientist
Environmental Educator
Environmental Auditor

61 Pine Avenue
East Ballina NSW 2478
T | 02 6686 5183
M | 0448 483 837
tim@timfitzroy.com.au
www.timfitzroy.com.au

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Appendices

1. Introduction

Tim Fitzroy & Associates has been engaged by Envirosafe Products Pty Ltd to undertake a Land Use Conflict Risk Assessment (LUCRA) for land described in real property terms as Lots 831, 832 and 833, DP 847683 Reardons Lane Swan Bay (see Site Locality Plan **Illustration 1**). This report has been prepared to accompany a planning proposal to Richmond Valley Council for a 43 lot rural residential development at the subject site. The site is zoned RU1 Primary Production under the Richmond Valley Local Environment Plan (LEP) 2012.

The purpose of the Planning Proposal is to change the town planning provisions applying to Lots 831, 832, 833 DP 847683 to rezone part of the land presently zoned RU1 – Primary Production to R5 – Large Lot Residential in accordance with the provisions of the Richmond Valley Local Environmental Plan 2012.

The land to which this LUCRA relates has an area of approximately 131 hectares and is located on the corner of Reardon's Lane and Darke Lane Swan Bay. The bulk of the land is under sugar cane cultivation. A series of cane drains and road crisscross the site. Site improvements include two free standing dwellings, and a series of sheds.

The subject lands are adjoined by farmland to the north, east and south and rural residential properties to the west and south east. The two existing dwellings are serviced by a septic tank and absorption trenches.

We note that the surrounding land use includes: sugar cane to the north and east and low intensity cattle (beef) grazing to the south east, regrowth bushland to the south and west, together with a smattering of rural dwellings. Further to the north (within 1.5km) is a rural residential development and the Newman's Landscaping Depot.

The *Living and Working in Rural Areas Handbook* (Department of Primary Industries et.al 2007) denotes a number of recommended buffer distances to *residential areas and urban development* and to *rural dwellings*. The planning proposal comprises rual residential allotments range in size from 0.75 to 1.49 hectares. Default buffer to rural residential settings are not specified.

It is our considered view that given the relative size of the proposed allotments that the buffer distances are akin to a *rural dwelling* than a *residential/urban development*. The relevant default buffers applicable to this proposal are therefore as follows:

- *50 metres to grazing of stock*
- *200 metres to sugar cane, cropping and horticulture*
- *200m from Cattle Dip Sites*

Onsite wastewater Management Systems are to be:

- *>250m from Groundwater well/s*
- *>6m up-gradient and >12m down-gradient from property boundaries*
- *>40m from intermittent watercourses/gullies*

Note: The closest point to the active face of the Mooniimba Quarry (Lot 193 DP 755603) to the subject site is approximately 17km, while the closest point of the land occupied by the Mooniimba Quarry to the subject site is approximately 12km.

The subject site exceeds the 1km minimum buffer distance for operations involving blasting (Table 6 Recommended minimum buffers (metres) for primary industries (DPI 2007).

While a default buffer area of 200m width is recommended between cropping and rural dwellings the actual width of the buffer should in practice be dependent on the most limiting factor involved (i.e. the factor that will require the widest buffer). In theory, this would lead to all other factors being adequately addressed.

The proposed development should be designed to minimise instances of incompatibility such that normal farming practice are not inhibited. Where such instances do arise, measures to ameliorate potential conflicts should be devised wherever possible.

Conflict between residential development and agricultural land uses is likely to occur where residential land uses directly abut, or are sufficiently close to, farmland such that they are likely to be affected by agricultural activities. Such conflict can arise from the use of agricultural chemicals noise, dust and odour generating activities. Adverse impacts of rural residential development on farmland include sediment and stormwater run-off.

When considering potential land use conflict between residential and agricultural activities it is important to recognise that all agricultural activities:

- should incorporate reasonable and practicable measures to protect the environment in accord with the Protection of the Environment Operations Act (POEO) and associated industry specific guidelines; and
- are legally conducted as required by other legislation covering workplace health and safety, and the use and handling of agricultural chemicals.

Nevertheless, certain activities practised by even the most careful and responsible farmer may result in a nuisance to adjacent residential areas through, for example, unavoidable odour drift and noise impacts.

Typical conflicts between agricultural enterprises and residential development as provided in Table 1 below:

Table 1 Typical Conflicts between agriculture and adjoining rural residential areas

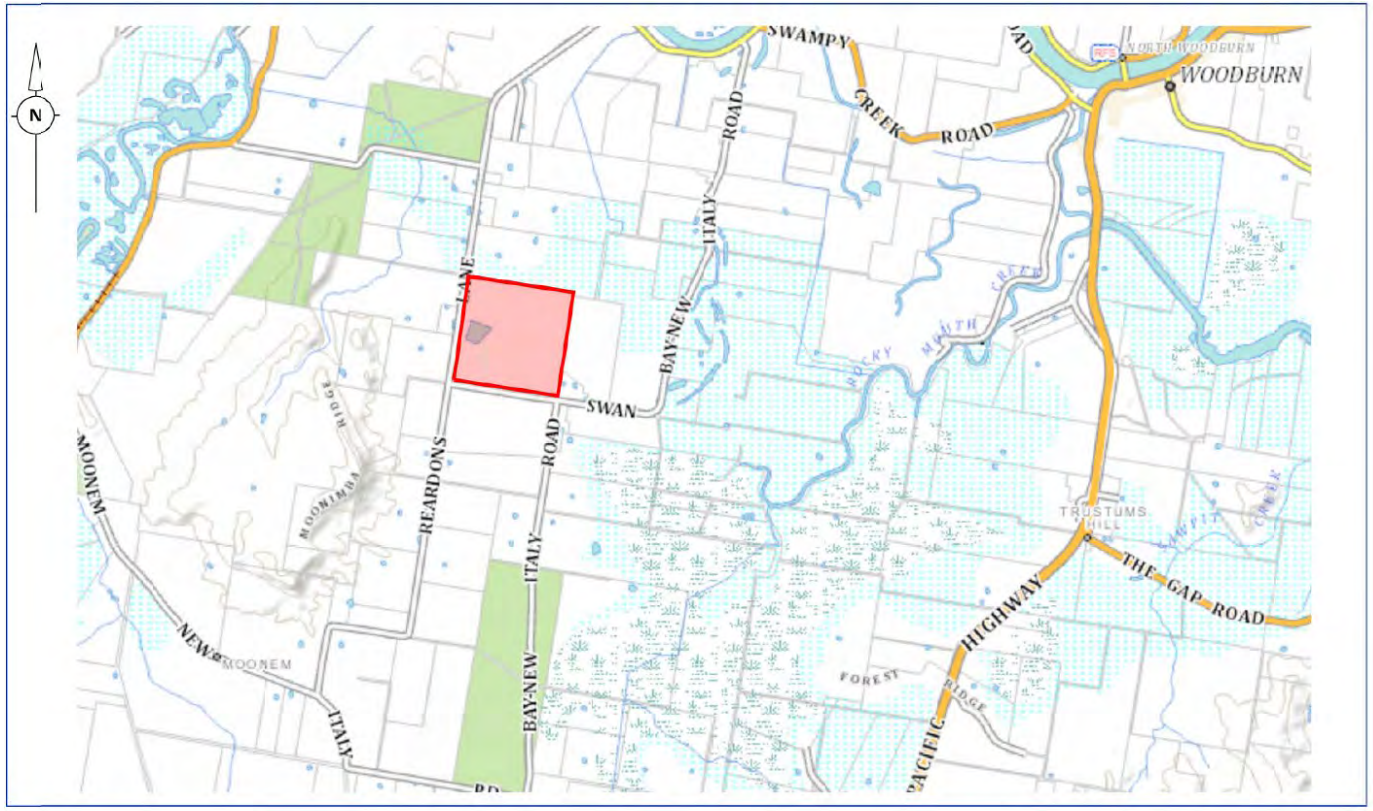
Noise	• Dogs, livestock. • Farming equipment, pumps, spray machines, transport. • Ancillary equipment associated with on-farm processing.
Odour	• Agricultural fertilisers and chemicals. • Intensive animal industries. • Application of effluent to pasture
Health concerns	• Chemicals. • Spray drift. • Smoke.

Water	• Access. • Pumping. • Quantity.
Smoke and ash	• Burning of pasture, stubble or 'rubbish'. • Cane fires.
Visual intrusion	• Hail netting. • Polyhouses.
Nuisance	• Stray dogs. • Vandalism. • Trespass. • Noxious and environmental weeds.

The Living and Working in Rural Areas Handbook (NSW DPI et. al 2007), in particular Chapter 6 Development Control, provides guidance in the assessment and mitigation of potential land use conflict matters and has been used as a resource for this Land Use Conflict Risk Assessment (LUCRA).

This LUCRA has been prepared to assist Council in assessing potential land use conflicts between the proposed development at the subject site and the neighbouring agricultural developments.

Illustration 1 Site Locality Plan



LEGEND:

SITE BOUNDARY

SOURCE PLAN: www.maps.six.nsw.gov.au - accessed 03.07.14

k:\jobs\2014\14227 - newman\planning\planning plans\ndc plans\cad files\14227 - newman rev b.dwg - plan 1 - location plan

Newton Denny Chapelle

Surveyors Planners Engineers

Email: office@newtondennychapelle.com.au

LISMORE 31 Carrington St. Lismore 2480 PH: 66222 1011

CASINO 100 Barker St. Casino 2470 PH: 6662 5000

PLAN 1 - LOCATION

CLIENT: NEWMAN

LOCATION: LOT 831, 832, 833 DP 847683
REARDONS LANE
SWAN BAY NSW

DATE: 17.12.15 REF: 14/227

SCALE: nts DRAWN: bk

1.1 Scope of Works

This assessment has been undertaken to determine the potential land use conflicts between the proposed rural residential development and the neighbouring agricultural enterprises. The proposed development comprises 43 rural residential allotments ranging in size from 0.75 to 1.48 hectares plus residual land.

The bulk of the subject site is under sugar cane cultivation. A series of cane drains and roads crisscross the site. Site improvements include two free standing dwellings, and a series of sheds.

The surrounding land use includes: sugar cane to the north and east and low intensity cattle (beef) grazing to the south east, regrowth bushland to the south and west, together with a smattering of rural dwellings. Further to the north (within 1.5km) is a rural residential development and the Newman's Landscaping depot.

The tasks involved in undertaking this assessment were to:

Step 1: Gather information

- Determine the nature of the land use change and development proposed.
- Assess the nature of the precinct where the land use change and development is proposed.
- Appraise the topography, climate and natural features of the site and broader locality
- Conduct a site inspection
- Describe and record the main activities of the surrounding agricultural land use and their regularity, including periodic and seasonal activities that have the potential to be a source of complaint or conflict.

Step 2: Evaluate the risk level of each activity

- Record each activity on the risk assessment matrix, and identify the level of risk of a land use conflict arising from the activity.

Step 3: Identify the management strategies and responses that could help lower the risk of the issue resulting in a dispute and conflict

- Identify management strategies for each activity
- Prioritise Strategies
- Provide Performance targets for each activity

Step 4: Record the results of the LUCRA

- Summarise the key issues, their risk level, and the recommended management strategies

2. Gather Information

2.1 Nature of the land use change and development proposed

Newton Denny Chapelle (NDC) on behalf of Envirosafe Products Pty Ltd are in the process of preparing a planning proposal to Richmond Valley Council for a 43-lot rural residential development at the subject site (see Site Layout Plan **Appendix A**).

The subject site is legally described as Lots 831, 832 and 833, DP 847683 Reardons Lane Swan Bay. The site has a total of 131ha in area, and has access to both Reardons and Darke Lane. The bulk of the subject site is under sugar cane cultivation. A series of cane drains and roads crisscross the site. Site improvements include two free standing dwellings and a series of farm sheds.

2.2 Nature of the precinct where the land use change and development is proposed

The site is zoned RU1 Primary Production under the Richmond Valley Local Environment Plan (LEP) 2012.

The relevant buffer applicable to this proposal are as follows:

- *50 metres to grazing of stock*
- *200 metres to sugar cane, cropping and horticulture*
- *>250m from Cattle Dip Sites*

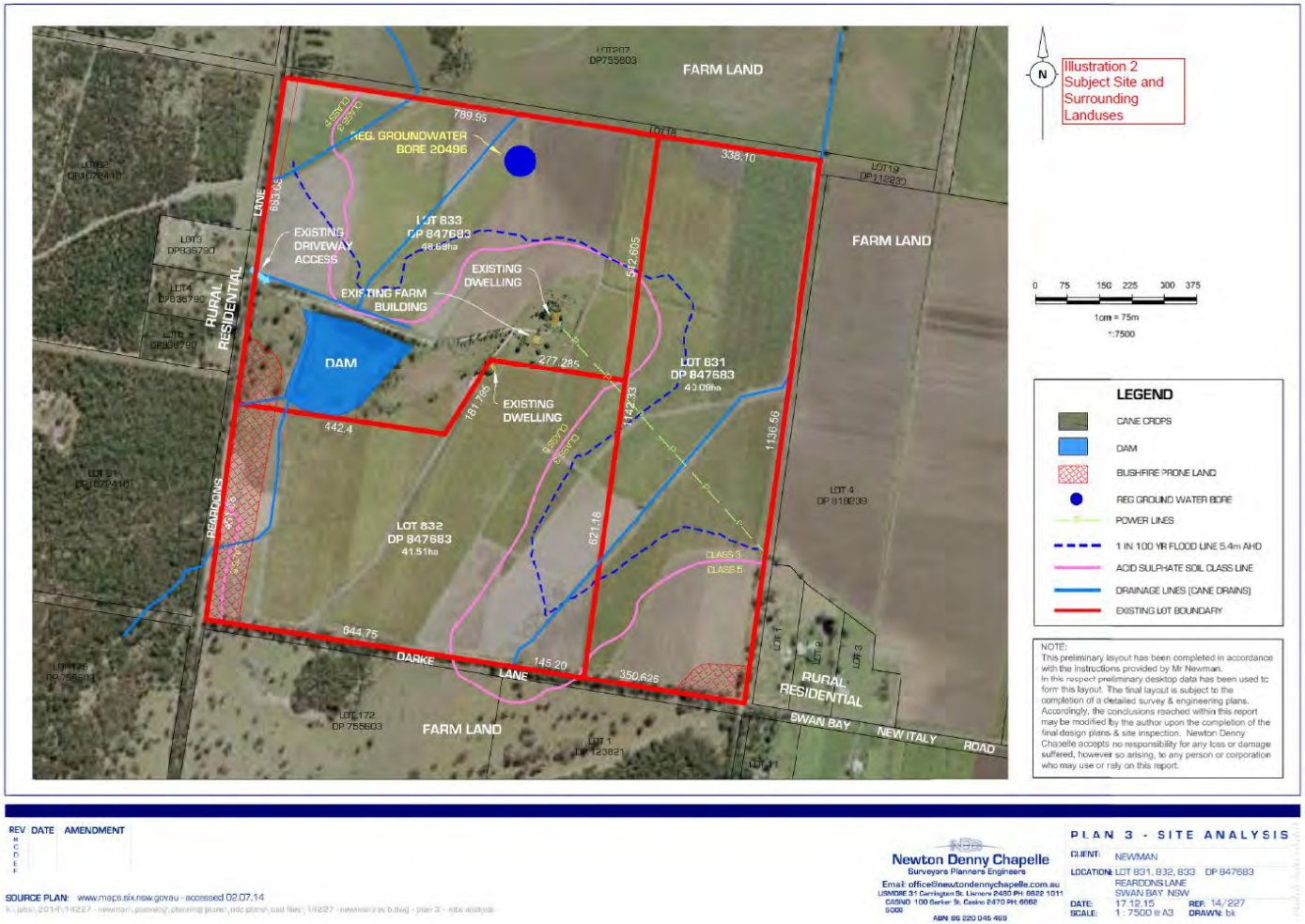
Onsite wastewater Management Systems are:

- *>40 metres intermittent watercourses, gullies*
- *>250m from Groundwater well/s*
- *>6m up-gradient and >12m down-gradient from property boundaries*

The bulk of the subject site is under sugar cane cultivation.

The surrounding land use includes: sugar cane to the north and east and low intensity cattle (beef) grazing to the south east, regrowth bushland to the south and west, together with a smattering of rural dwellings. Further to the north (within 1.5km) is a rural residential development and the Newman's Landscaping depot (1.8km) (see **Illustration 2.2**).

Illustration 2 Subject Site and Surrounding Land uses



2.3 Topography, Climate and Natural Features

The relief of the majority of the site varies between 16 and 4 m AHD. Slopes on the site are in the range of 0 to 7%.

The site is mostly within the sedimentary landscape (Jurassic Walloon shales and sandstones) while the drainage lines in the north east corner in the lower area reflect Quaternary alluvial soil. Other areas of the existing holding are not being subdivided because of their low lying nature in this black alluvium.

The site is situated with the sub-tropical climatic zone and the climate can be described as humid sub-tropical, characterised by hot, humid summers and mild winters. Rainfall is seasonally distributed, being concentrated mainly in the summer months.

Climate averages from the Evans Head Weather Station over the past 15 years are provided **Table 2.1**. Whilst not replicating the exact onsite weather conditions the Evans Head Weather station results provide a good indication of the general weather experienced in the locality.

Wind from the south-easterly quadrant predominates in summer and autumn. South-westerlies are the main winds in winter, whereas in the spring months, wind directions are equally divided between the north and south-east.

Although the strong winds are generally from the south-east and north, strong north-westerly winds, occur approximately one day per month during summer.

Table 2.1 Local Climatic Conditions

Australian Government
Bureau of Meteorology

Climate statistics for Australian locations

Monthly climate statistics

All years of record

Site information

Site name: EVANS HEAD RAAF BOMBING RANGE AWS
Site number: 058212
Latitude: 29.18 °S **Longitude:** 153.40 °E
Elevation: 63 m
Commenced: 1998 **Status:** Open
Latest available data: 03 Apr 2014

Additional information

Additional site information

Nearest alternative sites

1. 058052 TABBIMOBILE STATE FOREST (12.7km)
2. 058065 BROADWATER SUGAR MILL (18.7km)
3. 058012 YAMBA PILOT STATION (27.9km)

View: Main statistics All available | Period: 30 year period not available | Text size: Normal Large

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Temperature															
Mean maximum temperature (°C)	28.1	27.7	26.7	24.4	21.8	19.7	19.5	21.1	24.0	25.3	26.1	27.7	24.3	15	1998 2013
Mean minimum temperature (°C)	19.8	19.7	18.8	16.4	13.2	11.2	10.2	10.8	13.3	15.1	16.8	18.6	15.3	15	1998 2013
Rainfall															
Mean rainfall (mm)	160.3	150.8	176.4	167.0	111.6	187.0	74.9	74.7	53.0	93.0	132.2	86.4	1472.3	16	1998 2014
Decile 5 (median) rainfall (mm)	146.5	146.6	153.6	134.1	112.4	177.7	59.1	51.8	41.4	63.7	132.0	70.8	1464.8	16	1998 2014

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2.4 Site Inspection

A site inspection was conducted of the subject site on 25 October 2021. The land is composed of three ridges with gentle slopes, one along Reardon's Lane, the second running roughly north-east through the centre of the proposed subdivision, and the third on the eastern boundary. An access road exists on this central ridge, from which the land slopes gently to the drainage lines to the east and west. Other than a two shelter belts of pine trees, the remaining land has been cleared and cultivated for growing sugar cane.

Site improvements include two free standing dwellings and a series of sheds. Photographs of the site subject and surrounds were taken (see **Appendix B**).

Wind conditions at the time of inspection were south east approximately 10 to 15 km/hr. Observations recorded during our site inspections did not reveal any distinguishable impacts (noise, odour, dust) from any adjoining operations on the subject site.

2.5 Potential Land Use Conflicts

The following key items have been identified as potential land use conflicts between the surrounding agricultural/horticultural operations and the proposed development.

2.5.1 Agricultural Chemical Spray Drift

The off-target movement of agricultural chemicals can be a cause for concern to residents in proximity to farming areas. These concerns are largely based on fears of exposure to agricultural chemicals but also due to detection of odours associated with the chemical. In addition fertilisers applied to assist the growth of sugar cane can also be of cause of concern and complaint.

Information on farm operations was garnered from discussions with the Farm Operator, Noel Newman. Insecticides, fungicides and fertilisers are applied by direct injection into ground from tractor. As per Protection of the Environment Operation Regulation spraying is restricted to calm conditions to ensure that spray drift is restricted to the target crops. No aerial agricultural spraying is known to occur in the area. Given the use of ground cropping chemical application it is assumed that spray drift would be limited.

Very fine or fine droplets pose the highest risk of spray drift; it is the single most important factor controlling drift potential. The selection of applicators and nozzles that give the correct droplet size range is important.

The higher droplets are released, the greater potential for drift. Given the adjacent land use consists of ground vegetable cropping and the relatively low height at which spray released the risk of spray drift is reduced.

A variety of insecticides, fungicides and fertilisers are used each year on the sugar cane plantation (see **Table 2.2** below). The average frequency and method of application has been provided for chemicals utilised on the sugar cane plantation has also been included in Table 2.2.

Table 2.2 Chemicals (pesticides, herbicides and fertilisers) used on site

Chemicals	Type	Frequency Average	Application	Timing
Insecticides	Lorsban	Once a year during planting	Cane millet dumped into dip and then planted (no spray)	Day
Fungicides	Shirton	1 time each year	Cane millet dumped into dip and then planted (no spray)	Day
Fertilisers	Pot ash, phosphate & nitrogen/urea	Every second year	Injection via tractor	Day

Herbicides	Diuron (diurox)	1 time each year	Boom Spray	Day
	Paraquot	1 time each year	Boom Spray	Day

Note: Rodenticides are not used. Rodents (rats) require protein (found in grass seed) for sustenance. Well maintained perimeter grass to the cane farm is successfully used to manage the rat population. Rats will use cane farm for shelter but cannot live off sugar cane.

The greatest risk of drift potential relates to the use of the Boom Sprayer, however this impact is limited. Boom spraying is undertaken amongst established cane and within 300mm of the ground surface on two occasions per year. It is nevertheless important that all existing protocols are maintained to minimise spray drift.

From a planning perspective, it is not considered practical to base buffer area dimensions on individual chemicals or formulations. Based on the available research on chemical spray drift, the planning guidelines have adopted a minimum width of 200 m where open ground conditions apply (to rural dwellings); and a minimum width of 40 m where a vegetated buffer element can be satisfactorily implemented and maintained.

It should be noted that the recommended vegetated buffer (which includes multiple rows of trees) will not capture 100% of the chemical spray drift, but may reduce spray drift to less than 1% at a sensitive receptor when managed in terms of porosity, litter build up and noxious weed control to ensure effectiveness.

2.5.2 Odour

Odour from cropping and horticulture can arise from use of chemical sprays and fertilisers (inorganic and organic). Such detrimental odours can impact on residential amenity and have the potential to affect public health.

Odour is often a major factor in many complaints about off-site chemical spray drift where there is sometimes no objective evidence of toxic exposure. Some agricultural chemicals contain 'markers' (strong odours) to allow easy identification and these markers or mixing agents are sometimes detected at a distance from the target area and cause concern even though in some circumstances extremely low levels of the active ingredients may be present.

Residents' association of the odour with the chemical is sufficient to raise fears of exposure. In addition perceptions of an odour's acceptability and individual capacity to detect particular odours can vary greatly.

Factors affecting complaints from odour are influenced by the frequency, intensity, duration and offensiveness of the odour. An objectionable odour may be tolerated if it occurs infrequently at a high intensity, however a similar odour may not be tolerated at lower levels if it persists for a longer duration.

2.5.3 Cane Firing

Cane firing as a prelude to cane harvesting is a potential land use conflict for the proposed development. Whilst attempts have been made in recent years to harvest green cane locally, firing of cane remains in place for the foreseeable future.

On the subject site (131 hectare farm) there is four to six cane fires struck each year, depending on the paddock size. The average period of cane fire is 30 minutes, while a large fire will last up to 1 hour (pers.com Noel Newman).

In effect in any given year at the subject site the actual period of cane firing is on average 150 minutes (2.20 hours).

Cane firing is carefully managed by experienced cane farmers. Cane is burnt in the early evening. In the summertime (afternoon) south easterly winds predominant. Cane farmers will allow the south easterly breeze to desist prior to striking the fire. The orientation of the subject site and residual cane farm will result in cane ash and smoke (under slight south easterly breeze) being pushed to the north-west away from future residences within the proposed development.

Cane farmers notify neighbours in advance of firing.

2.5.4 Noise

The most likely types of noise associated with agricultural activity which may lead to land use conflict in the locality would be intermittent noise from tractors and other machinery and during cane harvesting.

Because background noise levels are low in the locality, excessive noise from vehicles, machinery and mechanical equipment may cause complaints from the prospective residents. Complaints are more likely to result when noisy activities are undertaken at night when background noise levels are low and neighbours may be sleeping.

Routine sugar cane operations occur from 6am until 4pm (Monday to Saturday). These times may be extended during the harvesting period. Noisy activities associated with sugar cane operations are intermittent.

Key operations and timetabling resulting in machinery noise from sugar cane production* include:

1. Cultivation (till soil and remove weeds) (3 to 4 times every second year);
2. Planting (once a year);
3. Fertilising (every second year);
4. Spraying (pre-emergents); and
5. Harvesting (12 days per year). Occurs in 4 rounds; 3 days at a time. Generally runs from April to September, weather permitting.

* The above operations and timetabling relate to the existing 131 hectare farm operation.

Given the intermittent and transient nature of farm noise sources coupled with the ample proposed allotments (0.75 to 1.49 hectares) noise decay through distance attenuation only will be sufficient to reduce noise impacts to a negligible level at the nearest affected residences.

2.5.5 Dust

The main sources of dust from a sugar cane cropping include cultivation prior to planting, tractor, harvesting and transport movements. Contemporary farming practices incorporate measures to minimise loss of soil, but at times it is necessary to leave land unplanted for extended periods, which can lead to the movement of dust.

Local conditions, including wind strength and direction, rainfall, humidity and ambient temperatures, soil type, vegetative cover and type of on-site activity determine the extent of the nuisance.

The vegetated buffer designed to capture chemical spray drift will also be effective in reducing conflict resulting from dust.

2.5.6 Surface Water and Sediment Runoff

The proposed development will alter land surface characteristics and the hydrological balance on the subject site and has the potential to impact adjoining farmland. The increase of impermeable surfaces and changes to drainage patterns can accelerate soil erosion, siltation and sedimentation; and increase the risk of flooding.

As the proposed land to be developed is upslope of surrounding cane lane techniques to alleviate conflict due to downstream effects of residential development are proposed which will include suitable erosion, sediment and stormwater control during the construction and operational stages of the development.

A Soil and Water Management Plan for the construction and operation phases of the development and management of stormwater run-off should be prepared. The SWMP should incorporate buffer areas and be designed to divert and spread stormwater to reduce negative impacts on water quality.

2.5.7 Pests

Pests primarily include flies and rodents. Practices that minimise breeding on farm are necessary since pest's impact directly on community amenity and increase the risk of disease transfer. All pest control materials need to be used in strict adherence with labelling directions. They must be correctly stored away from children and domestic animals. Records of pesticide use should also be maintained.

2.5.8 Operating Times

General farm operations are from 6am to 4:00pm, Monday to Saturday. Two staff operate the farm, outside of harvesting, when contract harvesters are employed.

The cane harvest period generally runs from the end of April to September, however the duration is subject to changeable weather conditions.

2.5.9 Chemical Use

Volatile components of chemicals sprayed may affect neighbours if not used in accordance with manufacturer and workplace health and safety requirements. Spraying should also be avoided during adverse weather conditions that may impact on neighbours.

2.5.10 Site Location: Vehicular Access

The subject site has direct access to Reardons and Darke Lanes. Two cane haulage roads exist on the subject site:

- Boyds Lane; and
- Darke Lane.

Boyds Lane is located approximately 300m north of the site dam, while the Darke Lane cane haulage road enters the site from the south. It is unlikely that the proposed

development will be significantly impacted by cane haulage or vehicle deliveries to the adjoining farms/businesses.

Any dust impacts from cane haulage trucks will be mitigated through the installation of a 40 metre wide vegetated buffer along the northern and eastern site boundaries.

3. Land Use Conflict Risk Assessment

3.1 Introduction

In this report, a risk assessment matrix is used to rank the potential Land Use Conflicts in terms of significance. The matrix assesses the environmental/public health and amenity impacts according to the:

- Probability of occurrence; and
- Severity of impact.

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The procedure of environmental/public health & amenity hazard identification and risk control is performed in three stages.

1. Environmental/public health & amenity hazard identification,
2. Risk assessment and ranking,
3. Risk control development.

Procedure:

1. Prepare LUCRA Hazard Identification and Risk Control form.
2. List all hazards associated with each activity.
3. Assess and rank the risk arising from each hazard before “controls” are applied on the LUCRA form.
4. Develop controls that minimise the probability and consequence of each risk using the five level methods. Record these controls on the form.
5. Re-rank each risk with the control in place to ensure that the risk has been reduced to an acceptable level. If the risk ranking is not deemed to be acceptable consideration should be given to whether the proposed activity should be allowed to proceed.

3.2 Risk Assessment and Risk Ranking

It is necessary to differentiate between an 'environmental hazard' and an 'environmental risk'. 'Hazard' indicates the potential for harm, while 'risk' refers to the probability of that harm occurring. For example, the presence of chemicals stored in a building is a hazard, but while the chemicals are stored appropriately, the risk is negligible. **Table 3.1** defines the hazard risks used in this report.

The Risk Ratings (severity of the risks) have been established by assessing the consequences of the risks and the likelihood of the risks occurring.

Table 3.1 Measure of Consequence

Level	Descriptor	Description	Examples/Implications
1	Severe	• Severe and/or permanent damage to the environment • Irreversible with management	• Damage or death to animals, fish, birds or plants • Long term damage to soil or water • Odours so offensive some people are evacuated or leave voluntarily • Many public complaints and serious damage to Council's reputation • Contravenes Protection of the Environment & Operations Act and the conditions of Council's licences and permits. Almost certain prosecution under the POEO Act
2	Major	• Serious and/or long-term impact to the environment • Long-term management implications	• Water, soil or air impacted badly, possibly in the long term. • Limited damage to animals, fish or birds or plants • Some public complaints Impacts pass quickly • Contravenes the conditions of Council's licences, permits and the POEO Act • Likely prosecution
3	Moderate	• Moderate and/or medium-term impact to the environment • Some ongoing management implications	• Water, soil or air known to be affected, probably in the short term • No damage to plants or animals • Public unaware and no complaints to Council • May contravene the conditions of Council's Licences and the POEO Act • Unlikely to result in prosecution
4	Minor	• Minor and/or short-term impact to the environment • Can be effectively managed as part of normal operations	• Theoretically could affect the environment or people but no impacts noticed • No complaints to Council • Does not affect the legal compliance status of Council

Level	Descriptor	Description	Examples/Implications
5	Negligible	• Very minor impact to the environment • Can be effectively managed as part of normal operations	• No measurable or identifiable impact on the environment

This report utilises an enhanced measure of likelihood of risk approach1 which provides for 5 levels of probability (A-E). The 5 levels of probability are set out below in **Table 3.2.**

Table 3.2 Probability Table

Level	Descriptor	Description
A	Almost certain	Common or repeating occurrence
B	Likely	Known to occur, or 'it has happened'
C	Possible	Could occur, or 'I've heard of it happening'
D	Unlikely	Could occur in some circumstances, but not likely to occur
E	Rare	Practically impossible

3.3 Risk Ranking Method

For each event, the appropriate 'probability' (i.e. a letter A to E) and 'consequence' (i.e. a number 1 to 5) is selected.

The consequences (environmental impacts) are combined with a 'probability' (of those outcomes) in the Risk Ranking Table (Table 3.3) to identify the risk rank of each environmental impact (e.g. a 'consequence' 3 with 'probability' D yields a risk rank 9).

The table yields a risk rank from 25 to 1 for each set of 'probabilities' and 'consequences'. A rank of 25 is the highest magnitude of risk that is a highly likely, very serious event.

A rank of 1 represents the lowest magnitude or risk, an almost impossible, very low consequence event.

Table 3.3 Risk Ranking Table

PROBABILITY	A	B	C	D	E
Consequence					
1	25	24	22	19	15
2	23	21	18	14	10
3	20	17	13	9	6
4	16	12	8	5	3
5	11	7	4	2	1

NOTE
A risk ranking of 25-11 is deemed as an unacceptable risk.

A risk ranking of 10-1 is deemed as an acceptable risk.

Thus, the objective is to endeavour to identify and define controls to lower risk to a ranking of 10 or below.

3.4 Risk Reduction Controls

The process of risk reduction is one of looking at controls that have and effect on probability such as the implementation of certain procedures; new technology or scientific controls that might lower the risk probability values.

It is also appropriate to look at controls which affect consequences e.g. staff supply with a mechanism to change impacts or better communications established. Such matters can sometimes lead to the lowering of the consequences.

Table 3.4 LUCRA Site Assessment

Site Feature	Condition/Comments	Potential Conflict
Rural Residential Development/Buffer Distances	The proposed development is • Located on a sugar cane plantation • Within 200m of sugar cane Default Buffer distances: • *50 metres to grazing of stock* • *200 metres to sugar cane, cropping and horticulture* • *40 metres intermittent watercourses*	Moderate
Site Location: Vehicular Access	The subject site has direct access to Reardons and Darke Lanes. It is unlikely that the site will be significantly impacted by vehicle deliveries to the adjoining farms/businesses	Low-Moderate
Aspect	North and Easterly	Low
Exposure	Predominately (28%) from south westerly at 9am and south-easterly(25%) and northerly (18%) breezes at 3pm. (BOM 2014) During calm conditions (1-2%) (BOM 2014)	Moderate

Run-on and Upslope Seepage Site Drainage and Water pollution	Run-on or seepage on adjoining farmland will be minimal given the size of the proposed allotments (0.75 to 1.49 hectares) and the relatively gentle slopes. The relief of the majority of the site varies between 16 and 4 m AHD. Slopes on the site are in the range of 0 to 7%. The site is mostly within the sedimentary landscape (Jurassic Walloon shales and sandstones) while the drainage lines in the north east corner in the lower area reflect Quaternary alluvial soil. Other areas of the existing holding are not being subdivided because of their low lying nature in this black alluvium..	Moderate
Agricultural Chemical Spray Drift	The off-target movement of agricultural chemicals can be a cause for concern to residents in proximity to farming areas. These concerns are largely based on fears of exposure to agricultural chemicals but also due to detection of odours associated with the chemical.	Moderate
Odour	Odour from cropping and horticulture can arise from use of chemical sprays, fertilisers (inorganic and organic), effluent disposal and composting. Such detrimental odours can impact on residential amenity and have the potential to affect public health.	Moderate
Noise	Because background noise levels are low in the locality, excessive noise from vehicles, machinery and mechanical equipment may cause complaints from the prospective residents. Given the intermittent and transient nature of farm noise sources coupled with the ample proposed allotments (0.75 to 1.49 hectares) noise decay through distance attenuation only will be sufficient to reduce noise impacts to a negligible level at the nearest affected residences.	Low
Dust	The main sources of dust from a sugar cane cropping include cultivation prior to planting, harvesting, tractor and transport (cane haulage movements).	Moderate
Smoke and Ash	Smoke and ash related to cane firing is generated under controlled conditions for a limited time each year (the equivalent of 2.20 hours)	Low
Cattle Dip Site	A search of the NSW Department of Primary Industries (DPI) Cattle Dip Site Locator tool (http://www.agric.nsw.gov.au/tools/dipsite-	Low

	locator/) indicated that the closest dipsite is approximately 2km from the subject site. Both the Reardons Lane and the Durrington's Dipsite have been decommissioned (see **Appendix C**). The cattle dip sites exceed the EPA investigation zone from the subject site and offer negligible risk to the proposed development.	

The areas of moderate potential conflict outlined in **Table 3.1** will be addressed through the following **Risk Reduction Controls**:

Table 3.5 Hazard Identification and Risk Control Sheet

Work undertaking Activity	Identified Hazard	Risk Ranking	Method of Control	Controlled Ranking
Use of Agricultural/ Horticultural Sprays	**Health and Safety** Spray drift from an application of agricultural chemicals has the potential to adversely affect the health and safety of persons in non-targeted areas.	**C3 = 13 Unacceptable**	Based on the surrounding land uses we recommend a vegetated buffer to provide an effective safeguard to spray drift. 1. A vegetated buffer based on the following criteria is to be installed on the subject site along the northern and eastern boundary where sugar cane farming abuts the common boundary: • a minimum total width of 40 m; and • contain random plantings of a variety of tree and shrub species of differing growth habits, at spacings of 4–5 m for a minimum width of 20 m. • include species with long, thin and rough foliage which facilitates the more efficient capture of spray droplets; • provide a permeable barrier which allows air to pass through the buffer. A porosity of 0.5 is acceptable (approximately 50% of the screen should be air space); • foliage is from the base to the crown; • include species which are fast growing and hardy; • have a mature tree height 1.5 times the spray release height or target vegetation height, whichever is higher; • have mature height and width dimensions which do not detrimentally impact upon adjacent cropped land;	**C4 = 8 Acceptable**

			• include an area of at least 10 m clear of vegetation or other flammable material to either side of the vegetated area; Note: The Pesticides Act 1999 regulates the use of pesticides in NSW. Management practices must either eliminate spray drift or at least minimise it to a level where it will not cause adverse health impacts.	
Odour	Chemical sprays, fertilisers (inorganic and organic)	**B4 = 12 Unacceptable**	The nominated vegetated buffer designed to capture chemical spray drift will also be effective in reducing conflict resulting from odour	**D4 = 5 Acceptable**
Noise	Vehicles, machinery,	**D3 =9 Acceptable**	The most likely types of noise associated with agricultural activity which may lead to land use conflict in the locality would be intermittent noise from tractors and other machinery. Measures to reduce conflict include: Given the intermittent and transient nature of farm noise sources coupled with the ample proposed allotments (0.75 to 1.49 hectares) noise decay through distance attenuation only will be sufficient to reduce noise impacts to a negligible level at the nearest affected residences. Standard (Category 1) building design will be sufficient to afford acoustic protection to residents	**D4 = 5 Acceptable**
Dust	Cultivation prior to planting, tractor and	**B3 = 17 Unaccep**	The nominated vegetated buffer designed to capture chemical spray drift will also be effective in reducing conflict resulting from dust.	**D4 = 5 Acceptable**

	transport (cane haulage) movements	**table**		
Residential Development /Buffer Distances	The proposed development is approximately • 40m vegetated buffer to northern and eastern boundaries • 5m vegetated buffer to cattle grazing	**B3 = 17 Unacceptable**	The nominated vegetated buffer designed to capture chemical spray drift will also be effective in reducing conflict resulting from activities associated with surrounding land uses.	**D4 = 5 Acceptable**
Run-on and Upslope Seepage Site Drainage and Water pollution	Increase of impermeable surfaces and changes to drainage patterns can accelerate soil erosion, siltation and sedimentation;	**C3 = 13 Unacceptable**	A Soil and Water Management Plan for the construction and operation phases of the development and management of stormwater run-off should be prepared. The SWMP should incorporate buffer areas including: • Incorporate designs to divert and spread stormwater to reduce conflicts from stormwater run-off between the proposed development and adjacent farmland. • A minimum 40m buffer from Onsite wastewater management system to dam and gullies	**D4 = Acceptable**
Cane Firing	Smoke and ash from fires	**C3 = 13 Unacceptable**	Cane firing is carefully managed by experienced cane farmers. Cane is burnt in the early evening. In the summertime (afternoon) south easterly winds predominant. Cane farmers will allow the south easterly breeze to desist prior to striking the fire. The orientation of the subject site and residual cane farm will result in cane ash and smoke (under	**D4 = Acceptable**

			slight south easterly breeze) being pushed to the north-west away from future residences within the proposed development. Cane farmers notify neighbours in advance of firing	

4. Discussion

While a default buffer area of 200m width is recommended between cropping and rural dwellings the actual width of the buffer should in practice be dependent on the most limiting factor involved (i.e. the factor that will require the widest buffer). In theory, this would lead to all other factors being adequately addressed.

The LUCRA identified that the most limiting factor is agricultural spray drift and odour.

The proposed development should be designed to minimise instances of incompatibility such that normal farming practice are not inhibited. Where such instances do arise, measures to ameliorate potential conflicts should be devised wherever possible.

Conflict between rural residential development and agricultural land uses is likely to occur where residential land uses directly abut, or are sufficiently close to, farmland such that they are likely to be affected by agricultural activities. Such conflict can arise from the use of agricultural chemicals noise, dust and odour generating activities. Adverse impacts of residential development on farmland include sediment and stormwater run-off.

When considering potential land use conflict between residential and agricultural activities it is important to recognise that all agricultural activities:

- should incorporate reasonable and practicable measures to protect the environment in accord with the Protection of the Environment Operations Act (POEO) and associated industry specific guidelines; and
- are legally conducted as required by other legislation covering workplace health and safety, and the use and handling of agricultural chemicals.

Nevertheless, certain activities practised by even the most careful and responsible farmer may result in a nuisance to adjacent residential areas through, for example, unavoidable odour drift and noise impacts.

4.1 Vegetated Buffers

The use of vegetated buffers to separate incompatible land uses is gaining increasing interest as a means of reducing the need for physical separation and hence increasing development opportunities. Biological buffers can also contribute to increased biodiversity, shade, visual improvements, soil stability, water quality and amenity. The role of appropriately designed vegetative buffers in intercepting chemical drift and providing visual barriers is well recognised. Such benefits, however, are only derived from established and well-maintained buffers, which may take many years to realise and can prove difficult to enforce.

Biological buffers can also affect the local microclimate (either positively or negatively) through shading, taking up of water and nutrients, and altered airflow patterns. They

can also impede the views and amenity of nearby residents and, if inappropriately managed, can harbour exotic weeds or pests.

Vegetated buffers have other advantages in that they:

- create habitat and corridors for wildlife;
- increase the biological diversity of an area, thus assisting in pest control;
- favourably influence the microclimate;
- are aesthetically pleasing;
- provide opportunities for recreational uses;
- contribute to the reduction of noise and dust impacts.

In order to maximise beneficial effects and effectively reduce conflict, biological buffers need to be well planned and managed. This includes effective provision for ongoing management and maintenance of the values of the vegetated barrier so that it performs its function as a buffer.

It is recommended that a landscape plan be prepared indicating the extent of the buffer, the location and spacing of proposed and existing trees and shrubs and a list of tree and shrub species to be planted. The application should also contain details concerning proposed ownership of the vegetated buffer and the means by which the buffer is to be maintained.

All plantings are to be mulched, fertilised and watered for the first twelve months after planting.

The landscape plan must indicate:

a) proposed location for planted shrubs and trees;
b) botanical name of shrubs and trees to be planted;
c) mature height of trees to be planted;
d) location of trees identified for retention in the development application plans.

As a general rule, buffer areas should be properly designed to avoid special maintenance requirements whilst achieving their maximum desired effect of separating conflicting land uses. However, it will be necessary to ensure ongoing maintenance of buffer areas, including replanting, thinning, management for fire protection, herbicide damage, noxious weeds, feral animals, litter build-up etc. so that the buffer areas continue to be effective in reducing conflict. Vegetated buffers may require ongoing attention to maintain a porosity of 0.5 with suitable lower and upper storey vegetation to ensure their effectiveness in capturing spray drift.

Vegetated buffers may serve as components of wildlife corridors and improve opportunities for conserving wildlife habitat.

To achieve effective management, clear responsibilities for maintenance should be determined before the buffer areas are implemented. Responsibilities for maintenance will be largely determined by ownership.. In general, maintenance of buffer areas in private ownership will be the responsibility of the proprietor, as controlled by development conditions. The recommended mechanism is through planning conditions imposed on a development approval. These conditions attach to the land and are binding on successors in title.

The necessary controls to ensure this maintenance is carried out must be in place at the time the buffer area is created.

4.2 Building Orientation and Design

The most likely types of noise associated with agricultural activity which may lead to land use conflict in the locality would be intermittent noise from tractors and other machinery.

Measures to reduce land use conflict include:

- Given the intermittent and transient nature of farm noise sources coupled with the ample proposed allotments (0.75 to 1.49 hectares) noise decay through distance attenuation only will be sufficient to reduce noise impacts to a negligible level at the nearest affected residences.

- Standard (Category 1) building design will be sufficient to afford acoustic protection to residents.

4.3 Stormwater Management

The preparation of a Soil and Water Management Plan for the construction and operation phases of the development and management of stormwater run-off is required to minimise the potential for erosion and sedimentation, nutrient runoff and pollution of adjacent farm land, water courses and wetlands.

The nominated buffer areas can also be designed to utilise techniques such as water spreading and water diversion to reduce conflicts from stormwater run-off between residential development and adjacent farmland. Ongoing maintenance and enforcement must be identified and incorporated into conditions of approval.

4.4 Onsite Wastewater Management

Patterson (July 2006) advised that based upon the soil assessment as being unsuitable for septic tank and traditional trenches, he recommends that only aerated wastewater treatment systems with subsurface drip irrigation be installed on each of the 43 lots. A variation could be the use of a compost toilet and greywater treatment system. Mounds are not appropriate as the soil has an excellent deep loam for the surface soil, groundwater is at more than 5 m and the soil has an extremely high phosphorus sorption capacity.

It is recommended that greater and secondary treated effluent dispersal systems be installed a minimum 40m from any gully, drain on dam to ensure that all wastewater is sufficiently assimilated onsite.

5 Conclusions and Recommendations

This Land Use Conflict Risk Assessment is based on:

- a review of Preliminary Site Plan;
- discussions with Noel Newman;
- Liaison with Luke Fittock (NDC);
- site inspection; and
- review of surrounding land uses.

This LUCRA has concluded that the subject site is suitable for the proposed development as described in **Appendix A** subject to the recommendations provided below

- A vegetated buffer based on the following criteria is to be installed on the subject site along the northern and eastern boundary:
    - a minimum total width of 40 m; and
    - contain random plantings of a variety of tree and shrub species of differing growth habits, at spacings of 4–5 m for a minimum width of 20m.
    - contain random plantings of a variety of tree and shrub species of differing growth habits, at spacings of 4–5 m for a minimum width of 20 m.
    - include species with long, thin and rough foliage which facilitates the more efficient capture of spray droplets;
    - provide a permeable barrier which allows air to pass through the buffer. A porosity of 0.5 is acceptable (approximately 50% of the screen should be air space);
    - foliage is from the base to the crown;
    - include species which are fast growing and hardy;
    - have a mature tree height 1.5 times the spray release
    - height or target vegetation height, whichever is higher;
    - have mature height and width dimensions which do not detrimentally impact upon adjacent cropped land;

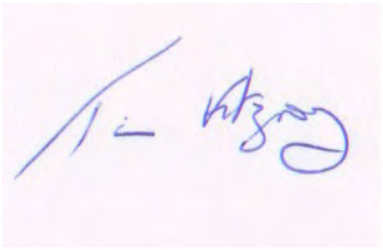
- Given the intermittent and transient nature of farm noise sources coupled with the ample proposed allotments (0.75 to 1.49hectares) noise decay through distance attenuation only will be sufficient to reduce noise impacts to a negligible level at the nearest affected residences.
- Standard (Category 1) building design will be sufficient to afford acoustic protection to residents
- The preparation of a Soil and Water Management Plan for the construction and operation phases of the development and management of stormwater run-off is required to minimise the potential for erosion and sedimentation, nutrient runoff and pollution of the farm dam.
- The nominated buffer areas can also be designed to utilise techniques such as water spreading and water diversion to reduce conflicts from stormwater run-off between residential development and adjacent farmland. Ongoing

maintenance and enforcement must be identified and incorporated into conditions of approval.
- Secondary treated effluent is to be applied a minimum of 40m setback from the dam, any gully or drain.

A number of factors have led to this conclusion including:

- No aerial agricultural spraying is known to occur in the area.
- Very fine or fine droplets pose the highest risk of spray drift; it is the single most important factor controlling drift potential. The higher droplets are released, the greater potential for drift. Given the adjacent land use consists of ground cropping and limited boom spray application and consequently the relatively low height at which spray is released the risk of spray drift is reduced.
- Low intensity cattle (beef) grazing to the south east, offer little potential risk of conflict.
- Noise associated with agricultural activity which may lead to land use conflict in the locality would be intermittent noise from tractors and other machinery.
- Cane firing is managed by experienced cane farmers and limited to an average of 2.20 hours per season.

This report has been prepared by Tim Fitzroy of *Tim Fitzroy & Associates.*



Tim Fitzroy
Environmental Health Scientist

References

Department of Primary Industries et al 2007 Living and Working in Rural Areas-a handbook for managing land use conflicts on the NSW North Coast, NSW

Planning Guidelines Separating Agricultural and Residential Uses, Queensland Department of Natural Resources 1997

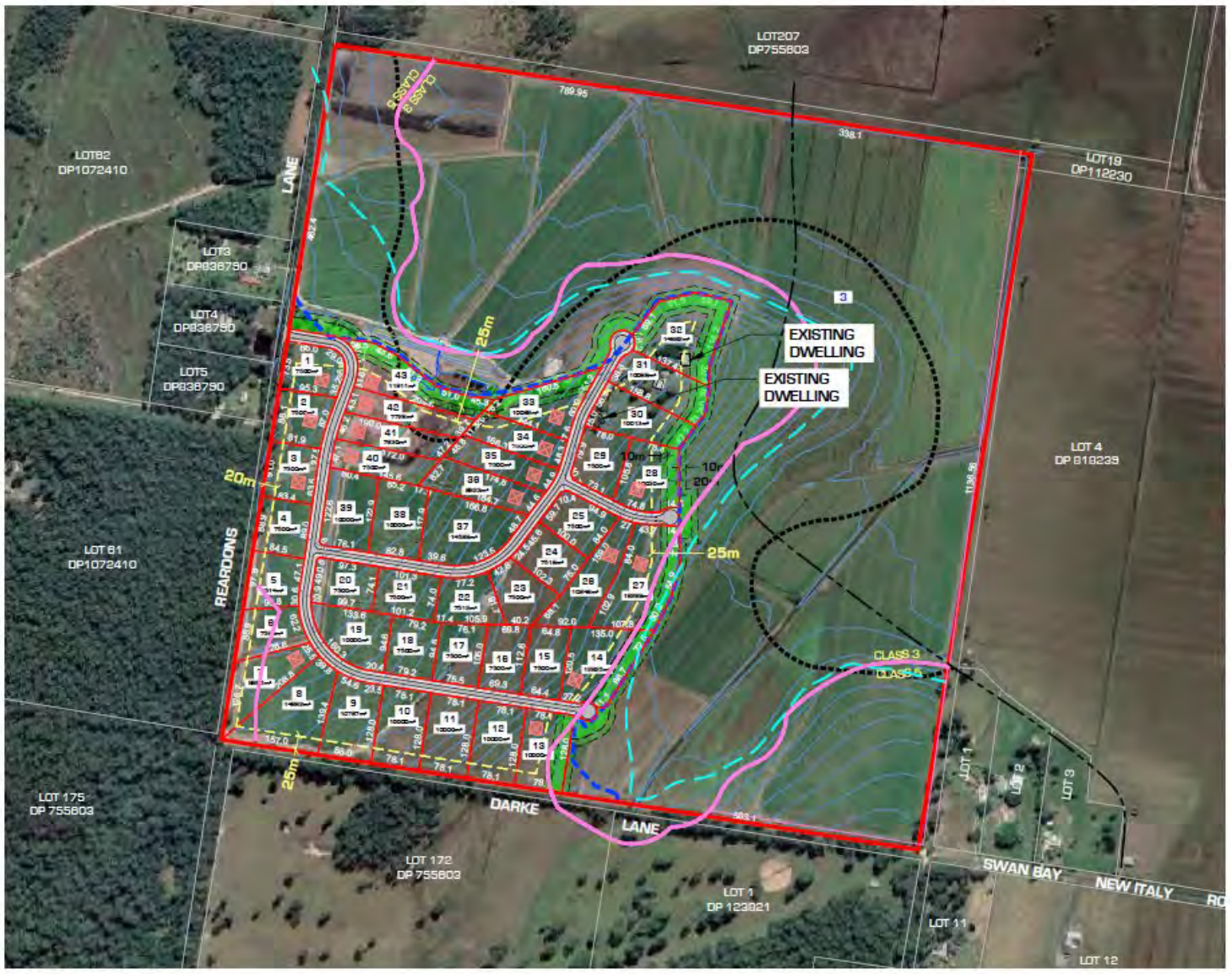
Personal Communication, Noel Newman 2013-2014 & 2021

Personal Communication, Luke Fittock 2021

Patterson, Robert, 2006, Onsite Wastewater Assessment for 66 lot Rural Residential Subdivision Lots 831, 832 and 833 DP 847683 Reardons Lane Swan Bay

Copyright and Usage

A Conceptual Site Layout Plan



LEGEND

- SITE BOUNDARY
- EXISTING BOUNDARY
- PROPOSED LOT BOUNDARIES
- RURAL RESIDENTIAL STRATEGY LINE
- CONTOURS
- REGIONALLY SIGNIFICANT FARMLAND
  SOURCE:
  Northern Rivers Farmland Protection Project
  Final Map 2005 (Section 117(2) Direction)
- APPROX. RL 5.4m AHD
  (1 IN 100 YEAR FLOOD LINE)
- PRIME AGRICULTURAL LAND - CLASS 3
- 40m VEGETATION BUFFER
  20m PLANTED &
  10m SEPARATION BUFFER EITHER SIDE
- ACID SULPHATE SOIL CLASS LINE
- APZ BUFFER
- INDICATIVE DWELLING ENVELOPE 20m X 20m

NOTE:
This preliminary layout has been completed in accordance with the instructions provided by Noel Newman.
In this respect preliminary desktop data has been used to form this layout. The final layout is subject to the completion of a detailed survey & engineering plans.
Accordingly, the conclusions reached within this report may be modified by the author upon the completion of the final design plans & site inspection. Newton Denny Chapelle accepts no responsibility for any loss or damage suffered, however so arising, to any person or corporation who may use or rely on this report.

REV	DATE	AMENDMENT
F	29.07.21	LOTS 14, 27 & 28 BOUNDARY AND ROAD
G	15.09.21	LOTS 43 AREA CORRECTED
H	01.11.21	VEGETATION BUFFER ADDED
I	04.01.22	ACID SULPHATE SOIL CLASS LINE ADDED
J	07.02.22	RURAL RES. LINE ADDED

SOURCE PLAN: N/A

I:\jobs\2014\14227 - newman\planning\planning plans\ndc plans\ cad files\ 14227 - newman.rev j.dwg - plan 4 - conceptual subdivision plan

Newton Denny Chapelle
Surveyors Planners Engineers
Email: office@ndc.com.au
31 Carrington St Lismore 2480
PH: 6622 1011
ABN: 18 094 669 845

PLAN 4 - CONCEPTUAL SUBDIVISION PLAN

CLIENT: N. NEWMAN REV J
LOCATION: LOT 831, 832, 833 DP 847683
REARDONS LANE
SWAN BAY NSW
DATE: 08.02.2022 REF: 14/227
SCALE: 1 : 7500 @ A3 DRAWN: CD

B Photographs

Photo A Existing Cane Farm

Photo B Secondary Dwelling

Photo C Principal Dwelling

C Cattle Dip Site Locator

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : 14227

Client Service ID : 656246

Newton Denny Chapelle Ndc

PO Box 1138

LISMORE New South Wales 2480

Attention: Newton Denny Chapelle Ndc

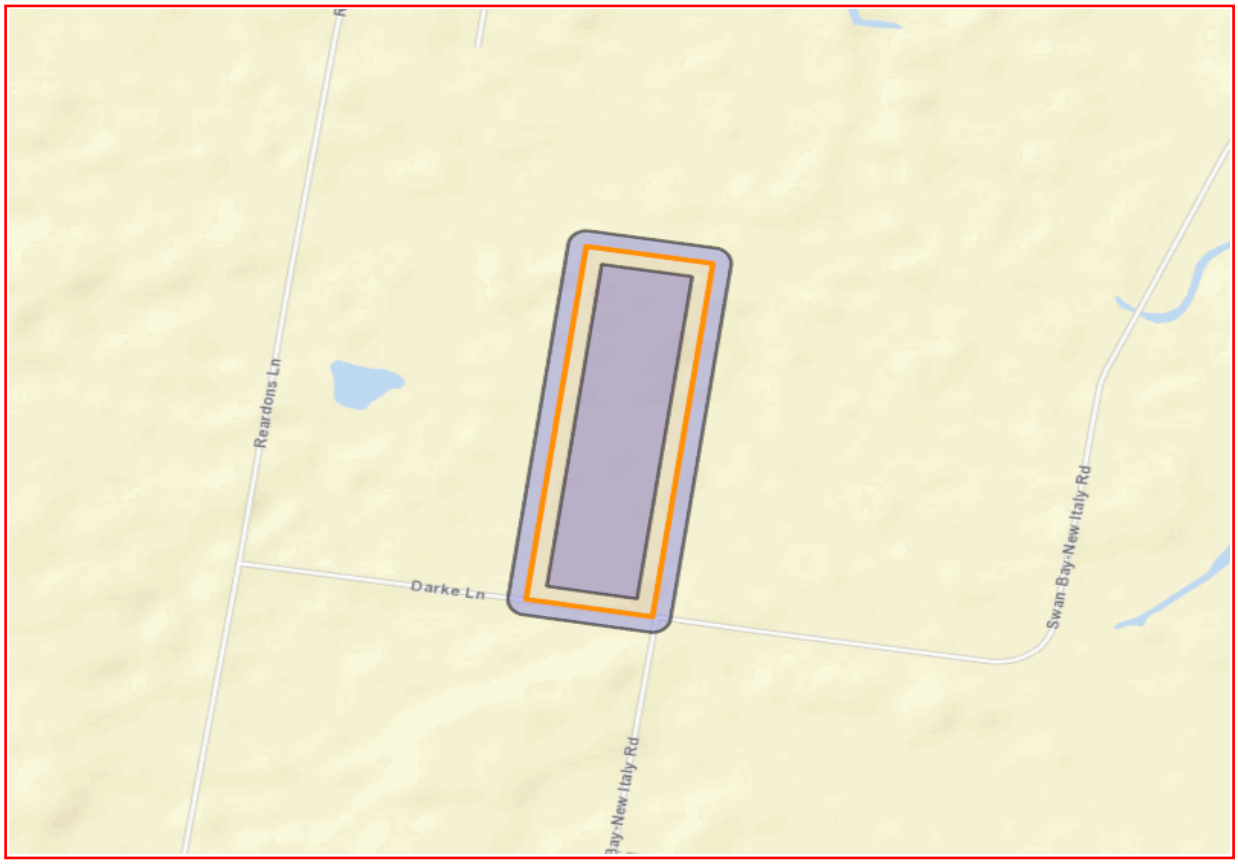
Email: admin@newtondennychapelle.com.au

Date: 03 February 2022

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 831, DP:DP847683, Section : - with a Buffer of 50 meters, conducted by Newton Denny Chapelle Ndc on 03 February 2022.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Level 6, 10 Valentine Ave, Parramatta 2150
Locked Bag 5020 Parramatta NSW 2124
Tel: (02) 9585 6345

ABN 34 945 244 274
Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : 14227

Client Service ID : 656248

Newton Denny Chapelle Ndc

Date: 03 February 2022

PO Box 1138
LISMORE New South Wales 2480

Attention: Newton Denny Chapelle Ndc

Email: admin@newtondennychapelle.com.au

Dear Sir or Madam:

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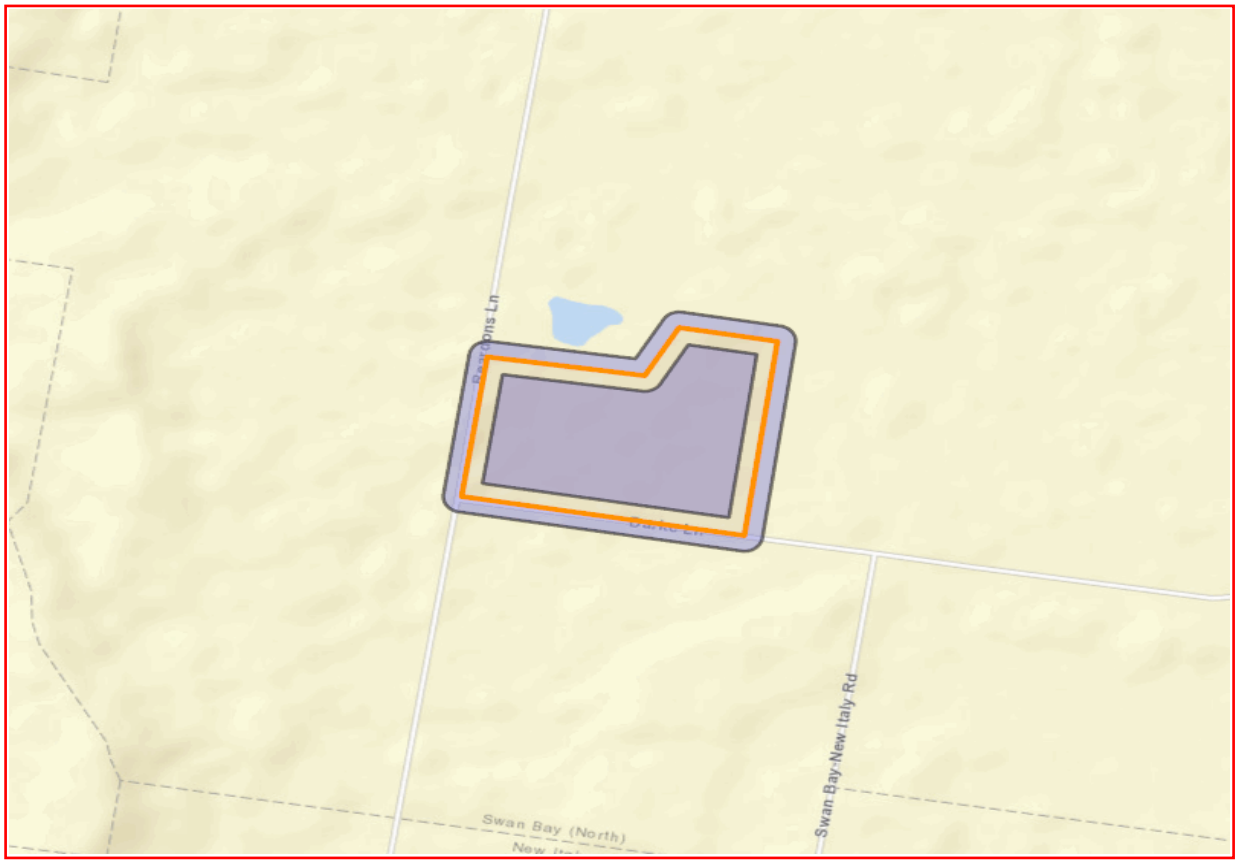

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Search Result

Your Ref/PO Number : 14227

Client Service ID : 656249

Newton Denny Chapelle Ndc

Date: 03 February 2022

PO Box 1138
LISMORE New South Wales 2480

Attention: Newton Denny Chapelle Ndc

Email: admin@newtondennychapelle.com.au

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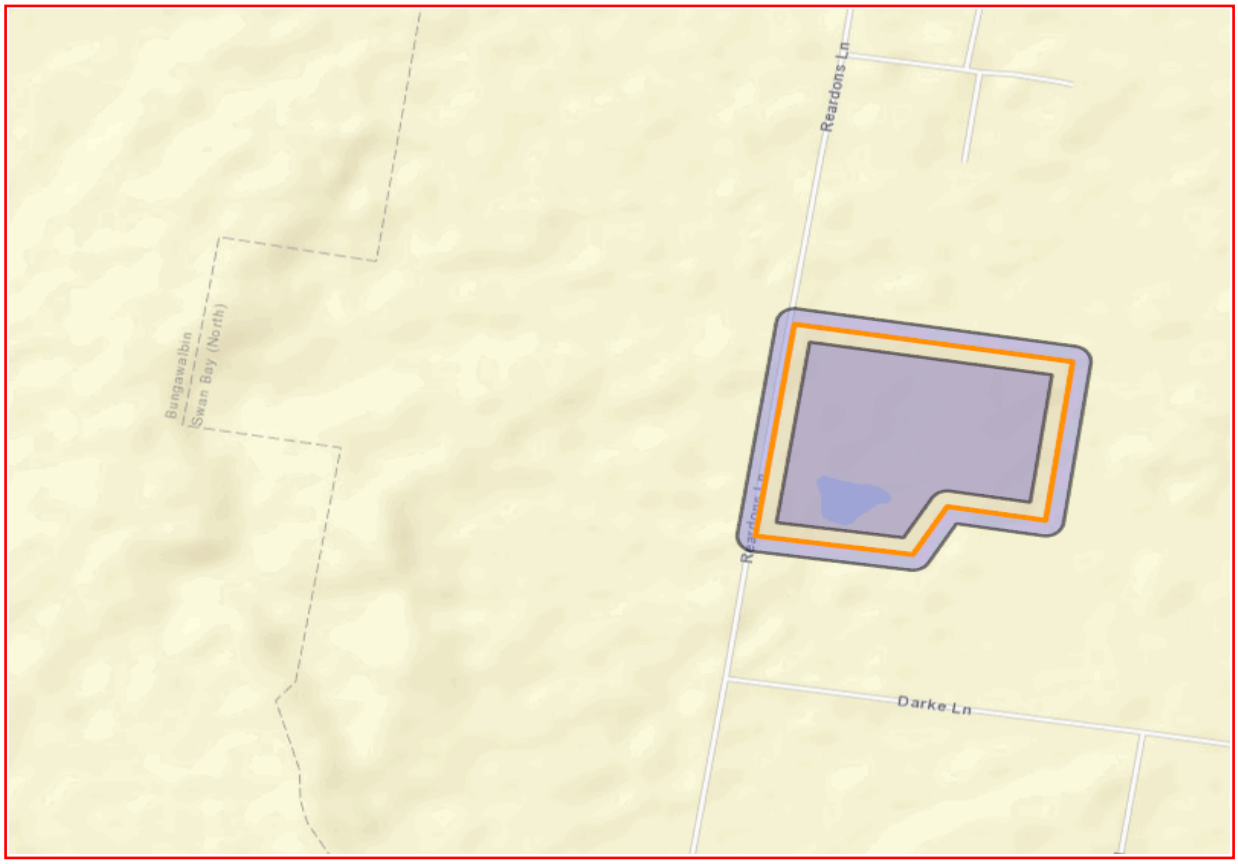

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BOGAL LOCAL ABORIGINAL LAND COUNCIL

PO BOX 72 CORAKI NSW 2471
PO BOX 72 CORAKI NSW 2471

TELEPHONE: (02) 6683 2510 FACSIMILE: (02) 6683 2698
TELEPHONE: (02) 6683 2510 FACSIMILE: (02) 6683 2698

ABN 79 408 575 142
ABN 79 408 575 142

bogallalc@bigpond.com
bogallalc@bigpond.com

15th March 2007
15th March 2007

Harrison Shepherd Pty Ltd
Harrison Shepherd Pty Ltd
Professional Surveyors and
Professional Surveyors and
Consultants
Consultants
3/19 Coldstream Street
3/19 Coldstream Street
PO Box 397
PO Box 397
Yamba NSW 2464
Yamba NSW 2464

Dear Wendy Shepherd,
Dear Wendy Shepherd,

Your request for Bogal LALC to be involved in an Aboriginal Heritage Assessment, for the proposed rezoning of land located at part Lot 66, along Reardons Lane - Swan Bay, has been completed.
Your request for Bogal LALC to be involved in an Aboriginal Heritage Assessment, for the proposed rezoning of land located at part Lot 66, along Reardons Lane - Swan Bay, has been completed.

This was achieved on Thursday the 15th of March, 2007.
This was achieved on Thursday the 15th of March, 2007.

Present - Tim Torrens & Victor Williams (Bogal LALC Representatives)
Present - Tim Torrens & Victor Williams (Bogal LALC Representatives)

We began the assessment starting from the southern side of the area in question.
We began the assessment starting from the southern side of the area in question.

Due to disturbance caused from past and present land activities such as slashing, ploughing & cane farming, the area assessed didn't offer much hope of finding anything of cultural significance at ground level.
Due to disturbance caused from past and present land activities such as slashing, ploughing & cane farming, the area assessed didn't offer much hope of finding anything of cultural significance at ground level.

Therefore, Bogal LALC has no objections to the proposed rezoning, of the land in question at part Lot 66, along Reardons Lane – Swan Bay.
Therefore, Bogal LALC has no objections to the proposed rezoning, of the land in question at part Lot 66, along Reardons Lane – Swan Bay.

Should you require any further information, please do not hesitate to contact me on the above number.
Should you require any further information, please do not hesitate to contact me on the above number.

For and on behalf of Bogal LALC
For and on behalf of Bogal LALC

Tim Torrens
Tim Torrens

Consultant – Sites Officer
Consultant – Sites Officer

COPY
sent 5/9/16.

Date: 29 August 2016
Our Ref: 14/227
Your Ref: PP2016/0003

General Manager
Richmond Valley Council
Locked Bag 10
CASINO NSW 2470

Attn: Mr Craig Rideout

Dear Craig,

Re: Gateway Planning Proposal
Reardons Lane, Swan Bay

Thank you for the opportunity to provide a response to Council's request for additional information and our subsequent meeting at Richmond Valley Council's office in Casino. Please find below a response to the matters raised.

1. Supply and Demand

We have undertaken a review of the supply and demand of lot release within the Swan Bay precinct and provide the following justification and respectfully request Council continue processing the Planning Proposal. The information below has been prepared following a meeting with Richmond Valley Council Strategic Planning staff and discussions with the Proponent of the proposed development Mr Noel Newman.

As Council is aware, Table 6.2 of the Richmond River Shire Rural Residential Development Strategy implements a lot allocation of 80 lots for the first ten years between 1999 – 2009 for the Woodburn catchment district. However, further discussion with Council has identified that DUAP (Department of Urban Affairs and Planning) previously stipulated that an average 40 lot supply be available at any one time within each 5 year period.

The below estimated supply and demand projections for the next 5 year period are based on a realistic take up rate of lots within the Swan Bay precinct and has accounted for 'lead time' in which a subdivision development typically requires for the preparation, lodgement and assessment of a Development Application, construction of the subdivision and registration of the lots at the NSW Land Titles Office together with the marketing and sales period. The below projection also takes into account lead time for the completion of the current Planning Proposal being assessed under PP2016/0003.

The projected number of lots over the next 5 year period is calculated at 42 lots which is consistent with the 40 lot average previously stipulated by DUAP. However, by the time the

current Planning Proposal has progressed through to the sale and development of the lots post the development application and registration period at the NSW LTO, it is reasonable to consider that the current supply of lots will have further dwindled due to demand.

The below table should be read in conjunction with the attached supply and demand diagram.

Projected Supply and Demand of Lots within Swan Bay

Area	Lots approved via a Planning Proposal/Development Application	Projected supply of lots over the next 5 years which accounts for 'lead time into the development', marketing and sales period
1	Land is rezoned for 56 lots however a Development Application has not been lodged. NDC understands that our client Mr Noel Newman has spoken with the developer and advises that whilst the land has been rezoned, the Proponent of Area 1 intends to only likely develop 10 lots over the next few years. However, a conservative figure of 15 lots has been assumed.	Assumed **15 lots**
2	Area 2 has been approved for 16 lots that were registered in 2005 therefore falling within the 1st 10 year allocation of rural residential lots within the Woodburn Catchment. The Proponent of Area 2 Mr Noel Newman, has advised that all but 2 lots have houses constructed on them. Therefore 2 lots have been factored into this assessment.	**2 lots**
3	This land is owned by Noel Newman's brother and involves 14 lots. Noel has advised that it is his brother's intention to put 4 lots on the market in the first instance and 1 lot per year thereafter. Therefore 8 lots have been assumed over the next 5 years.	Assumed **8 lots**
4	Noel Newman's existing subdivision development approved via Development Application 2014.221 for 20 lots. Subdivision yet to be registered at the NSW Land Titles Office. Currently, Noel has advised that 5 lots have been sold off the plan and 3 more have interested buyers. Based on this scenario, and discussion with the developer it is reasonable to assume	Assumed **5 lots**

	that 15 lots could be sold and developed over the next 1-3 years. Accordingly 5 lots have been factored into this assessment at the time the lots subject to the current Planning Proposal PP2016/0003 become available for development post the development application and registration period at the NSW LTO.	
5	Current Planning Proposal being assessed under PP2016/0003 for 76 lots. The Proponent Noel Newman has indicated that he intends on staging the construction of the subdivision which will involve 10 – 12 lots in the first stage which could occur 1.5 – 2 years post Development Application lodgement. Therefore 12 lots have been factored into this assessment once the marketing and sales period are taken into account.	Assumed **12 lots**
6	It is understood that this area involves 14 lots however we are advised by Council this is a 'sleeper' development and is therefore not included within the supply and demand calculation.	Assumed **Nil**.
Assumed Total		**42 Lots**

Based on the above estimated supply and demand projection of lots within Swan Bay over the next 5 year period, it is considered appropriate for Richmond Valley Council to continue processing the Planning Proposal in the manner presented. In this regard, the estimated projected supply is calculated at 42 lots which is consistent with the 40 lot average previously stipulated by DUAP. Importantly as submitted above, by the time the current Planning Proposal has progressed through to the sale and development of the lots post the development application and registration period at the NSW LTO, the current supply of lots will have further dwindled due to demand.

Point 1 Agricultural Assessment
The Proponent will engage an Agricultural Consultant to address the agricultural matter raised by Council. This report will be submitted to Council under separate cover.

Point 2 Amended Zoning Plan
Enclosed is an amended split zoning plan identifying the R5 – Large Lot Residential zone and RU1 – Primary Production zone which aligns with the 1 in 100 year flood level.

To justify having parts of the lots located over both the R5 and RU1 zone, the following points of justification are provided:

- The extension of lots into the RU1 zone provides acreage to those lots within the subdivision. The creation of larger acreage lots provides a good variety of lot sizes within the estate in conjunction with smaller sized lots which is considered to improve the viability and marketability with regard to future sale of the lots. The mix of lot sizes will accommodate different user requirements and preferences of future land owners.
- The viability of the land will be realised through siting future dwellings within the lots on land located above the 1 in 100 year flood line in accordance with Council's flood controls.

Point 3 On-site Wastewater
The Proponent will consider the engagement of a suitable on-site wastewater consultant upon receiving confirmation from Richmond Valley Council that the Planning Proposal has satisfied the lot supply and demand matter, and the other matters raised by Council.

The aim of preparing this wastewater assessment will be to justify that future lots ranging between 5,000m^2 and 1 hectare still have capacity to support on-site wastewater management systems.

As per justification provided above under point 2, the creation of these smaller sized lots below 1 hectare affords a greater variety and mix of lot sizes which will improve the marketability of future land sales. The development will accommodate different user requirements and preferences of future land owners who wish to own smaller rural residential sized lots without the burden of having to maintain larger acreage sized lots greater than 1 hectare.

Point 4 Reduced Minimum Lot Size Map
We confirm that those lots proposed with lot sizes less than 1 hectare are located above the mapped 1 in 100 year flood limit. For clarity the enclosed minimum lot size map overlays the 1 in 100 year flood limit.

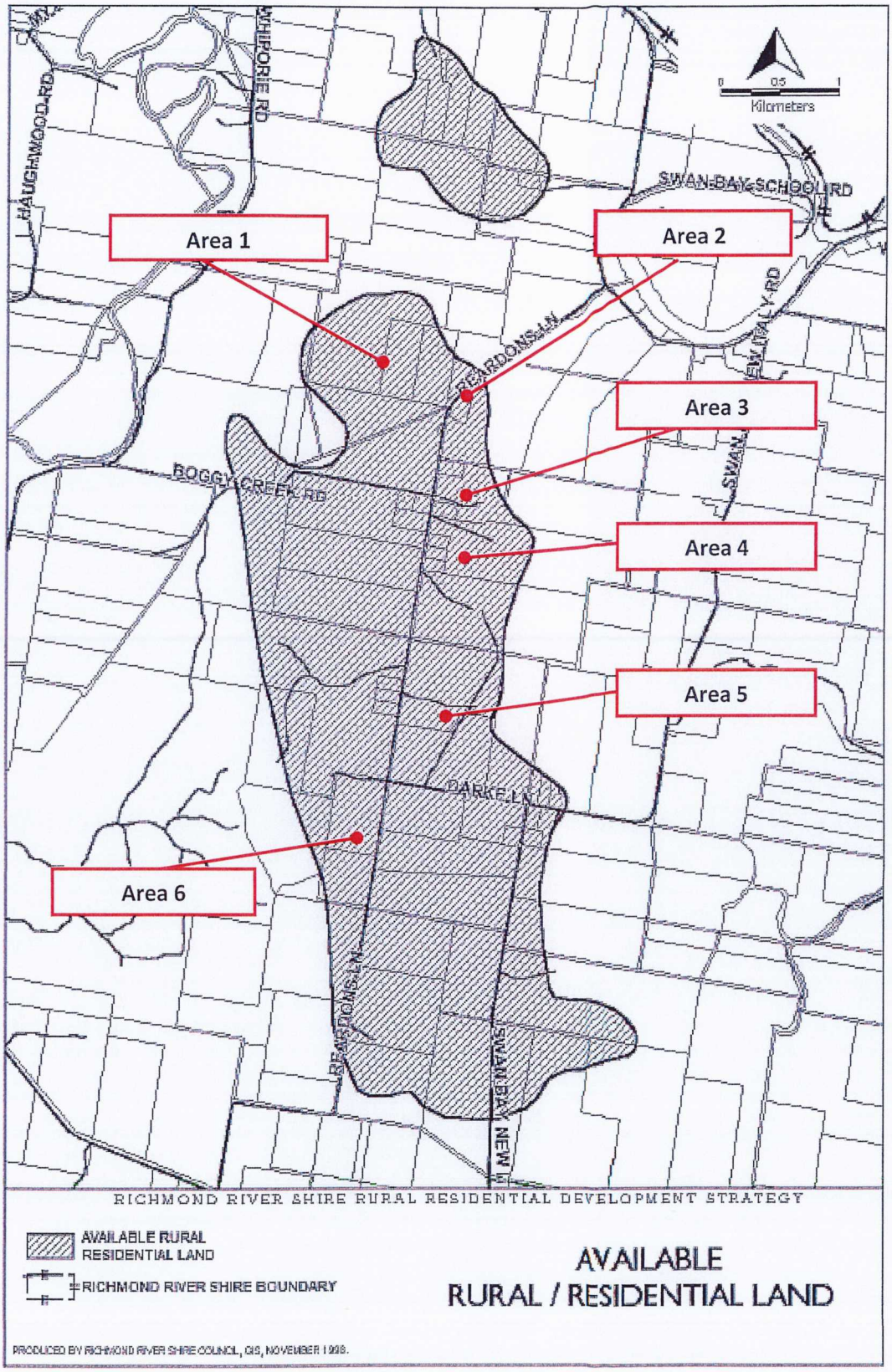
Point 5 Cultural Heritage Assessment
An updated cultural heritage assessment can be provided post gateway determination.

Should you have any questions regarding this matter or require changes to the Planning Proposal documentation, please do not hesitate contacting Mr Damian Chapelle or Luke Fittock of this office.

Yours sincerely,
NEWTON DENNY CHAPELLE

Dai Chapelle.

DAMIAN CHAPELLE
Town Planner. BTP. CPP.



Plan: Supply and Demand Diagram

Base Map Source: Richmond River Shire Rural Residential Development Strategy 1999

Assessment Against State Environmental Planning Policies

State Environmental Planning Policy	Applies?	Comments
SEPP (Biodiversity and Conservation) 2021	N/A	The SEPP primarily relates to development applications and will be addressed at the development application stage. Vegetation has been addressed within Question 7 of the Planning Proposal. The following points are provided following desk-top assessment: o As provided under Question 8 of the Planning Proposal, a draft flora and fauna assessment was completed for the site by James Warren & Associates Pty Ltd (November 2008). The report addressed statutory requirements including State Environmental Planning Policy No. 44 (SEPP 44 – Koala Habitat Protection), Section 5A of the Environmental Planning & Assessment Act (1979) and the Commonwealth EPBC Act (1999). The SEPP 44 assessment concluded that the site does not contain core Koala habitat. A Koala Plan of Management was not required. o High Environmental Value land identified within the former North Coast Regional Plan 2036 is located adjacent to the edge of Darke Lane being the southern border of the property. Future dwelling development within the lots will be clear of the HEV mapped land. o As identified in Section 1.4, the Planning Proposal has been reviewed by the NSW DPE BCD, and they have no further comments on biodiversity for the Planning Proposal. o The Biodiversity Offsets Scheme Entry Threshold Tool (BOSET) is a test used to determine when it is necessary to engage an accredited assessor to apply the Biodiversity Assessment Method to assess the impacts of a proposal. The subject land is not mapped as containing areas of biodiversity on the NSW Government Biodiversity Values Map and Threshold Tool (accessed 3/2/21). The BOSET tool was again accessed (08/04/24) and does not identify the area to be rezoned to R5 Large Lot Residential as containing mapped biodiversity values. o RVC Intramaps identifies Terrestrial Biodiversity located adjacent to the edge of Darke Lane being the southern border of the property. Future dwelling development within the lots will be clear of the Terrestrial Biodiversity mapped land.

State Environmental Planning Policy	Applies?	Comments
SEPP (Exempt and Complying Development Codes) 2008	N/A	-
SEPP (Housing) 2021	N/A	The SEPP primarily relates to development applications and will be addressed at the development application stage as required.
SEPP (Industry and Employment) 2021	N/A	-
SEPP (Planning Systems) 2021	N/A	-
SEPP (Precincts – Central River City) 2021	N/A	-
SEPP (Precincts - Eastern Harbour City) 2021	N/A	-
SEPP (Precincts – Regional) 2021	N/A	-
SEPP (Precincts – Western Parkland City) 2021	N/A	-
SEPP (Primary Production) 2021	N/A	The SEPP primarily relates to development applications and will be addressed at the development application stage as required. The following comments are provided: • The Planning Proposal does not propose to rezone State Significant farmland identified within the Northern Rivers Farmland Protection Project Final Map 2005. • The subject land is mapped as containing both "Other Rural Lands" and also "Regionally Significant Farmland" under the Northern Rivers Farmland Protection Project. • The Planning Proposal does not propose to rezone Regionally Significant farmland identified within the Northern Rivers Farmland Protection Project Final Map 2005. • The Planning Proposal does not propose to rezone areas of mapped Class 3 prime agricultural land. • To address land use conflict and the proposed development, reference should be made to the LUCRA report prepared by Tim Fitzroy & Associates contained within **Attachment 4**. Recommendations with regard to vegetation buffers can be implemented into a future subdivision lot layout at the Development Application stage. • As outlined in Section 1.4 of this Planning Proposal a number of issues were raised by NSW DPI which have now been addressed through direct consultation between NDC and the DPI.

State Environmental Planning Policy	Applies?	Comments
		• The Planning Proposal is consistent with the NCRP 2041.
SEPP (Resilience and Hazards) 2021	Applies	In response to Chapter 4 of the SEPP, a preliminary site contamination report has been prepared by Tim Fitzroy & Associates and is contained within **Attachment 10**. The report concludes that *"Based on the outcomes of this PSI there is no impediment to approval of Planning Proposal for the proposed rezoning from RU1 Primary Production to R5 Large Lot Residential. Further investigation in accordance with the EPA sampling guidelines is required prior to the issue of a subdivision certificate for large lot residential use."*
SEPP (Resources and Energy) 2021	N/A	-
SEPP (Sustainable Buildings) 2022	N/A	-
SEPP (Transport and Infrastructure) 2021	N/A	The SEPP primarily relates to development applications and will be addressed at the development application stage.

Assessment Against S9.1 Ministerial Directions

Section 9.1 Direction	Applies?	Comments
Focus area 1: Planning Systems		
1.1 Implementation of Regional Plans	Applies	The Planning Proposal is consistent with the North Coast Regional Plan 2041 as addressed within Question 3 of this Planning Proposal.
1.2 Development of Aboriginal Land Council land	N/A	-
1.3 Approval and Referral Requirements	Applies	No referral or concurrence requirements are proposed within the Planning Proposal. The Gateway Determination contained within **Attachment 14** specifies the duration and extent of public exhibition for the Planning Proposal. Pursuant to the NSW DPIE Local Plan Making Guidelines (August 2023), the Planning Proposal will be publicly exhibited for 20 working days in line with a 'standard application'.
1.4 Site Specific Provisions	N/A	-
1.4A Exclusion of Development Standards from Variation	N/A	-
Focus area 1: Planning Systems – Place-based		
1.5 Parramatta Road Corridor Urban Transformation Strategy	N/A	-
1.6 Implementation of North West Priority Growth Area Land Use and Infrastructure Implementation Plan	N/A	-
1.7 Implementation of Greater Parramatta Priority Growth Area Interim Land Use and Infrastructure Implementation Plan	N/A	-
1.8 Implementation of Wilton Priority Growth Area Interim Land Use and Infrastructure Implementation Plan	N/A	-

1.9 Implementation of Glenfield to Macarthur Urban Renewal Corridor	N/A	-
1.10 Implementation of the Western Sydney Aerotropolis Plan	N/A	-
1.11 Implementation of Bayside West Precincts 2036 Plan	N/A	-
1.12 Implementation of Planning Principles for the Cooks Cove Precinct	N/A	-
1.13 Implementation of St Leonards and Crows Nest 2036 Plan	N/A	-
1.14 Implementation of Greater Macarthur 2040	N/A	-
1.15 Implementation of the Pyrmont Peninsula Place Strategy	N/A	-
1.16 North West Rail Link Corridor Strategy	N/A	-
1.17 Implementation of the Bays West Place Strategy	N/A	-
1.18 Implementation of the Macquarie Park Innovation Precinct	N/A	-
1.19 Implementation of the Westmead Place Strategy	N/A	-
1.20 Implementation of the Camellia-Rosehill Place Strategy	N/A	-
1.21 Implementation of South West Growth Area Structure Plan		
1.22 Implementation of the Cherrybrook Station Place Strategy		

Focus area 2: Design and Place		
-	-	This Focus Area was blank when the Directions were made
Focus area 3: Biodiversity and Conservation		
3.1 Conservation Zones	N/A	-
3.2 Heritage Conservation	Applies	The following comments are provided: ○ Previous Consultants working on the project (Harrison Shepherd Pty Ltd) engaged Bogal Local Aboriginal Land Council to be involved in an Aboriginal Heritage Assessment for the proposed rezoning. The correspondence from Bogal Aboriginal Land Council to Harrison Shepherd Pty Ltd is contained within **Attachment 5**. ○ The assessment concluded that due to disturbance caused from past and present land activities such as slashing, ploughing and cane farming, the area assessed didn't offer much hope of finding anything of cultural significance at ground level, and therefore Bogal LALC has no objections to the proposed rezoning. ○ A more recent search of AHIMS by NDC (**Attachment 5**) did not identify any Aboriginal sites or places within 50 metres of the subject lands. ○ The Richmond Valley LEP 2012 mapping does not identify the subject lands as containing a heritage item.
3.3 Sydney Drinking Water Catchments	N/A	-
3.4 Application of C2 and C3 Zones and Environmental Overlays in Far North Coast LEPs	N/A	-
3.5 Recreation Vehicle Areas	N/A	-
3.6 Strategic Conservation Planning	N/A	-
3.7 Public Bushland	N/A	-
3.8 Willandra Lakes Region	N/A	-
3.9 Sydney Harbour Foreshores and Waterways Area	N/A	-

3.10 Water Catchment Protection	N/A	-
Focus area 4: Resilience and Hazards		
4.1 Flooding	Applies	As addressed in Section 1.4, BMT have completed a Qualitative Flood Impact and Risk Assessment (FIRA) which is contained within **Attachment 12**. The Report concludes that *"the FIRA was based on the simple assessment approach in accordance with the FIRA guideline LU01 (DPE, 2023). The assessment was conducted based on an understanding of existing flood behaviour from the recently completed Richmond River Flood Study (RVFS) (BMT, September 2023)."* Whilst Section 5 summarises the key findings of the FIRA, the report concludes that *"Overall, the proposed concept subdivision plan (incorporating the proposed flood risk treatment options) is considered to be compatible with the flood hazard."* In accordance with the Gateway Determination conditions, the Planning Proposal has removed those parts of the land affected by a high flood hazard (H5 and H6) in the Probable Maximum Flood event.
4.2 Coastal Management	N/A	-
4.3 Planning for Bushfire Protection	Applies	Current mapping obtained from Richmond Valley Council indicates that the north western and south western portions of the land are mapped as being bushfire prone. A bushfire assessment report prepared by Bushfire Certifiers is contained within **Attachment 3**.
4.4 Remediation of Contaminated Land	Applies	A preliminary site contamination report has been prepared by Tim Fitzroy & Associates and is contained within **Attachment 10.** The report concludes that *"Based on the outcomes of this PSI there is no impediment to approval of Planning Proposal for the proposed rezoning from RU1 Primary Production to R5 Large Lot Residential. Further investigation in accordance with the EPA sampling guidelines is required prior to the issue of a subdivision certificate for large lot residential use."*
4.5 Acid Sulfate Soils	Applies	The subject lands are identified as containing a combination of Class 3 & 5 Acid Sulfate Soils on RVLEP 2012 Acid Sulfate Soils mapping. Reference should be made to the Acid Sulfate Soil Assessment prepared by Tim Fitzroy & Associates as contained within **Attachment 9**. The assessment concludes the following: *"The revised development footprint has been reduced to elevated portions of the subject site such that the proposed works will not*

		disturb acid sulfate soils (see Attachment A ASS Risk Map and Conceptual Site Plan). As a consequence, ASS has not been identified as an impediment to the Planning Proposal to be submitted to Richmond Valley Council (RVC) for the establishment of a 43 Lot Rural Residential Subdivision at the subject site."
4.6 Mine Subsidence and Unstable Land	N/A	-
Focus area 5: Transport and Infrastructure		
5.1 Integrating Land Use and Transport	Applies	*Improving Transport Choice* Access to the public road network to and from the site will be achieved from the adjoining public road network. The proposal relates to a form of rural residential subdivision, and is not a typical urban residential style development in an urban area to which the Improving Transport Choice document relates. In this regard, the proposal is not inconsistent with the relevant location and design guidelines (Part 3) contained within the document 'Improving Transport Choice' with regard to housing. *The Right Place for Business and Services* 'The Right Place for Business and Services' document relates to business and services and does not directly apply to the current Planning Proposal for rural residential development.
5.2 Reserving Land for Public Purposes	N/A	-
5.3 Development Near Regulated Airports and Defence Airfields	N/A	-
5.4 Shooting Ranges	N/A	-
Focus area 6: Housing		
6.1 Residential Zones	Applies	The following comment are provided: o The Planning Proposal involves the application of a zoning framework consistent with large lot residential zoning already existing within the immediate Reardons Lane locality; o The subject land is nearby land that has been rezoned for rural residential purposes within the Reardons Lane, Swan Bay precinct. Following rezoning, the subdivision will deliver housing within the Reardons Lane precinct that will support the delivery of housing diversity on lots with minimum lot sizes of 7,000m^2. o The site's location and attributes are consistent with the southerly expansion of the Reardons Lane rural residential precinct.

		○ The rezoning of the land for rural residential purposes will have positive social and economic effects. In particular the development of the land for housing will assist in meeting housing supply goals identified in the Richmond Valley Growth Management Strategy. Significant community benefit associated with the proposed development will be found in the provision of additional housing to service the population needs of the Richmond Valley LGA. ○ The proposal is responsive to and consistent with the Richmond Valley LSPS as addressed within the Planning Proposal report with regards to the provision of residential development. ○ The proposal is consistent with NCRP 2041 with regards to the provision of rural residential development. The current proposal accords with the Richmond Valley Local Government Narrative under the North Coast Regional Plan 2041. ○ The lots will be required to be serviced by all necessary utility infrastructure that will be addressed at the development application stage. The lots will be self sufficient with regards to water supply for potable and fire-fighting purposes (via rainwater storage tanks), and on-site wastewater systems for the disposal of wastewaters. ○ The proposal will enable residents to have access to Casino, Woodburn, and Evans Head which provide services and facilities including retail services, financial services, Council offices, recreational opportunities, educational and childcare services, health services, industrial services, and good transport infrastructure.
6.2 Caravan Parks and Manufactured Home Estates	N/A	-
Focus area 7: Industry and Employment		
7.1 Employment Zones	N/A	-
7.2 Reduction in non-hosted short-term rental accommodation period	N/A	-
7.3 Commercial and Retail Development along the Pacific Highway, North Coast	N/A	-
Focus area 8: Resources and Energy		
8.1 Mining, Petroleum Production and Extractive Industries	Applies	**Justified Inconsistency** Direction 8.1 applies to the Planning Proposal as it will have the effect of prohibiting extractive industries on the subject land once zoned R5.

		Considering the fact that the proposal will enable a subdivision within an established rural residential area identified within Council's strategic planning framework, the inconsistency is considered to be of minor significance. Consultation with NSW Mining, Exploration and Geoscience is expected to occur as part of the Planning Proposal assessment process.
Focus area 9: Primary Production		
9.1 Rural Zones	Applies	**Justified Inconsistency** In addressing Clause 1(a) of the Direction: • The Planning Proposal seeks to rezone land zoned RU1 Primary Production to an R5 Large Lot Residential Zone. To address the inconsistency of Clause 1(a) in rezoning land from rural to residential, the following is submitted. • The Planning Proposal is consistent with the relevant local Planning strategies as demonstrated within Question 4 of this Planning Proposal; • The Planning Proposal is consistent with the North Coast Regional Plan 2041 as identified within Question 3 of this Planning proposal. As outlined in Section 1.4 of this Planning Proposal a number of issues were raised by NSW DPI which have now been addressed through direct consultation between NDC and the DPI. Agricultural land class in regards to the subdivision has been addressed earlier. In this regard the following points are provided: • The Planning Proposal does not propose to rezone State Significant farmland identified within the Northern Rivers Farmland Protection Project Final Map 2005. • The Planning Proposal does not propose to rezone Regionally Significant farmland identified within the Northern Rivers Farmland Protection Project Final Map 2005. • The Planning Proposal does not propose to rezone areas of mapped Class 3 prime agricultural land. • Further discussion regarding the development footprint and the agricultural land can be found in Section 1.4 of this report which discusses the consultation that has been undertaken with the NSW DPI. • To address land use conflict and the proposed development, reference should be made to the LUCRA report prepared by Tim Fitzroy & Associates contained within **Attachment 4**. Recommendations with regard to vegetation buffers can be implemented into a future subdivision lot layout at the Development Application stage.

9.2 Rural Lands	Applies	The Planning Proposal seeks to rezone land currently zoned RU1 Primary Production to a R5 Large Lot Residential Zone. The Planning Proposal also seeks to amend the minimum lot size to 7,000m^2 for that part of the land proposed to be rezoned to R5. To address the requirements of sub-clauses 1 & 2 in regards to rezoning land from rural to residential, and amending the minimum lot size, the following is submitted: • The Planning Proposal is consistent with the Richmond Valley Growth Management Strategy, and Richmond Valley 2040 Community Strategic Plan as demonstrated within Question 4 of this Planning Proposal. • The Planning Proposal is consistent with the NCRP 2041 as identified within Question 3 of this Planning Proposal. • The Planning Proposal is consistent with the Richmond Valley LSPS as identified within Question 4 of this Planning Proposal. • As outlined in Section 1.4 of this Planning Proposal a number of issues were raised by NSW DPI which have now been addressed through direct consultation between NDC and the DPI. • The Planning Proposal does not propose to rezone State Significant farmland identified within the Northern Rivers Farmland Protection Project Final Map 2005. • The Planning Proposal does not propose to rezone Regionally Significant farmland identified within the Northern Rivers Farmland Protection Project Final Map 2005. • The Planning Proposal does not propose to rezone areas of mapped Class 3 prime agricultural land. • The relevant site and surrounding environmental aspects, natural and physical constraints have been identified within this report and attached technical reports. • To address land use conflict and the proposed development, reference should be made to the LUCRA report prepared by Tim Fitzroy & Associates contained within **Attachment 4**. Recommendations with regard to vegetation buffers can be implemented into a future subdivision lot layout at the Development Application stage. • As discussed under Section 1.4 of the Planning Proposal with regard to the agricultural landscape, previous information has been submitted to the NSW DPI illustrating that the subject land is located on the eastern side of Reardons Lane where a number of rural residential estates have been approved and developed. The proposal maintains consistency with the already developed land within the rural residential precinct and does not fragment the surrounding agricultural landscape. • Given the above, the future subdivision is not considered likely to adversely affect the operation and viability of

		existing and future rural land uses and related enterprises. Similarly, the proposal is considered to be able to satisfactorily address the provisions of Clause 5.16 of the Richmond Valley LEP 2012. • Social and economic impacts have been identified within this Planning Proposal. • No issues have been identified concerning cultural heritage impacts as addressed within the Planning Proposal. • With respect to biodiversity and vegetation, reference should be made to the information provided under Question 7 of the Planning Proposal. • The rezoning of the land for rural residential purposes will have positive social and economic effects. In particular the development of the land for housing will assist in meeting housing supply goals identified in the Richmond Valley Growth Management Strategy. Significant community benefit associated with the proposed development will be found in the provision of additional housing to service the population needs of the Richmond Valley LGA. • As provided within the Planning Proposal, the development site is readily accessible and proximate to Casino, Woodburn, and Evans Head that contain a diverse range of community facilities as well as retail, administrative, education, health, sporting, open space and transport services. • Services to the development have been considered and addressed within Question 11 of this Planning Proposal. • As submitted in Section 1.4 of the Planning Proposal, the lot supply and demand matter previously raised by Council has now been resolved.
9.3 Oyster Aquaculture	N/A	-
9.4 Farmland of State and Regional Significance on the NSW Far North Coast	Applies	The Planning Proposal does not propose to rezone State Significant farmland identified within the Northern Rivers Farmland Protection Project Final Map 2005. The Planning Proposal does not propose to rezone Regionally Significant farmland identified within the Northern Rivers Farmland Protection Project Final Map 2005. The Planning Proposal does not propose to rezone areas of mapped Class 3 prime agricultural land. To address land use conflict and the proposed development, reference should be made to the LUCRA report prepared by Tim Fitzroy & Associates contained within **Attachment 4**. Recommendations with regard to vegetation buffers can be implemented into a future subdivision lot layout at the Development Application stage.

		As outlined in Section 1.4 of this Planning Proposal a number of issues were raised by NSW DPI which have now been addressed through direct consultation between NDC and the DPI. The Planning Proposal is consistent with the NCRP 2041.

tim fitzroy & associates
environmental health | environmental education | environmental auditing

10 February 2022
Ref: 90/2021_ass

General Manager
Richmond Valley Council
Locked bag 10
Casino NSW 2470

Dear Sir

RE: Preliminary Acid Sulfate Soil Assessment Revised Planning Proposal 43 Lot Rural Residential Subdivision Lots 831, 832 and 833, DP 847683 Reardons Lane Swan Bay

Tim Fitzroy & Associates (TFA) were initially engaged by NJ & KA Newman in 2013 to undertake a preliminary site investigation under State Planning Policy No.55 and an investigation into the presence of Acid Sulfate Soils(ASS) at Lots 831, 832 and 833, DP 847683 Reardons Lane Swan Bay. In 2021 TFA were engaged by Envirosafe Products Property Pty Ltd to review and update the ASS investigation to support a revised Planning Proposal to be submitted to Richmond Valley Council (RVC) for the establishment of a 43 Lot Rural Residential Subdivision at the subject site.

The subject site is approximately 131 hectares. The bulk of the land is under sugar cane cultivation. A series of cane drains and road crisscross the site. Site improvements include two free standing dwellings, a shed and a large dam.
A total of 43 large residential allotments are proposed ranging in size from 0.750ha to 1.498 ha.

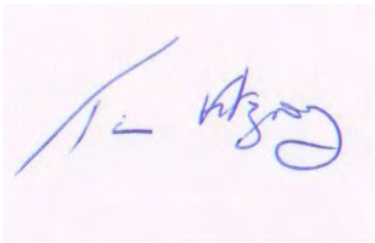
The revised development footprint has been reduced to elevated portions of the subject site such that the proposed works will not disturb acid sulfate soils (see **Attachment A** ASS Risk Map and Conceptual Site Plan). As a consequence, ASS has not been identified as an impediment to the Planning Proposal to be submitted to Richmond Valley Council (RVC) for the establishment of a 43 Lot Rural Residential Subdivision at the subject site.

Kind regards,

61 Pine Avenue
East Ballina NSW 2478
M | 0448 483 837
tim@timfitzroy.com.au

ABN: 94120188829
ACN: 120188829

www.timfitzroy.com.au



Tim Fitzroy
Environmental Health Scientist
Environmental Auditor

61 Pine Avenue
East Ballina NSW 2478
M | 0448 483 837
tim@timfitzroy.com.au

ABN: 94120188829
ACN: 120188829
www.timfitzroy.com.au

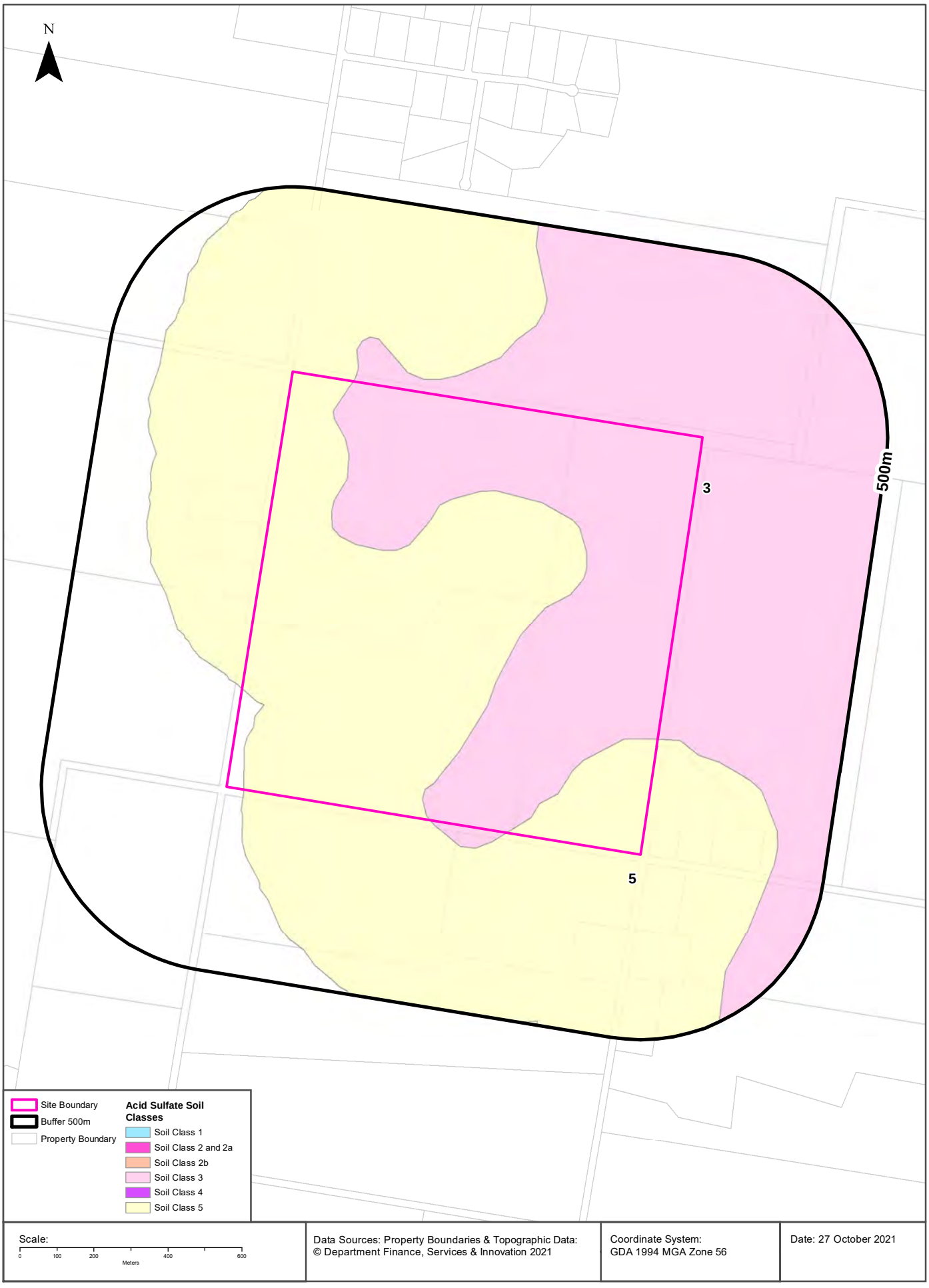
Appendix A ASS Risk Map & Conceptual Site Plan

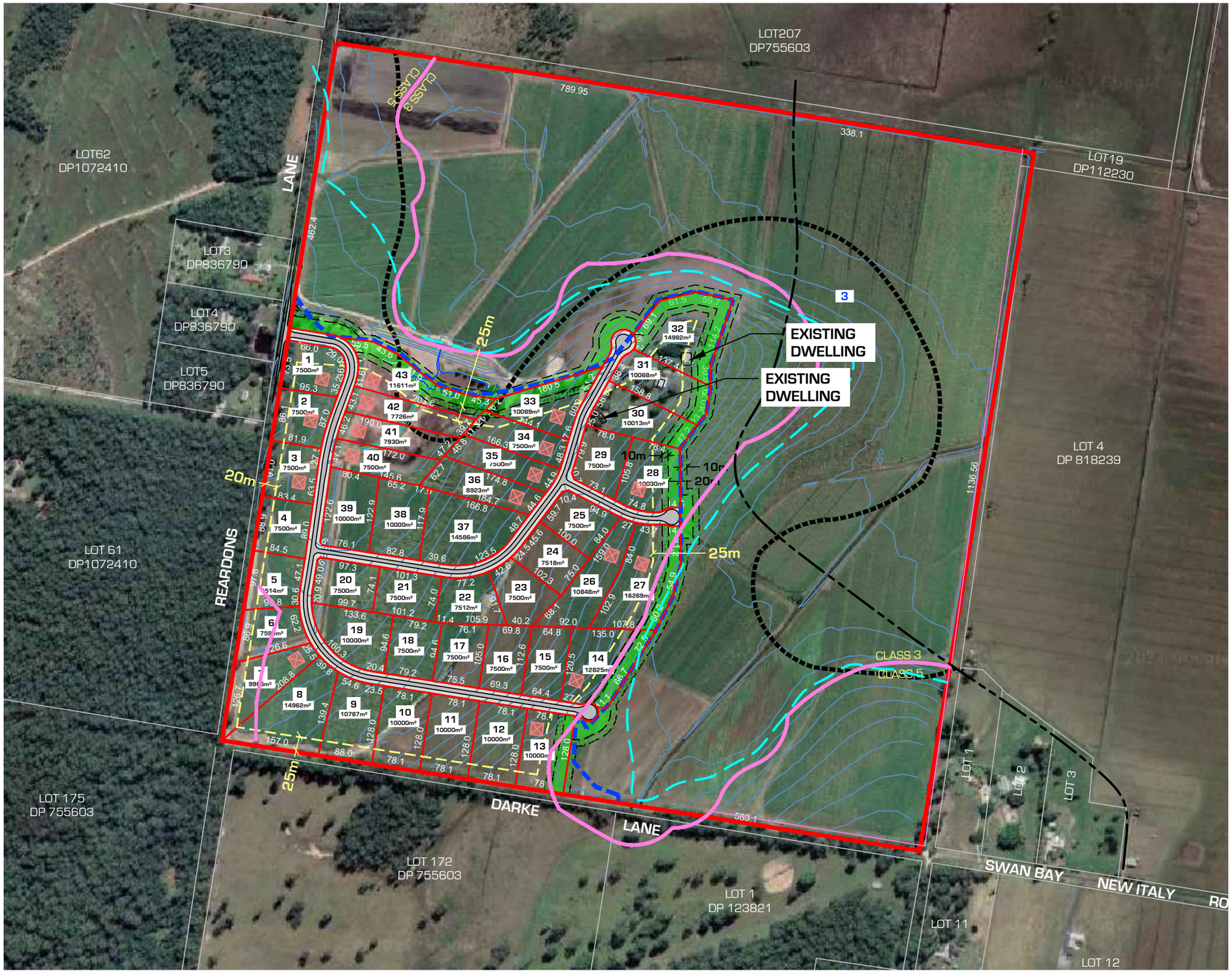
61 Pine Avenue
East Ballina NSW 2478
M | 0448 483 837
tim@timfitzroy.com.au

ABN: 94120188829
ACN: 120188829
www.timfitzroy.com.au

Acid Sulfate Soils

395 Reardons Lane, Swan Bay, NSW 2324





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1cm = 75m

1:7500

LEGEND

- SITE BOUNDARY
- EXISTING BOUNDARY
- PROPOSED LOT BOUNDARIES
- RURAL RESIDENTIAL STRATEGY LINE
- CONTOURS
- REGIONALLY SIGNIFICANT FARMLAND
  SOURCE:
  Northern Rivers Farmland Protection Project
  Final Map 2005 (Section 117(2) Direction)
- APPROX. RL 5.4m AHD
  (1 IN 100 YEAR FLOOD LINE)
- 3 PRIME AGRICULTURAL LAND - CLASS 3
- 40m VEGETATION BUFFER
  20m PLANTED &
  10m SEPARATION BUFFER EITHER SIDE
- ACID SULPHATE SOIL CLASS LINE
- APZ BUFFER
- INDICATIVE DWELLING ENVELOPE 20m X 20m

NOTE:
This preliminary layout has been completed in accordance with the instructions provided by Noel Newman.
In this respect preliminary desktop data has been used to form this layout. The final layout is subject to the completion of a detailed survey & engineering plans.
Accordingly, the conclusions reached within this report may be modified by the author upon the completion of the final design plans & site inspection. Newton Denny Chapelle accepts no responsibility for any loss or damage suffered, however so arising, to any person or corporation who may use or rely on this report.

REV	DATE	AMENDMENT
F	29.07.21	LOTS 14, 27 & 28 BOUNDARY AND ROAD
G	19.08.21	LOTS 43 AREA CORRECTED
H	01.11.21	VEGETATION BUFFER ADDED
I	24.01.22	ACID SULPHATE SOIL CLASS LINE ADDED
J	07.02.22	RURAL RES. LINE ADDED

SOURCE PLAN: N/A

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Newton Denny Chapelle
Surveyors Planners Engineers
Email: office@ndc.com.au
31 Carrington St Lismore 2480
PH: 6622 1011
ABN: 18 094 689 845

PLAN 4 - CONCEPTUAL SUBDIVISION PLAN

CLIENT: N. NEWMAN REV J

LOCATION: LOT 831, 832, 833 DP 847683
REARDONS LANE
SWAN BAY NSW

DATE: 08.02.2022 REF: 14/227
SCALE: 1 : 7500 @ A3 DRAWN: CD

Preliminary Site Contamination Report

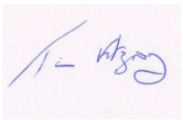
Lots 831,832 & 833 DP 847683
Reardon's Lane Swan Bay

HEALTH SCIENCE ENVIROMENTAL EDUCATION
ENVIRONMENTAL AUDITOR

Preliminary Site Contamination Report

Lots 831,832 & 833 DP 847683 Reardon's Lane Swan Bay

Prepared for: Envirosafe Products Property Pty Ltd
Version: Final
Date: 10 February 2022
Job No. 90/2021_psi
Tim Fitzroy & Associates
ABN: 94120188829
ACN: 120188829



Tim Fitzroy
Director
Date: 10 February 2022

environmental

Tim Fitzroy

Environmental Health Scientist
Environmental Educator
Environmental Auditor

61 Pine Avenue
East Ballina NSW 2478
T | 02 6686 5183
M | 0448 483 837
tim@timfitzroy.com.au
www.timfitzroy.com.au

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Appendices

1. Introduction

Tim Fitzroy & Associates (TFA) has been engaged by Envirosafe Products Pty Ltd to undertake a preliminary site contamination investigation to support a Planning Proposal to be submitted to Richmond Valley Council (RVC) for the establishment of a 43 Lot Rural Residential Subdivision of Lots 831,832 & 833 DP 847683 Reardon's Lane Swan Bay (**see Figure 1).**

This report should be read in conjunction with TFA's General limitations to environmental information in Section 1.5.

1.1 Background

The planning proposal comprises:

- An application to RVC to rezone Lots 831,832 & 833 DP 847683 Reardon's Lane Swan Bay from RU1 Primary Production to R5 Large Lot Residential under Richmond Valley Local Environmental Plan 2012, with a view to future residential development of the land (see **Figure 2**).

1.2 Objectives

This report has been prepared to accompany a Planning Proposal to RVC to specifically address potential contamination issues from past and current uses on Lots 831,832 & 833 DP 847683 Reardon's Lane Swan Bay. The assessment is preliminary in nature and suitable for a planning proposal application only.

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) relates to contaminated land issues. Clause 7(1) of SEPP 55 sets out the obligations a planning authority must consider when granting a development application. Clause 7 relevantly provides:

7 Contamination and remediation to be considered in determining development application

(1) A consent authority must not consent to the carrying out of any development on land unless:
(a) it has considered whether the land is contaminated, and
(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and
(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.
(2) Before determining an application for consent to carry out development that would involve a change of use on any of the land specified in subclause (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines.

(3) The applicant for development consent must carry out the investigation required by subclause (2) and must provide a report on it to the consent authority. The consent authority may require the applicant to carry out, and provide a report on, a detailed investigation (as referred to in the contaminated land planning guidelines) if it considers that the findings of the preliminary investigation warrant such an investigation.
(4) The land concerned is:
(a) land that is within an investigation area,
(b) land on which development for a purpose referred to in Table 1 to the contaminated land planning guidelines is being, or is known to have been, carried out,
(c) to the extent to which it is proposed to carry out development on it for residential, educational, recreational, or childcare purposes, or for the purposes of a hospital—land:
(i) in relation to which there is no knowledge (or incomplete knowledge) as to whether development for a purpose referred to in Table 1 to the contaminated land planning guidelines has been carried out, and
(ii) on which it would have been lawful to carry out such development during any period in respect of which there is no knowledge (or incomplete knowledge).

This report has been prepared to satisfy Council that the site is suitable for the use proposed in the planning proposal.

1.3 Summary

This investigation is Tier 1 - preliminary site investigation, which is required to determine if contamination of the site's soil has occurred from past land usage in accordance with NEPM 1999 (2013), DUAP and EPA (1998). The investigation includes obtaining a history of land usage on the site and a preliminary soil-sampling regime. The results of the soil sample analysis are compared with the Health Investigation Levels (HIL's) and Ecological Investigation (EIL's) and Ecological Screening Levels (HSL's) outlined in NEPM 1999 (2013).

An oral site history has been provided by Noel Newman. Mr Newman manages the subject property on behalf of his sister Francis Newman. Ms. Newman purchased by the land approximately 20 years ago. The property has been used to grow sugar cane since 1981. Prior to sugar cane the site was used to grow beef cattle and sorgum.

The Newman family have a strong connection with the land and Swan Bay area as their grandfather owned land adjacent to the said property.

A review of the NSW Agriculture Dipsite locator indicates that there are two decommissioned cattle dipsites within a 2km radius of the subject site; Durrington's and Reardons Lane. The subject site is unaffected by residual contamination from the dipsites.

A total of 45 soil samples plus 4 Quality Assurance soil sample were collected from within the proposed development envelope.

All of the soil samples show contaminant levels well below the relevant Australian and New Zealand Environment and Conservation Council (ANZECC), National Environment Protection Measure (NEPM 2013) HILA *Residential with garden/accessible soil also includes children's day care centres, preschools and primary schools* and *Ecological Soil Investigation Levels* and Ecological Screening Levels (HSL's) (NEPM 2013).

Based on the outcomes of this PSI there is no impediment to approval of Planning Proposal for the proposed rezoning from RU1 Primary Production to R5 Large Lot Residential. Further investigation in accordance with the EPA sampling guidelines is required prior to the issue of a subdivision certificate for large lot residential use.

1.4 Scope of Works

The objective of this preliminary investigation has been to determine if land contamination has occurred from historical and current land use activities occurring on site or immediately nearby. To determine if the site poses a significant risk of harm to end users (and nearby sensitive receptors), available historical information has been reviewed and a number of soil samples have been collected and analysed for a range of contaminants typically associated with the land uses identified as having occurred on site including metals and organochlorines. In addition, the importation of quarry material containing recovered aggregate has been analysed in accordance with the Recovered Aggregate Exemption Criteria (NSW EPA 2014).

The results of the soil analysis are compared to relevant National Environmental Protection Measure (NEPM 1999 updated 2013) guidelines in order to assess the significance of risk. This investigation is considered to be Stage 1 of the Managing Land Contamination Planning Guidelines (DUAP and EPA, 1998) or a Preliminary Site Investigation (PSI; NEPM 1999). If contamination levels exceed the adopted EPA acceptable levels, a detailed investigation is then required (i.e., a Stage 2 investigation or Detailed Site Investigation (DSI)). If the contamination levels are below the relevant acceptable levels, and information gathered as part of the investigation also supports that contamination was unlikely to have occurred; only a Stage 1 (or PSI) investigation would be required.

This preliminary investigation has been used to identify the following:

- Past and present potentially contaminating activities occurring on or near the site; and
- The presence of Potential Contaminants of Concern associated with the identified land uses.

The investigation will also:

- Discuss the site condition;
- Provide a preliminary assessment of the site's contamination status; and
- Assess the need for further investigations.

Relevant documents considered in the preparation of this investigation included:

- ANZECC and NHMRC (1992) Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites;
- Council of Standards Australia (2005) AS 4482.1-2005 Guide to the sampling and investigation of potentially contaminated soil – Non-volatile and semi-volatile compounds;
- NSW DEC (2006) Contaminated Sites – Guidelines for the NSW Site Auditor Scheme 2nd Edition;
- NSW EPA (1995) Contaminated Sites – Sampling Design Guidelines;
- NSW EPA (2011) Guidelines for Consultants Reporting Contaminated Sites; and
- National Environment Protection Council (NEPC) (2013) National Environment Protection (Assessment of Site Contamination) Measure

This preliminary assessment report is written in accordance with the new Contaminated land guidelines (NSW Environment Protection Authority 2020) and the Northern Rivers Regional Councils (NRRC) Regional Policy for the Management of Contaminated Land (NRRC 2006).

1.5 General limitations to environmental information

TFA has conducted the services in a manner consistent with the appropriate levels of care and rigour expected of members of the environmental assessment profession. No warranties or guarantees, expressed or implied, are made.

The findings of this report are strictly limited to identifying the environmental conditions associated with the subject property in regard to site contamination, and does not seek to provide an opinion regarding other aspects of the environment not related to site contamination, or to the suitability of the site in regard to: land use planning and legal use of the land; and/or regulatory responsibilities or obligations (for which a legal opinion should be sought); and/or the occupational health and safety legislation; and/or the suitability of any engineering design. Reviews of such information are only in relation to the contaminated land aspects of any project or site. If specialist technical review of such documents is required, these should be obtained by an appropriate specialist.

The reporting and conclusions are based on the information obtained at the time of the assessments. Changes to the subsurface conditions may occur subsequent to the investigation described, through natural processes or through the intentional or accidental addition of contaminants, and these conditions may change with space and time.

Furthermore, the test methods used to characterise the contamination at each sampling location are subject to limitations and provide only an approximation of the contaminant concentrations. Monitoring and chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

The absence of any identified hazardous or toxic materials at the site should not be interpreted as a warranty or guarantee that such materials do not exist at the site. Therefore, future work at the site which involves subsurface excavation or removal of structures or parts thereof, should be conducted based on appropriate management plans. These should include, inter alia, environmental management plans, including unexpected findings protocols, hazardous building materials management plans, and occupational health and safety plans.

2. Site identification and Surrounds

2.1 Site Description

The subject site is described in Real Property terms as Lots 831, 832 and 833, DP 847683 Reardons Lane Swan Bay. The subject site is approximately 131 hectares. The land is composed of three ridges with gentle slopes, one along Reardon's Lane, the second running roughly north-east through the centre of the proposed subdivision, and the third on the eastern boundary. An access road exists on this central ridge, from which the land slopes gently to the drainage lines to the east and west. Other than some pine trees, the remaining land has been cleared and cultivated for growing sugar cane. Site improvements include two free standing dwellings and 2 sheds.

A site locality diagram that shows the subject site is provided in **Figure 1**. A copy of the proposed planning proposal is located in **Figure 2**.

2.2 Zoning

The subject land is zoned RU1 Rural Production under the Richmond Valley Local Environmental Plan 2012 (see **Appendix A**).

2.3 Surrounding Land use

The subject site is surrounded by sugar cane to the north and east, while there is a forested area to the west and grazing land to the south.

Rural dwellings are located to the immediate west and south east, while the site is approximately 700m south of an existing rural residential subdivision.

2.4 Current Use

There is currently a two-storey dwelling house, 2 sheds and a sugarcane plantation on the subject site.

3. Environmental Setting

3.1 Local Meteorology

A summary of the climatic data from the Evans Head AWS (located approximately 17 km south east of the subject site) is shown in **Table 3.1**.

Table 3.1 Climate Summary Evans Head Weather Station

	Temperature ^{0}C		Rainfall mm	Mean number of raindays
	Minimum	Maximum	Average monthly	
January	21.3	28.0	153.4	14.6
February	21.1	27.6	156.1	14.9
March	20.2	26.6	150.9	16.9
April	17.6	24.0	168.5	15.1
May	15.1	21.5	89.5	13.2
June	13.2	19.4	174.9	14.3
July	12.3	18.9	80.9	11.4
August	13.1	20.1	72.4	7.8
September	15.3	22.1	52.0	9.3
October	16.9	23.6	91.4	12.6
November	18.6	25.3	87.6	11.2
December	19.9	26.6	123.0	13.5

The has a minor slope ranging from about 8 to 13mAHD.

3.3 Geology and Soils

3.3.1 Geology

The site is mostly within the sedimentary landscape (Jurassic Walloon shales and sandstones) while the drainage lines in the north east corner in the lower area reflect Quaternary alluvial soil. Other areas of the existing holding are not being subdivided because of their low lying nature in this black alluvium.

3.3.2 Soils

Based on the Atlas of Australian Soils mapping (accessed October 2021), soil types within the area are expected to:

- Kurosols: Undulating to hilly: hard acidic yellow mottled soils (Dy3.41) and hard acidic red and red mottled soils (Dr2.21) and (Dr3.21 and Dr3.41), with generally flatter areas of sandy acidic yellow mottled soils (Dy5.61) often containing ironstone gravels. Soil dominance varies locally. As mapped, areas

of units Wc7, Tb57, and minor occurrences of units M12 and Mg24 are included.; and

- Hydrosols Coastal plains, generally low lying, poorly drained, and subject to flooding (lower and middle reaches of river flood-plains, swamps, estuarine areas, and tidal marshes): chief soils seem to be friable acidic gley soils (Dg4.11), (Dg4.41), and (Dg4.81); friable acidic yellow mottled soils (Dy5.11); leached sand soils (Uc2.2) and/or (Uc2.3); and sandy acidic yellow mottled soils (Dy5.61), (Dy5.41), and (Dy5.81) in a complex and not well-known pattern, generally as follows: (i) flat to gently sloping areas of (Dg4.11), (Dg4.41), and (Dg4.81) or (Dy5.11), and/or (Ug5.16) and (Ug5.4), with some (Dd3.11) and (Uf6.41); (ii) sandy flats and swamps of (Uc2.2), and/or (Uc2.3), and/or acid peats (0); and (iii) slightly raised sandy areas of (Dy5.61), (Dy5.41), and (Dy5.81) with (Uc2.2) and (Uc4.2). Small areas of units NY2 (Sheet 3) and B9 are included.

The Soil Landscapes of Central and Eastern NSW (NSW Department of Planning, Industry and Environment) classify the site as containing the
:

- New Italy soil landscape
    - undulating rises and low hills separated by broad drainage depressions on the Walloon Coal Measures (sandstone, carbonaceous siltstone, shale, mudstone, coal and minor oil shale). Slopes 2 – 10%; relief 30 – 40 m; elevation 5 – 50 m; and
- Dungarubba soil landscape
    - backplains of lower Richmond River. Relief <5 m; slopes <1%; elevation 1 – 5 m. Extensively cleared open-forest and swamp complex.
    - deep (>150 cm), poorly drained Grey Kandosols (Humic Gleys) and Redoxic/Oxyaquic Hydrosols buried by alluvium (Humic Gleys) within alluvial plain/backplain. Deep (>150 cm), moderately well-drained Brown Dermosols (affinity with Prairie Soils) on levees.

3.4 Acid Sulfate Soils

Tim Fitzroy & Associates (TFA) were initially engaged by NJ & KA Newman in 2013 to undertake a preliminary site investigation under State Planning Policy No.55 and an investigation into the presence of Acid Sulfate Soils(ASS) at Lots 831, 832 and 833, DP 847683 Reardons Lane Swan Bay. In 2021 TFA were engaged by Envirosafe Products Property Pty Ltd to review and update the ASS investigation to support a revised Planning Proposal to be submitted to Richmond Valley Council (RVC) for the establishment of a 43 Lot Rural Residential Subdivision at the subject site.

The subject site is approximately 131 hectares. The bulk of the land is under sugar cane cultivation. A series of cane drains and road crisscross the site. Site improvements include two free standing dwellings, a shed and a large dam.
A total of 43 large residential allotments are proposed ranging in size from 0.750ha to 1.498 ha.

The revised development footprint has been reduced to elevated portions of the subject site such that the proposed works will not disturb acid sulfate soils (see Preliminary

Acid Sulfate Soil Assessment, TFA 27 January 2022). As a consequence, ASS has not been identified as an impediment to the Planning Proposal to be submitted to Richmond Valley Council (RVC) for the establishment of a 43 Lot Rural Residential Subdivision at the subject site.

3.5 Hydrogeology

A search of NSW Department of Primary Industries Office of Water licensed bores within a 2km radius of the site identified 9 registered bores. GW020496 is located on the northern boundary of the subject site at a depth of 3.6m within a shale substrate and is used for stock and domestic purposes. The closest offsite registered groundwater bore GW072758 at a depth of 17.0m is located 103m north west of the subject site.

The results of the groundwater bore search are summarised in **Table 3.2** below and included in full in **Appendix A**.

Table 3.2 Registered Groundwater Drillers Logs in the Locale

Groundwater Boreholes

Boreholes within the dataset buffer:

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW020496	30BL012256, 30BL027383	Well	Private	Domestic, Stock	Stock			3.60	3.70					0m	On-site
GW072758	30BL155011	Bore	Private	Domestic, Stock	Domestic, Stock		20/06/1994	17.00	17.00	Good	6.00	0.490		103m	North West
GW053329	30BL120553	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/01/1980	27.00		Salty				185m	South East
GW018112	30BL012255	Bore open thru rock	Private	Domestic, Stock	Domestic, Stock		01/04/1962	24.70	24.70	7001-10000 ppm				255m	North
GW047986	30BL116660	Well	Private	Domestic, Irrigation, Stock	Irrigation			5.50		Salty				308m	South East
GW047987	30BL116661	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/10/1979	9.00	9.00	V.Salty				403m	South East
GW026681	30BL019318	Bore open thru rock	Private	Domestic, Stock	Domestic, Stock		01/05/1967	9.80	9.80					454m	North
GW305734	30BL183248	Bore	Private	Domestic	Domestic		01/02/2005	18.00	18.00		13.00	0.600		1371m	North
GW305748	30BL183949	Bore	Private	Domestic	Domestic, Stock		10/05/2006	90.00	90.00		66.00	1.200		1594m	West

Given the medium to heavy clays in the subsoil, the risk to groundwater contamination from application of fertilisers, herbicides and insecticides from routine cane farming operations is low.

4. Site History

4.1 Land Use History

An oral site history has been provided by Noel Newman. Mr Newman manages the subject property on behalf of his sister Francis Newman. Ms. Newman purchased by the land approximately 21 years ago. The property has been used to grow sugar cane since 1981. Prior to sugar cane the site was sued to grow beef cattle and sorgum.

The Newman family have a strong connection with the land and Swan Bay area as their grandfather owned land adjacent to the said property. Two dwellings are established on the site. The principal dwelling consists of brick and tile construction (circa 1980's) while the second dwelling appears to be weatherboard with metal roof. A large metal shed is located to the south west of the primary dwelling.

The following sources of information were accessed to assess the history of the Site and the surrounding area:

1. Historical Aerial Photographs
2. Historical Maps
3. Historical Business Directories
4. Historical Mining and Exploration Licences

4.3 Historical Aerial Photography Review

A search of historical aerial photographs was conducted of the subject site in an attempt to identify past uses on or about the future building envelopes. Aerial photographs were reviewed for the followings years: 1964, 1971, 1988, 1998, 2004, 2011 and 2021 (see **Appendix A**). Information garnered from the historical photographs is summarised in **Table 4.1** below:

Table 4.1 Review of Historical Aerial Photographs

Photograph	Site Observations
1964	In 1964 the site is partially cleared of vegetation. The remainder is under native vegetation.
1971	In 1971 a greater proportion of the site (up to 70%) is cleared and appears to be used for agriculture.
1988	By 1988 aerial photography indicates that the site under sugar cane and a large dam in the western portion. Two dwellings are noted in the aerial photo.
1998	By 1998 the colour aerial photography clearly shows the sugar cane paddocks,

Photograph	Site Observations
	the dam, vegetation (possibly cropping) around the dam.
2004	The 2004 aerial photography does not show any significant changes at the subject site.
2011	The 2011 aerial photography shows the vegetation around the dam has been removed. No other changes are noted.
2021	In 2021 the aerial photography shows the dam has been filled in. No other changes are noted.

4.4 Historical Maps

Historical maps from 1942, 1969 and 2015 reflect the progress from undeveloped to farmland (see **Appendix A**). There is no evidence of contaminating activities occurring on or adjacent to the subject site in the historical maps.

4.5 Historical Business Directories

A review of historic business directories did not reveal any past business operating on or within close proximity of the subject site (see **Appendix A**).

4.6 Historical Mining and Exploration Licences

Whilst there are numerous historical exploration leases over the entire area there is no evidence of mining occurring on the subject site or within the vicinity of the subject site (see **Appendix A**).

4.7 Summary of Historical Findings

From the aerial photograph review it appears that the subject site was used for sugar cane from 1971 which has continued till the present.

4.6 Australian and NSW Heritage Register

On 27 October 2021 (see **Appendix A**) a search of the:

- Commonwealth Heritage List did not reveal any heritage listed items on within close proximity of the subject site
- Australian Heritage Trust database did not reveal any heritage listed items on within close proximity of the subject site
- NSW State Heritage Items did not reveal any heritage listed items on within close proximity of the subject site
- Richmond Valley Local Environmental Plan did not reveal any heritage listed items on within close proximity of the subject site.

4.7 State and Local Authority Records

4.7.1Contaminated Land Record Search

4.7.1.1 Contaminated Land Record

A search of the Contaminated Land Record (EPA 2010b) on 27 October 2021 for the Richmond Valley Shire Council Local Government Area (LGA) did not identify any notices on or near the subject site (see **Appendix A**).

4.7.2 Protection of the Environmental Operations Act Licenses

A search of the current list (EPA 2010c) of licensed activities as per Schedule 1 of the Protection of the Environment Operations Act 1997 did not identify any licensed activities within the data set:

4.7.3 Cattle Tick Dip Sites

A search of the NSW Department of Primary Industry (DPI) Cattle Dip Site Locator tool (https://www.dpi.nsw.gov.au/animals-and-livestock/beef-cattle/health-and-disease/parasitic-andprotozoal- diseases/ticks/cattle-dip-site-locator) indicated that there are no cattle dip sites within the 200m nominal EPA residential investigation zone of proposed development (see **Appendix A**). As the closest dip (Durrington's) lies well outside the 200m residential investigation buffer to the proposed development therefore no further investigation is considered necessary.

4.7.4 Integrity Assessment

The site history information documented above is generally consistent with the aerial photographs, and the physical condition of the site. Based on the information available, TFA considers that sufficient historical information and site condition information has been obtained to allow for a thorough investigation of the environmental condition of the site.

5.0 Sampling & Quality Assurance Plan

5.1 Overview of DQO Process

The DQOs process is a planning tool developed to ensure that any data collected is of sufficient quality and quantity to support defensible decision making. It is a process used to define the type, quantity and quality of data needed to support decisions relating to the environmental condition of a site and provides a systematic approach for defining the criteria that a data collection design should satisfy.

It is recognised that the most efficient way to accomplish these goals is to establish criteria for defensible decision making before the data collection begins, and then develop a data collection design based on these criteria. By using the DQOs process to plan the investigation effort, the relevant parties can improve the effectiveness, efficiency and defensibility of a decision in a resource and cost-effective manner. DQOs have been developed to detail the type of data that is needed to meet the overall objectives of this project. The DQO's presented in this document have been developed with procedures stated in the following guidelines:

Prior to conducting site works, TFA undertook the data quality objectives (DQOs) planning process.

Table 5.1 DQOs Planning Process Output – Estimation Process

<table>
<tr><td colspan="7">Step 1 – State the problem
Summarise the contamination problem that will require new environmental data and identify the resources available to resolve the problem.</td></tr>
<tr><td>1.1</td><td colspan="6">Write a brief summary of the contamination problem:
Given the use of the site for agricultural purposes namely sugar cane production and the use of chemical fertilisers, herbicides and pesticides there is a potential for residual contamination of the subject site.</td></tr>
<tr><td rowspan="4">1.2</td><td colspan="6">Identify members of the planning team:</td></tr>
<tr><td>Person</td><td colspan="2">Organisation</td><td colspan="3">Role</td></tr>
<tr><td>Tim Fitzroy</td><td colspan="2">TFA</td><td colspan="3">Project Director</td></tr>
<tr><td>Jacob Fitzroy</td><td colspan="2">TFA</td><td colspan="3">Environmental Economist</td></tr>
<tr><td>1.3</td><td colspan="6">Develop/refine the conceptual site model (CSM) (see Figure 3):
A graphical representation of the conceptual site model for the site is included as Figure 3.
Details are included of historical land use and areas of concern.</td></tr>
<tr><td rowspan="7">1.4</td><td colspan="6">Define the summary exposure scenarios (Y/N)*:</td></tr>
<tr><td>Soil/Dust</td><td>Y</td><td>Groundwater</td><td>Y</td><td>Surface Water</td><td>Y</td></tr>
<tr><td>Dermal</td><td>R/M</td><td>Dermal</td><td></td><td>Dermal</td><td>-</td></tr>
<tr><td>Ingestion</td><td>R/M</td><td>Ingestion</td><td></td><td>Ingestion</td><td>-</td></tr>
<tr><td>Inhalation</td><td>R/M</td><td>Inhalation</td><td></td><td>Inhalation</td><td>-</td></tr>
<tr><td>Ecological</td><td>-</td><td>Ecological</td><td>R/M</td><td>Ecological</td><td>Y</td></tr>
<tr><td colspan="6">* R = residential, RC = recreational, C = commercial worker, M = maintenance worker (i.e., during site works/construction); B = local bores</td></tr>
</table>

Step 1 – State the problem Summarise the contamination problem that will require new environmental data and identify the resources available to resolve the problem.	
	Use of the site for commercial farming practices necessitating the need for use of pesticides, herbicides and fertilisers provides a potential source of residual contamination that requires assessment to inform the applicant and regulatory authorities as to whether the site is suitable for rezoning to R5 Large Lot residential use

Step 2 - Identify the decision To identify the decision that requires new environmental data to address the contamination problem.	
2.1	If identified Contaminants of Concern are detected in soils or groundwater exceed Tier 1 or Tier 2 Risk Assessment Criteria. If the 95% UCL does not exceed Tier 1 of Tier 2 Risk Assessment Criteria a Human health/ ecological pathway is considered to not exist

Step 3 – Identify the inputs to the decision To identify the information that will be required to support the decision and specify which inputs require new environmental measurements.	
	Identify the information that will be required to resolve the decision statements, including existing information and new environmental data, and identify the sources for each item of information required:
	Existing information:
3.1	From the aerial photograph review it appears that the subject site was used for sugar cane from 1971 which has continued till the present. The subject site is within an agricultural precinct and has been used to produce sugar cane for many decades which suggests that there would be a moderate probability of contaminants originating from the Site.
3.2	Identify the information needed to establish the action level: The results of the soil sample analysis are compared with the Health Investigation Levels (HILs) set out in Table 1A (1) of NEPM 1999 (2013) under Residential with garden/accessible soil and the Ecological Soil investigation levels (Table 1B(5) NEPC 2013). NSW EPA (1995) & NEPM 1999 (2013) state that if the contaminant concentration of the site is below a threshold limit, the site can be considered as uncontaminated. As per Section 3.2.2 of Schedule B1 of NEPM 1999 (2013), if Tier 1 investigations levels are exceeded and it is indicated that there is a risk of negative impact to human or ecological health, a site specific risk assessment will be undertaken. Given that the evidence that the site has been used to produce sugar cane for many decades it was decided to undertake sampling of soil onsite.
3.3	Confirm that appropriate analytical methods exist to provide the necessary data: Feasible analytical methods, both field and laboratory will be consistent with existing guidance including being in accordance with NEPM, 1999. Laboratories to be used are NATA accredited and use analytical methods based on USEPA and APHA methods.

Step 4 - Define the boundaries of the study To define the spatial and temporal boundaries that the data must represent to support the decisions.	
4.1	Specify the characteristics that define the population of interest: The investigation area is limited areas to the proposed development footprint Investigation area are presented in Figure 3.
4.2	Define the geographic area and media to which the decision statement applies: The investigation boundary is shown on Figure 1. Media is also stratified depending on the nature of the material encountered (i.e., natural soil), .

Step 4 - Define the boundaries of the study To define the spatial and temporal boundaries that the data must represent to support the decisions.	
4.3	When appropriate, divide the populations into strata that have relatively homogenous characteristics: Populations consist of natural clay beneath the site.
4.4	Determine the time frame to which the decision applies: This timeframe may be affected by other external factors, which may include the following: Inclement weather delaying progress
4.5	Determine when to collect data: Rain conditions will likely limit access. Works will be undertaken during normal working hours.
4.6	Define the scale of the decision making: Update as required
4.7	Identify any practical constraints on data collection: The following constraints are likely to impact data collection: Rain conditions will likely limit access

Step 5 - Develop the analytic (statistical) approach Develop a logical "if …, then …, else …" statement that defines the conditions that would cause the decision maker to choose among alternative actions.	
5.1	Specify the statistical parameter that characterises the population of interest, such as mean, median, maximum or proportion, etc.: The 95% UCL for will be the key characteristic. Other data evaluation will entail: No sample will exceed 250% of the criteria Standard deviation will be < 50% criteria 95% UCL is < criteria
5.2	Specify the action level for the decision: Analytical actions levels based on residential criteria with garden/accessible soil (home-grown produce < 10% fruit and vegetable and no poultry) in NEPM 1999, amended 2013. The criteria is not clean-up criteria; therefore, exceedances will be screened to determine whether further investigation is required.
5.3	Confirm that measurement detection will allow reliable comparisons with the action level: Samples will be collected and submitted for NATA accredited laboratory analysis to determine site conditions. Standard limits of reporting (LOR) are less than the criteria.
5.4	Combine the outputs from the previous DQOs steps and develop an "if ..., then ..., else ..." theoretical decision rule based on the chosen action level: If the statistical parameters of the data exceed applicable action levels, further remediation/assessment or management will be required at the site. If not, no further remediation will be required at the site.

Step 6 – Specify performance or acceptance criteria To specify probability limits for false rejection and false acceptance decision errors.	
6.1	Specify the decision rule as a statistical hypothesis test: Null hypothesis (HO) is the 95% UCL for concentration for soil is > action level; and Alternative hypotheses (HA) the 95% UCL for concentration for soil is ≤ action level.
6.2	Examine consequences of making incorrect decisions from the test: False rejection or Type I error of determining the site is suitable when it is not (wrongly rejects a true HO). Consequence is potential risks to human health and/or the environment. False acceptance or Type II error of determining the site is not suitable when it is (wrongly accepts a false HO). Consequence is unnecessary expenditure of resources or a site not being used for its highest value.
6.3	Place acceptable limits on the likelihood of making decision errors:

Step 6 – Specify performance or acceptance criteria To specify probability limits for false rejection and false acceptance decision errors.	
	Decision errors occur when accurate analytical results generated from tiny samples (sampling unit) are assumed to represent the concentrations of much larger volumes of matrix, but that extrapolation is invalid because confounding variables have not been acknowledged or controlled. No sample result will exceed 250% of the criteria. Standard deviation will be < 50% criteria. 95% UCL is < criteria.

Step 7 – Optimise the design for obtaining data To identify a resource effective sampling and analysis design for generating data that are expected to satisfy the DQOs.				
7.1	Document the final sampling and analysis design, along with a discussion of the key assumptions underlying this design: Refer to SAQP section of report.			
7.2	Detail how the design should be implemented, together with contingency plans for unexpected events: Refer to SAQP section of report.			
7.3	Determine the quality assurance and quality control (QA/QC) procedures that would be performed to detect and correct problems to ensure defensible results: The field QA, and the field and laboratory QC, are described in the sampling, analysis and quality plan (SAQP). In summary, the following QC soil and groundwater samples are proposed in accordance with the NEPM 2013.			
	Field QC samples		Lab QC samples	
	Field duplicate	≥ 5%	Lab blank	≥ 1/lab batch
			Surrogate spike	
			LCS	≥ 1/lab batch
			Matrix spike	≥ 1/media type
	Trip spike (vol)	≥ 1/field batch	Lab duplicate	≥ 10%
7.4	Document the operational details and theoretical assumptions of the selected design in the sampling, analysis, and quality plan (SAQP):			

5.2 Possible Contaminant Sources

Given the current agricultural at the site metals and chemicals may be possible at the site. **Table 5.2** below lists the sources of potential contamination at the site and their associated contaminants of concern. The site has been used for sugar cane production from at least 1971 and has been subject to herbicide and pesticide application which has the potential to be contaminating activities. Based on the site history information, site inspection and surrounding land uses, the potentially contaminating activities were identified as:

- Pesticide use associated with sugar cane production
- Herbicide use to control weeds

Table 5.2 Potential Contaminants of Concern for Identified Activities

Potential contaminants of concern (PCOC) related to these suspected activities are presented below

Potential contaminants of concern (PCOC)	Suspected Activities (source)
Organochlorine/organophosphorus pesticide and herbicide	residual chemicals used for general weed control and pets control
Heavy Metals	metals including arsenic and lead found in pesticides

Technical guidance considered in preparing these DQOs **includes:**

- NSW EPA (formerly Office of Environment and Heritage (OEH)) (2011) Guidelines for
- Consultants Reporting on Contaminated Sites.
- NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme (3rd edition).
- NSW EPA (2012) Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases.
- NSW EPA (2014) Recovered Aggregate Exemption Order
- National Environment Protection Council (NEPC) National Environment Protection
- (Assessment of Site Contamination) Measure 1999 (ASC NEPM (2013)) – Schedule
- B2: Guideline on Site Characterisation (2013).

5.3 Relevant Environmental media

The environmental media considered relevant for the investigation consisted of clay site soils.

5.4 Relevant Environmental Criteria

5.4.1 Soil (general contaminates)

For soil, the appropriate and adopted criteria are based on the ASC NEPM 2013, in particular the health investigation levels (HILs), environmental investigation levels (EILs), environmental screening levels (ESLs) applicable for residential A land use.

HSLs and ESLs – soil type

Based on the nature of the soil, clay soil criteria have been used as the soil type for deriving the HSLs and ESLs.

6 Site Assessment

6.1 Preliminary Site Investigations

The field work was undertaken in general accordance with the DQOs. Field works were conducted on:

- 25 October 2021

All fieldwork was completed by Tim Fitzroy (TFA). TFA undertook sampling of the surface soil and arranged for analysis at the Environmental Analysis Laboratory, Southern Cross University, Lismore in accordance with the Recovered Aggregate Exemption Order (NSW EPA 2014). Further details are provided in section 6.2.

The sampling and analytical strategy and methodology are described below. The results of the assessment are provided in Section 7. Soil sample locations are shown on **Figure 4**.

On the day of the site assessments the weather was fine. Photographs of the subject site can be seen in **Appendix B**.

6.2 Visible Signs of Contamination

The Investigation Area was assessed on foot in order to identify any signs of contamination. In general, no obvious signs of contamination (such as plant stress, surface spills, waste materials, odours etc.) were evident during the site investigation.

6.3 Odours

There were no obvious odours akin to contamination observed during site inspections.

6.4 Flood Potential

There is no likely of flooding on the development site.

6.5 Presence of Drums, Wastes and Fill Material

There was no evidence of drums, waste or fill material.

6.6 Methodology

The objective of this preliminary investigation is to gather information with regard to the type, location, concentration and distribution of contaminants to determine if the subject site (prior to demolition of existing structures) represents a risk of harm to end users and sensitive receptors. To determine this, soil sampling and laboratory analysis has been conducted upon surface soils collected from the study area.

The following sampling, analysis and data quality objectives have been adopted for this site investigation:

- to confirm the soils in the proposed building footprint and immediate vicinity on each of the proposed alteration and additions at the subject site do not pose a risk to human health or the environment through soil contamination.
- to employ quality assurance when sampling, assessing and during evaluation of the subject soils.
- to ensure that decontamination techniques are applied during the sampling procedure and that no cross contamination of samples occurs.

6.6.1 Soil (general contaminates)

On 25 October 2021 forty five (45) soil samples plus 4 QA samples were collected from the proposed development envelope and immediate vicinity in a systematic basis. Soil sampling was conducted as part of a Preliminary Site investigation to support the Planning proposal. Soil samples were analysed for 16 metals, organochlorine and organophosphorus pesticides.

The following basic measures were undertaken by *TFA* to conform to the minimum standards for sampling and quality control procedures:

- Bore holes were developed via a mechanical auger
- Soil samples were collected with a stainless steel trowel and placed in new, clip lock plastic bags. Sampling equipment (stainless steel trowel) was decontaminated between samples by rinsing thoroughly with de-mineralise water, scrubbing with cleanser (Decon 90), and finally re-rinsing with de-mineralised water.
- All samples were collected from the surface soil horizon between 0 and 100 mm below the surface.
- The sampling procedure utilised in this investigation was in accordance with AS 4482.1 – 2005.
- All soil samples (45 +4 QA/QC) were placed into an esky with ice bricks, and delivered to the Environmental Analysis Laboratory at Southern Cross University, Lismore. Metals analysis was conducted by EAL and quality control. Analysis is conducted using a Perkin Elmer ELANDRC-e ICPMS (Inductively Coupled Plasma Mass Spectrometry). Chain of custody forms, laboratory quality assurance and laboratory quality control documentation are available on request.
- Chain of Custody forms, which identified the sample identification codes, the collection dates and the type of analysis to be undertaken were fully completed and delivered with the samples (see **Appendix C**).
- Residual samples were stored, frozen and retained by *Environmental Analysis Laboratory* pending the need for additional or repeat analysis.
- Laboratory Results are available in **Appendix D**.

6.3 Data Usability

All site work was completed in accordance with standard *TFA sampling protocols*, including a QA/QC programme and standard operating procedures.

A data usability assessment has been performed for the sampling undertaken during this investigation, as summarised in **Appendix E** and includes:

- Summary of field quality assurance/quality control

- Field quality control soil samples summary
- Summary of laboratory quality assurance/quality control.

Following this discussion, the data usability assessment shows that the data is of suitable quality to support the conclusions made in this report.

6.4 Conditions Encountered

Access to natural clay soils was favourable. As the samples were surface samples no bore logs have been produced.

7 Analytical Results

The analytical results are presented below.

7.1 Soil

Table 7.1 Results of Laboratory Analysis of Soil for Metals, OCs & OPs

Analyte	Health Criteria 0m to <1m	Ecological Criteria	Management Limits	Site Data			
	HIL/HSL mg/kg	EIL/ESL (mg/kg)	ML (mg/kg)	No. samples analysed	Number of exceedances	Max mg/kg	Meets Screening criteria?
Heavy Metals							
(Arsenic)	100	100		49	0	9	Yes
(Lead)	300	1,100			0	17	Yes
Cadmium	20	-			0	<0.5	Yes
Chromium	100	410			0	13	Yes
Copper	6,000	230			0	25	Yes
Nickel	400	270			0	7	Yes
Zinc	7,400	770			0	58	Yes
Mercury	40	-			0	0.09	Yes
(OCs)							
(Endrin)	10	NL		49	0	<0.2	Yes
(Dieldrin)	6	NL			0	<0.2	Yes
(DDD, DDE and DDT)	240	180			0	<0.2	Yes

The results of soil analysis from all samples onsite indicate compliance with all nominated Health and Ecological Criteria.

8 Discussion and Conceptual Site Model

8.1 Discussion

This investigation is Tier 1 - preliminary site investigation, which is required to determine if contamination of the site's soil has occurred from past land usage in accordance with NEPM 1999 (2013), DUAP and EPA (1998). The investigation includes obtaining a history of land usage on the site and a preliminary soil-sampling regime. The results of the soil sample analysis are compared with the Health Investigation Levels (HIL's) and Ecological Investigation (EIL's) and Ecological Screening Levels (HSL's) outlined in NEPM 1999 (2013).

A total of 45 soil samples plus 4 QA samples were collected from within the proposed development envelope.

All of the soil samples show contaminant levels well below the relevant Australian and New Zealand Environment and Conservation Council (ANZECC), National Environment Protection Measure (NEPM 2013) HILA *Residential with garden/accessible soil also includes children's day care centres, preschools and primary schools* and *Ecological Soil Investigation Levels* and Ecological Screening Levels (HSL's) (NEPM 2013).

8.2 Conceptual Site Model

The conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM for the site, following the site investigation is detailed in Table 8.1 below.

Table 8.1 CSM Discussion

Element	Site Specific Information
Potential sources of contamination and contaminants of concern	Metals, and chemicals may be presents from agricultural land use
Potentially affected media, such as soil	Media consists of soil
Human and ecological receptors.	Potential human & ecological receptors include: • Construction workers; • Residents • Receiving water
Potential and complete exposure pathway to human and/or environmental receptors.	• Subsurface infrastructure

Based on the results of this assessment, the likelihood for chemical contamination to be present in the proposed development envelope is considered to be low to moderate.

9Conclusions

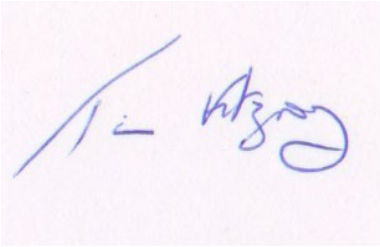
This investigation is Tier 1 - preliminary site investigation, which is required to determine if contamination of the site's soil has occurred from past land usage in accordance with NEPM 1999 (2013), DUAP and EPA (1998). The investigation includes obtaining a history of land usage on the site and a preliminary soil-sampling regime. The results of the soil sample analysis are compared with the Health Investigation Levels (HIL's) and Ecological Investigation (EIL's) and Ecological Screening Levels (HSL's) outlined in NEPM 1999 (2013).

A total of 45 soil samples plus 4 QA samples were collected from within the proposed development envelope.

All of the soil samples show contaminant levels well below the relevant Australian and New Zealand Environment and Conservation Council (ANZECC), National Environment Protection Measure (NEPM 2013) HILA *Residential with garden/accessible soil also includes children's day care centres, preschools and primary schools* and *Ecological Soil Investigation Levels* and Ecological Screening Levels (HSL's) (NEPM 2013).

Based on the outcomes of this PSI there is no impediment to approval of Planning Proposal for the proposed rezoning from RU1 Primary Production to R5 Large Lot Residential. Further investigation in accordance with the EPA sampling guidelines is required prior to the issue of a subdivision certificate for large lot residential use.

This report has been prepared by Tim Fitzroy of Tim Fitzroy & Associates.



Tim Fitzroy
Environmental Health Scientist
Environmental Auditor

References

Australia and New Zealand Environment and Conservation Council (ANZECC), 1992, Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, Australia and New Zealand Environment and Conservation Council.

Environment Protection Authority, 1995, Contaminated Sites Sampling Design Guidelines, Environment Protection Authority, Sydney.

National Environment Protection Council (2013) 'Schedule B (1) Guideline on the Investigation Levels for Soil and Groundwater

Council of Standards Australia (2005) AS 4482.1-2005 Guide to the sampling and investigation of potentially contaminated soil – Non-volatile and semi-volatile compounds

NSW DEC (2006) Contaminated Sites – Guidelines for the NSW Site Auditor Scheme 2nd Edition

NSW EPA (2011) Guidelines for Consultants Reporting Contaminated Sites

National Environment Protection Council (NEPC) (2013) National Environment Protection (Assessment of Site Contamination) Measure

Contaminated land guidelines (NSW Environment Protection Authority 2020)

Northern Rivers Regional Councils (NRRC) Regional Policy for the Management of Contaminated Land (NRRC 2006)

Copyright and Usage

Figures

Figure 1 Location map

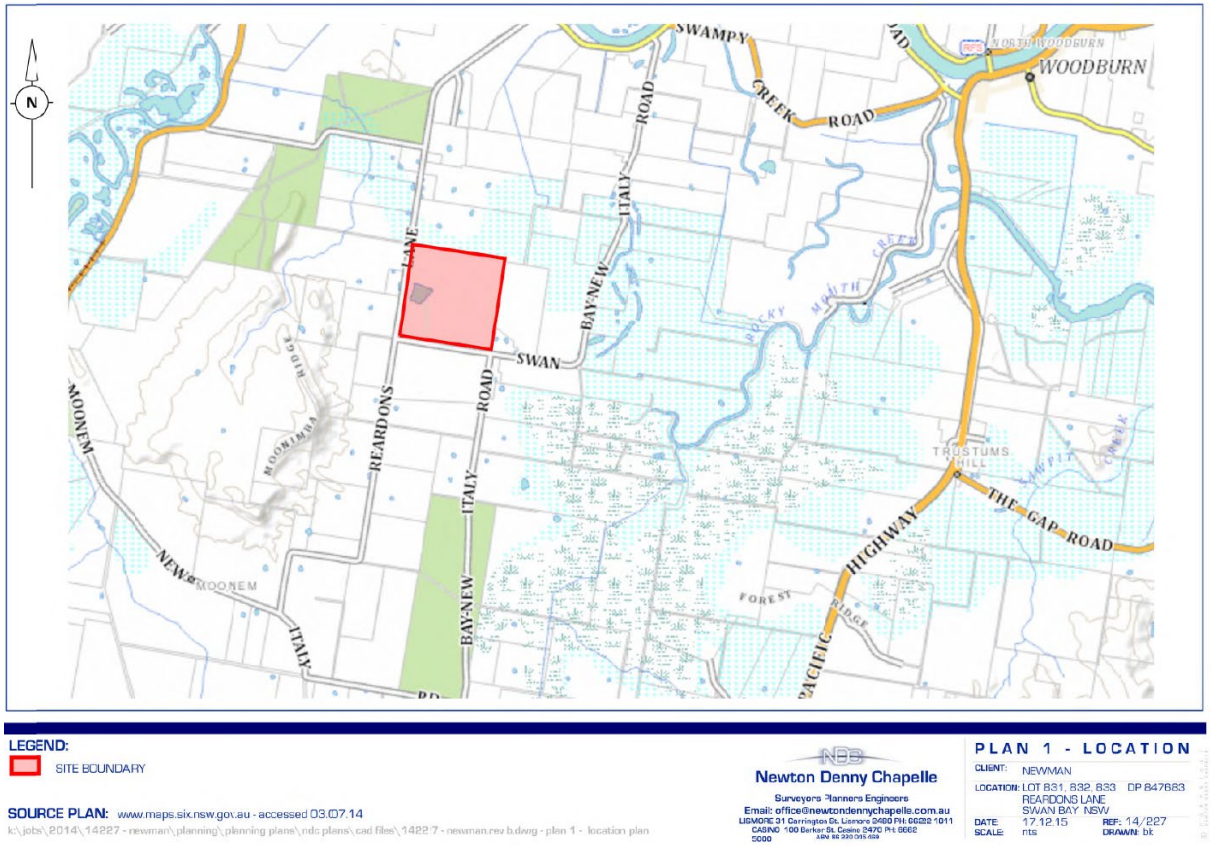


Figure 2 Planning Proposal

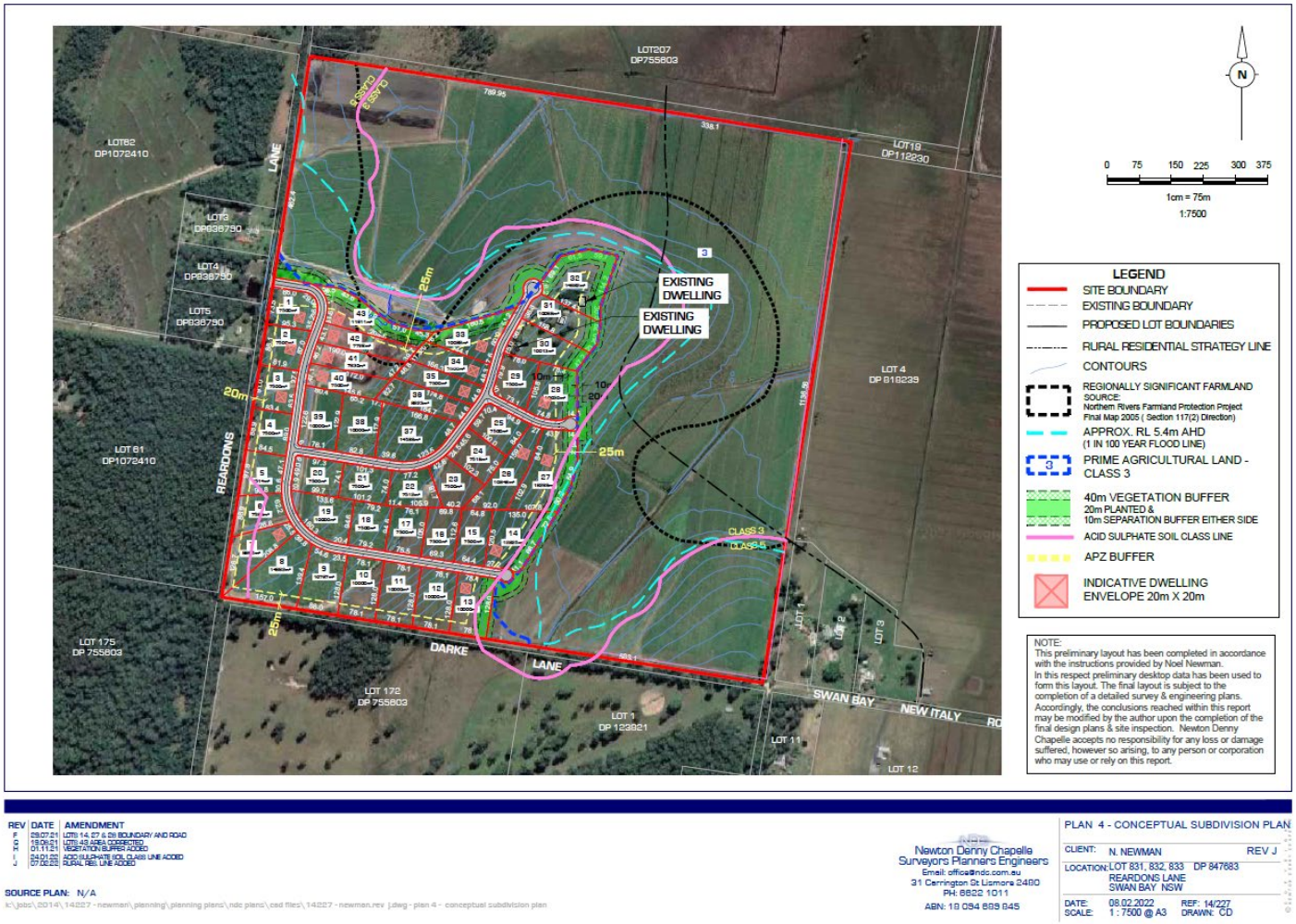


Figure 3 Investigation Area

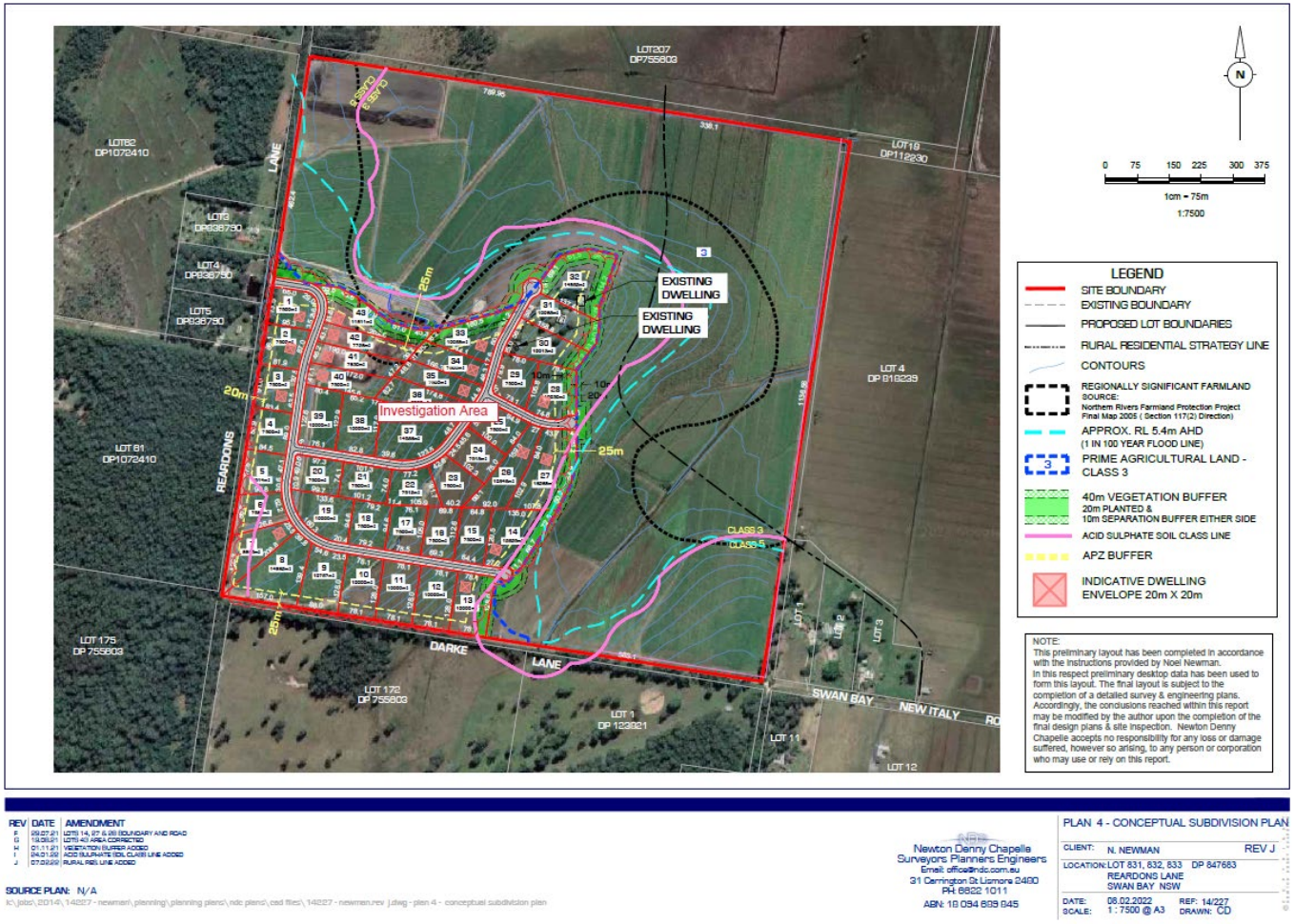
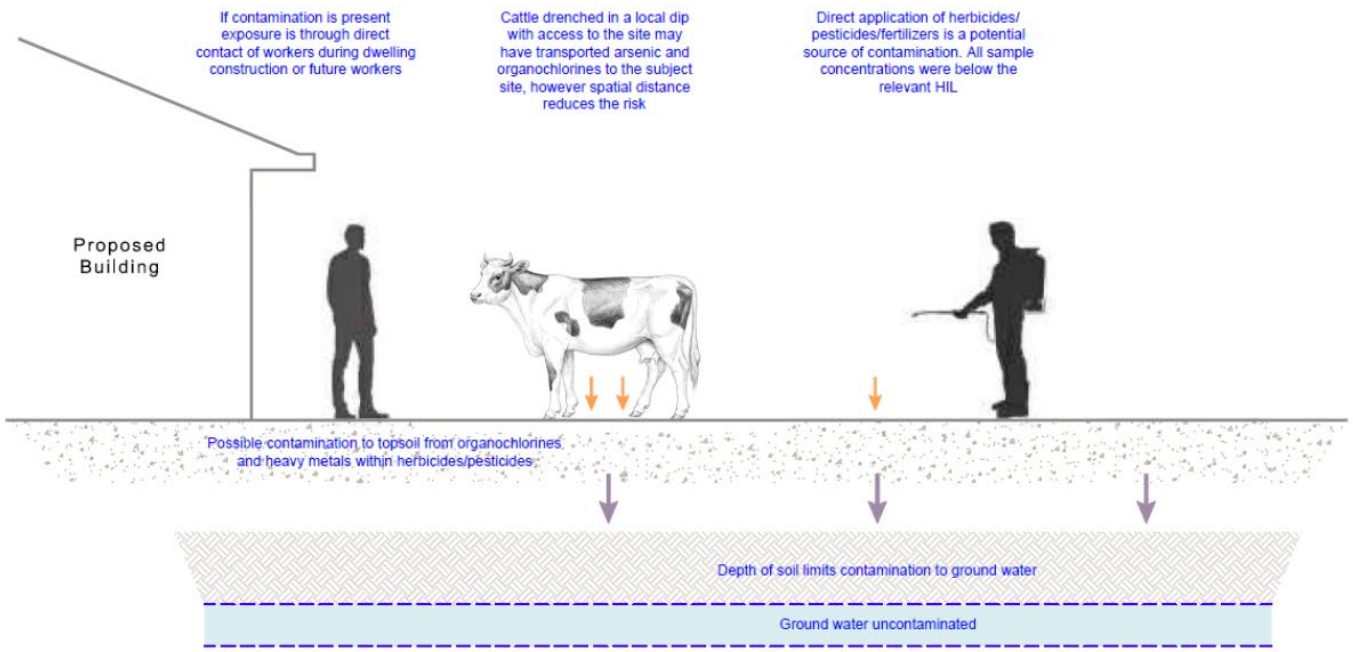


Figure 4 Sample Locations

Illustration 1
Soil Sampling Locations
Revised Planning Proposal for a 43 Lot Rural Residential Subdivision
Lots 831,832 & 833 DP 847683 | Reardon's Lane, Swan Bay

PREPARED BY:
tim fitzroy & associates

Figure 5 Conceptual Site Model



A Lotsearch

LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

Date: 27 Oct 2021 14:38:45

Reference: LS025745 EP

Address: 395 Reardons Lane, Swan Bay, NSW 2324

Dataset Listing

Datasets contained within this report, detailing their source and data currency:

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features On-site	No. Features within 100m	No. Features within Buffer
Cadastre Boundaries	NSW Department of Finance, Services & Innovation	30/06/2021	30/06/2021	Quarterly	-	-	-	-
Topographic Data	NSW Department of Finance, Services & Innovation	25/06/2019	25/06/2019	As required	-	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	13/10/2021	11/10/2021	Monthly	1000m	0	0	0
Contaminated Land Records of Notice	Environment Protection Authority	08/10/2021	08/10/2021	Monthly	1000m	0	0	0
Former Gasworks	Environment Protection Authority	11/08/2021	11/10/2017	Quarterly	1000m	0	0	0
National Waste Management Facilities Database	Geoscience Australia	12/05/2021	07/03/2017	Annually	1000m	0	0	0
National Liquid Fuel Facilities	Geoscience Australia	15/02/2021	13/07/2012	Annually	1000m	0	0	0
EPA PFAS Investigation Program	Environment Protection Authority	27/09/2021	28/04/2021	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Investigation Sites	Department of Defence	28/09/2021	28/09/2021	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Management Sites	Department of Defence	28/09/2021	28/09/2021	Monthly	2000m	0	0	0
Airservices Australia National PFAS Management Program	Airservices Australia	08/10/2021	08/10/2021	Monthly	2000m	0	0	0
Defence 3 Year Regional Contamination Investigation Program	Department of Defence	19/08/2021	19/08/2021	Quarterly	2000m	0	0	0
EPA Other Sites with Contamination Issues	Environment Protection Authority	02/02/2021	13/12/2018	Annually	1000m	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	27/09/2021	27/09/2021	Monthly	1000m	0	0	0
Delicensed POEO Activities still regulated by the EPA	Environment Protection Authority	27/09/2021	27/09/2021	Monthly	1000m	0	0	0
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	27/09/2021	27/09/2021	Monthly	1000m	4	4	4
UBD Business Directories (Premise & Intersection Matches)	Hardie Grant			Not required	150m	0	0	0
UBD Business Directories (Road & Area Matches)	Hardie Grant			Not required	150m	-	0	0
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	500m	0	0	0
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	500m	-	0	0
Cattle dips of the Northern Rivers region	NSW Dept. of Primary Industries	15/02/2021	15/02/2021	Annually	1000m	0	0	1
Points of Interest	NSW Department of Finance, Services & Innovation	19/08/2021	19/08/2021	Quarterly	1000m	0	0	0
Tanks (Areas)	NSW Department of Customer Service - Spatial Services	19/08/2021	19/08/2021	Quarterly	1000m	0	0	0
Tanks (Points)	NSW Department of Customer Service - Spatial Services	19/08/2021	19/08/2021	Quarterly	1000m	0	0	0
Major Easements	NSW Department of Finance, Services & Innovation	19/08/2021	19/08/2021	Quarterly	1000m	0	1	1
State Forest	Forestry Corporation of NSW	25/02/2021	14/02/2021	Annually	1000m	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment & Heritage	22/01/2021	11/12/2020	Annually	1000m	0	0	0
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	08/10/2014	17/03/2000	As required	1000m	1	1	1
Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018	NSW Department of Planning, Industry and Environment	26/10/2020	21/02/2018	Annually	1000m	0	0	0

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features On-site	No. Features within 100m	No. Features within Buffer
Groundwater Boreholes	NSW Dept. of Primary Industries - Water NSW; Commonwealth of Australia (Bureau of Meteorology)	24/07/2018	23/07/2018	Annually	2000m	1	1	9
Geological Units 1:100,000	NSW Department of Planning, Industry and Environment	20/08/2014		Annually	1000m	3	3	6
Geological Structures 1:100,000	NSW Department of Planning, Industry and Environment	20/08/2014		Annually	1000m	0	0	1
Naturally Occurring Asbestos Potential	NSW Dept. of Industry, Resources & Energy	04/12/2015	24/09/2015	Unknown	1000m	0	0	0
Atlas of Australian Soils	Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES)	19/05/2017	17/02/2011	As required	1000m	2	2	3
Soil Landscapes of Central and Eastern NSW	NSW Department of Planning, Industry and Environment	14/10/2020	27/07/2020	Annually	1000m	3	3	6
Environmental Planning Instrument Acid Sulfate Soils	NSW Department of Planning, Industry and Environment	19/08/2021	28/06/2021	Monthly	500m	2	-	-
Atlas of Australian Acid Sulfate Soils	CSIRO	19/01/2017	21/02/2013	As required	1000m	3	3	3
Dryland Salinity - National Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	None planned	1000m	0	0	0
Mining Subsidence Districts	NSW Department of Customer Service - Subsidence Advisory NSW	19/08/2021	05/08/2021	Quarterly	1000m	0	0	0
Current Mining Titles	NSW Department of Industry	28/09/2021	28/09/2021	Monthly	1000m	0	0	0
Mining Title Applications	NSW Department of Industry	28/09/2021	28/09/2021	Monthly	1000m	0	0	0
Historic Mining Titles	NSW Department of Industry	28/09/2021	28/09/2021	Monthly	1000m	9	9	13
Environmental Planning Instrument SEPP State Significant Precincts	NSW Department of Planning, Industry and Environment	19/08/2021	07/12/2018	Monthly	1000m	0	0	0
Environmental Planning Instrument Land Zoning	NSW Department of Planning, Industry and Environment	19/08/2021	13/08/2021	Monthly	1000m	1	1	3
Commonwealth Heritage List	Australian Government Department of the Agriculture, Water and the Environment	18/05/2021	20/11/2019	Annually	1000m	0	0	0
National Heritage List	Australian Government Department of the Agriculture, Water and the Environment	18/05/2021	20/11/2019	Annually	1000m	0	0	0
State Heritage Register - Curtilages	NSW Department of Planning, Industry and Environment	19/08/2021	25/06/2021	Quarterly	1000m	0	0	0
Environmental Planning Instrument Local Heritage	NSW Department of Planning, Industry and Environment	19/08/2021	13/08/2021	Monthly	1000m	0	0	0
Bush Fire Prone Land	NSW Rural Fire Service	21/10/2021	19/10/2021	Weekly	1000m	1	3	3
Eastern Bushland Database (North Region)	NSW Office of Environment & Heritage	24/07/2016	01/01/1991	None planned	1000m	1	2	4
Ramsar Wetlands of Australia	Australian Government Department of Agriculture, Water and the Environment	24/02/2021	19/03/2020	Annually	1000m	0	0	0
Groundwater Dependent Ecosystems	Bureau of Meteorology	14/08/2017	15/05/2017	Annually	1000m	4	4	6
Inflow Dependent Ecosystems Likelihood	Bureau of Meteorology	14/08/2017	15/05/2017	Unknown	1000m	10	14	20
NSW BioNet Species Sightings	NSW Office of Environment & Heritage	18/10/2021	18/10/2021	Weekly	10000m	-	-	-

Site Diagram

395 Reardons Lane, Swan Bay, NSW 2324

Legend

- Site Boundary
- Internal Parcel Boundaries

Total Area: 1.28km²

Total Perimeter: 4.53km

Disclaimers:

Measurements are approximate only and may have been simplified or smaller lengths removed for readability.

Parcels that make up a small percentage of the total site area have not been labelled for increased legibility.

Scale: 0 25 50 100 150 200 250 Meters

Data Sources: Aerial Imagery:
© NSW Department of Finance, Services & Innovation

Coordinate System:
GDA 1994 MGA Zone 56

Date: 27 October 2021

Contaminated Land

395 Reardons Lane, Swan Bay, NSW 2324

List of NSW contaminated sites notified to EPA

Records from the NSW EPA Contaminated Land list within the dataset buffer:

Map Id	Site	Address	Suburb	Activity	Management Class	Status	Location Confidence	Dist	Direction
N/A	No records in buffer								

The values within the EPA site management class in the table above, are given more detailed explanations in the table below:

EPA site management class	Explanation
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the Environmental Planning and Assessment Act 1979 (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination currently regulated under CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's Contaminated Land Public Record of Notices.
Contamination currently regulated under POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Management of the contamination is regulated under the Protection of the Environment Operations Act 1997 (POEO Act). The EPA's regulatory actions under the POEO Act are available on the POEO public register.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed under the Protection of the Environment Operations Act 1997 (POEO Act).
Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the Environmental Planning and Assessment Act 1979 (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the Contaminated Land Management Act 1997 (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's Contaminated Land Public Record of Notices.
Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997. A regulatory approach is being finalised.
Regulation under the CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the Contaminated Land Management Act 1997 is not required.
Under assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or Protection of the Environment Operations Act 1997. Alternatively, the EPA may require information via a notice issued under s77 of the Contaminated Land Management Act 1997 or issue a Preliminary Investigation Order.

NSW EPA Contaminated Land List Data Source: Environment Protection Authority

Contaminated Land

395 Reardons Lane, Swan Bay, NSW 2324

Contaminated Land: Records of Notice

Record of Notices within the dataset buffer:

Map Id	Name	Address	Suburb	Notices	Area No	Location Confidence	Distance	Direction
N/A	No records in buffer							

Contaminated Land Records of Notice Data Source: Environment Protection Authority

Terms of use and disclaimer for Contaminated Land: Record of Notices, please visit http://www.epa.nsw.gov.au/clm/clmdisclaimer.htm

Former Gasworks

Former Gasworks within the dataset buffer:

Map Id	Location	Council	Further Info	Location Confidence	Distance	Direction
N/A	No records in buffer					

Former Gasworks Data Source: Environment Protection Authority

Waste Management & Liquid Fuel Facilities

395 Reardons Lane, Swan Bay, NSW 2324

National Waste Management Site Database

Sites on the National Waste Management Site Database within the dataset buffer:

Site Id	Owner	Name	Address	Suburb	Class	Landfill	Reprocess	Transfer	Comments	Loc Conf	Dist	Direction
N/A	No records in buffer											

Waste Management Facilities Data Source: Geoscience Australia

National Liquid Fuel Facilities

National Liquid Fuel Facilties within the dataset buffer:

Map Id	Owner	Name	Address	Suburb	Class	Operational Status	Operator	Revision Date	Loc Conf	Dist	Direction
N/A	No records in buffer										

National Liquid Fuel Facilities Data Source: Geoscience Australia

PFAS Investigation & Management Programs

395 Reardons Lane, Swan Bay, NSW 2324

EPA PFAS Investigation Program

Sites that are part of the EPA PFAS investigation program, within the dataset buffer:

Map ID	Site	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

EPA PFAS Investigation Program: Environment Protection Authority

Defence PFAS Investigation Program

Sites being investigated by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

Defence PFAS Investigation Program Data Custodian: Department of Defence, Australian Government

Defence PFAS Management Program

Sites being managed by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

Defence PFAS Management Program Data Custodian: Department of Defence, Australian Government

Airservices Australia National PFAS Management Program

Sites being investigated or managed by Airservices Australia for PFAS contamination within the dataset buffer:

Map ID	Site Name	Impacts	Loc Conf	Dist	Dir
N/A	No records in buffer				

Airservices Australia National PFAS Management Program Data Custodian: Airservices Australia

Defence Sites

395 Reardons Lane, Swan Bay, NSW 2324

Defence 3 Year Regional Contamination Investigation Program

Sites which have been assessed as part of the Defence 3 Year Regional Contamination Investigation Program within the dataset buffer:

Property ID	Base Name	Address	Known Contamination	Loc Conf	Dist	Dir
N/A	No records in buffer					

Defence 3 Year Regional Contamination Investigation Program, Data Custodian: Department of Defence, Australian Government

EPA Other Sites with Contamination Issues

395 Reardons Lane, Swan Bay, NSW 2324

EPA Other Sites with Contamination Issues

This dataset contains other sites identified on the EPA website as having contamination issues. This dataset currently includes:

- James Hardie asbestos manufacturing and waste disposal sites
- Radiological investigation sites in Hunter's Hill
- Pasminco Lead Abatement Strategy Area

Sites within the dataset buffer:

Site Id	Site Name	Site Address	Dataset	Comments	Location Confidence	Distance	Direction
N/A	No records in buffer						

EPA Other Sites with Contamination Issues: Environment Protection Authority

EPA Activities

395 Reardons Lane, Swan Bay, NSW 2324

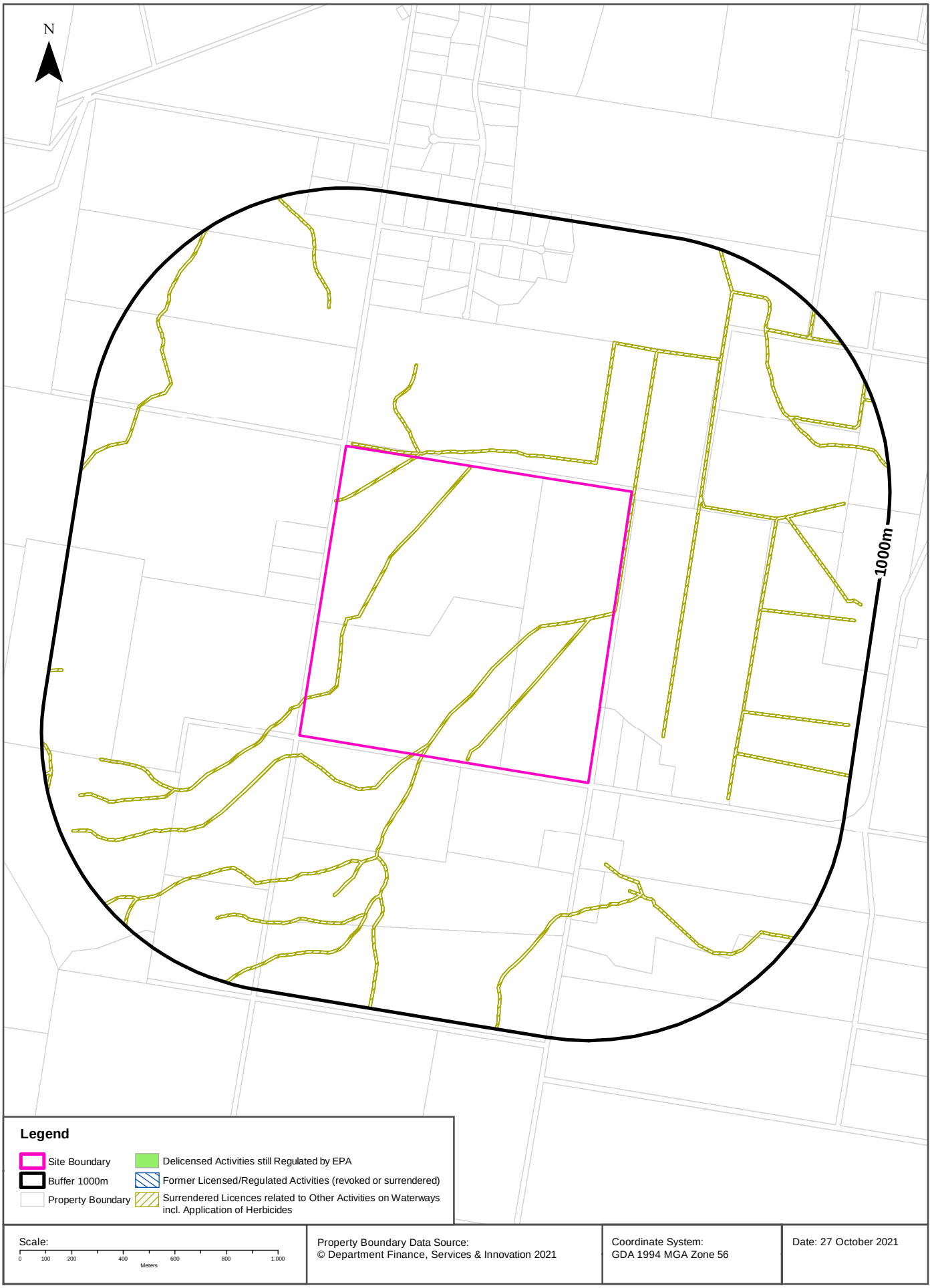
Licensed Activities under the POEO Act 1997

Licensed activities under the Protection of the Environment Operations Act 1997, within the dataset buffer:

EPL	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
N/A	No records in buffer							

Delicensed & Former Licensed EPA Activities

395 Reardons Lane, Swan Bay, NSW 2324



EPA Activities

395 Reardons Lane, Swan Bay, NSW 2324

Delicensed Activities still regulated by the EPA

Delicensed activities still regulated by the EPA, within the dataset buffer:

Licence No	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
N/A	No records in buffer							

Delicensed Activities Data Source: Environment Protection Authority

Former Licensed Activities under the POEO Act 1997, now revoked or surrendered

Former Licensed activities under the Protection of the Environment Operations Act 1997, now revoked or surrendered, within the dataset buffer:

Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
4292	FAR NORTH COAST COUNTY COUNCIL	COUNTY DISTRICT - LISMORE NSW 2480	Surrendered	06/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	On-site
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered	06/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	On-site
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered	07/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	On-site
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered	09/11/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	On-site

Former Licensed Activities Data Source: Environment Protection Authority

Historical Business Directories

395 Reardons Lane, Swan Bay, NSW 2324

Business Directory Records 1950-1991
Premise or Road Intersection Matches

Universal Business Directory records from years 1991, 1982, 1970, 1961 & 1950, mapped to a premise or road intersection within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
N/A	No records in buffer						

Business Directory Records 1950-1991
Road or Area Matches

Universal Business Directory records from years 1991, 1982, 1970, 1961 & 1950, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer					

Historical Business Directories

395 Reardons Lane, Swan Bay, NSW 2324

Dry Cleaners, Motor Garages & Service Stations Premise or Road Intersection Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a premise or road intersection, within the dataset buffer.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
N/A	No records in buffer						

Dry Cleaners, Motor Garages & Service Stations Road or Area Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer					

Cattle Dips of the Northern Rivers Region

395 Reardons Lane, Swan Bay, NSW 2324

Cattle Dips

395 Reardons Lane, Swan Bay, NSW 2324

Cattle Dips of the Northern Rivers Region

Cattle dip sites within the dataset buffer:

Dip Name	Road	Town	Dip Status	Licence / Lease Status	Licence / Lease Expiry Date	Distance	Direction
DURRINGTONS	SWAN BAY NEW ITALY RD	VIA WOODBURN	DECOMMISSION	LAPSED	30/11/1998	316m	South East

Cattle dip site data provided by the NSW Department of Primary Industries.

Aerial Imagery 2021

395 Reardons Lane, Swan Bay, NSW 2324

Scale:
0 110 220 330 440
Meters

Data Source Aerial Imagery: © 2021 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 22 October 2021

Aerial Imagery 2011

395 Reardons Lane, Swan Bay, NSW 2324

Scale:
0 110 220 330 440
Meters

Data Source Aerial Imagery: © 2021 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 22 October 2021

Aerial Imagery 2004

395 Reardons Lane, Swan Bay, NSW 2324

Scale:
0 110 220 330 440
Meters

Data Source Aerial Imagery: © 2021 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 22 October 2021

Aerial Imagery 1998

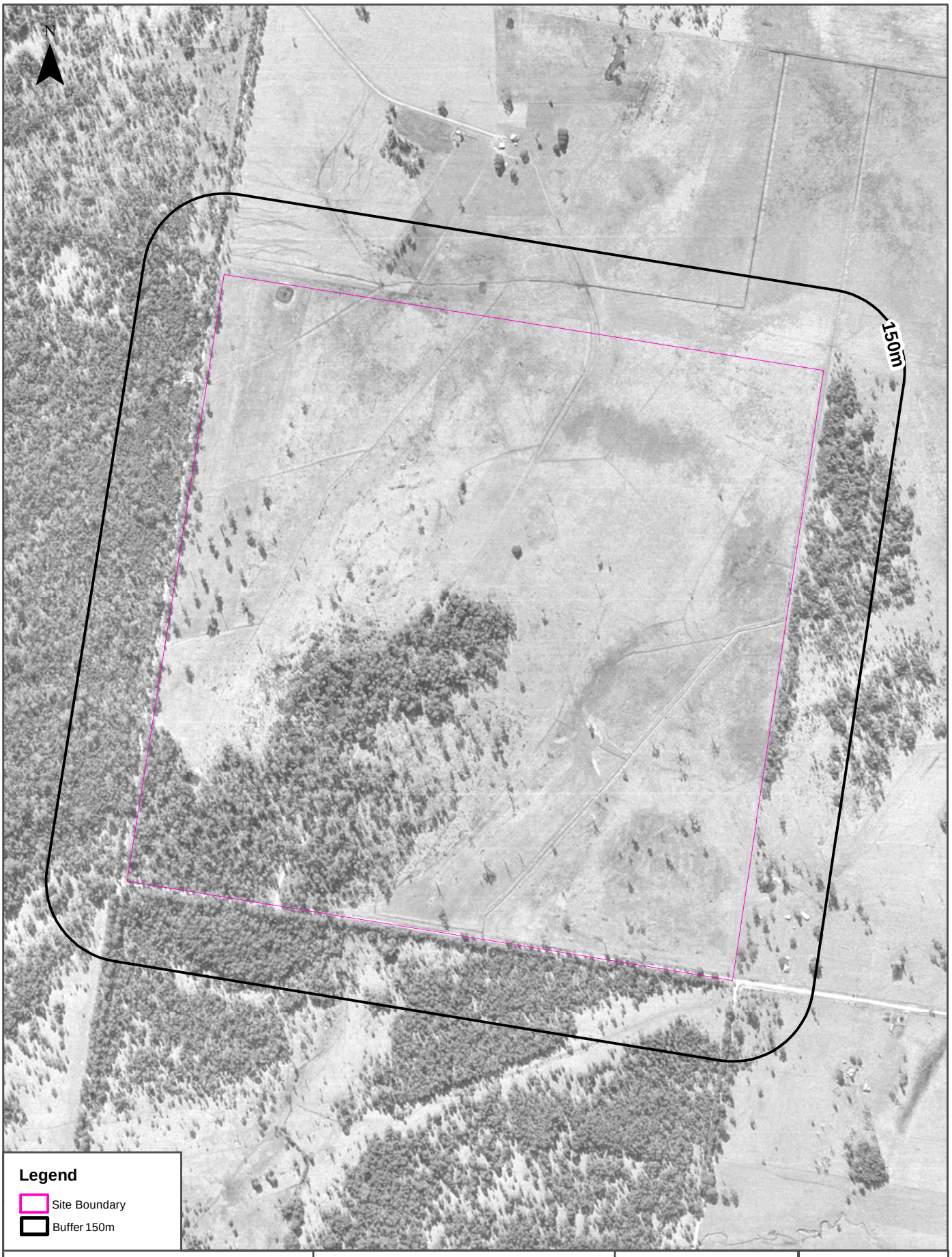
395 Reardons Lane, Swan Bay, NSW 2324

Aerial Imagery 1988

395 Reardons Lane, Swan Bay, NSW 2324

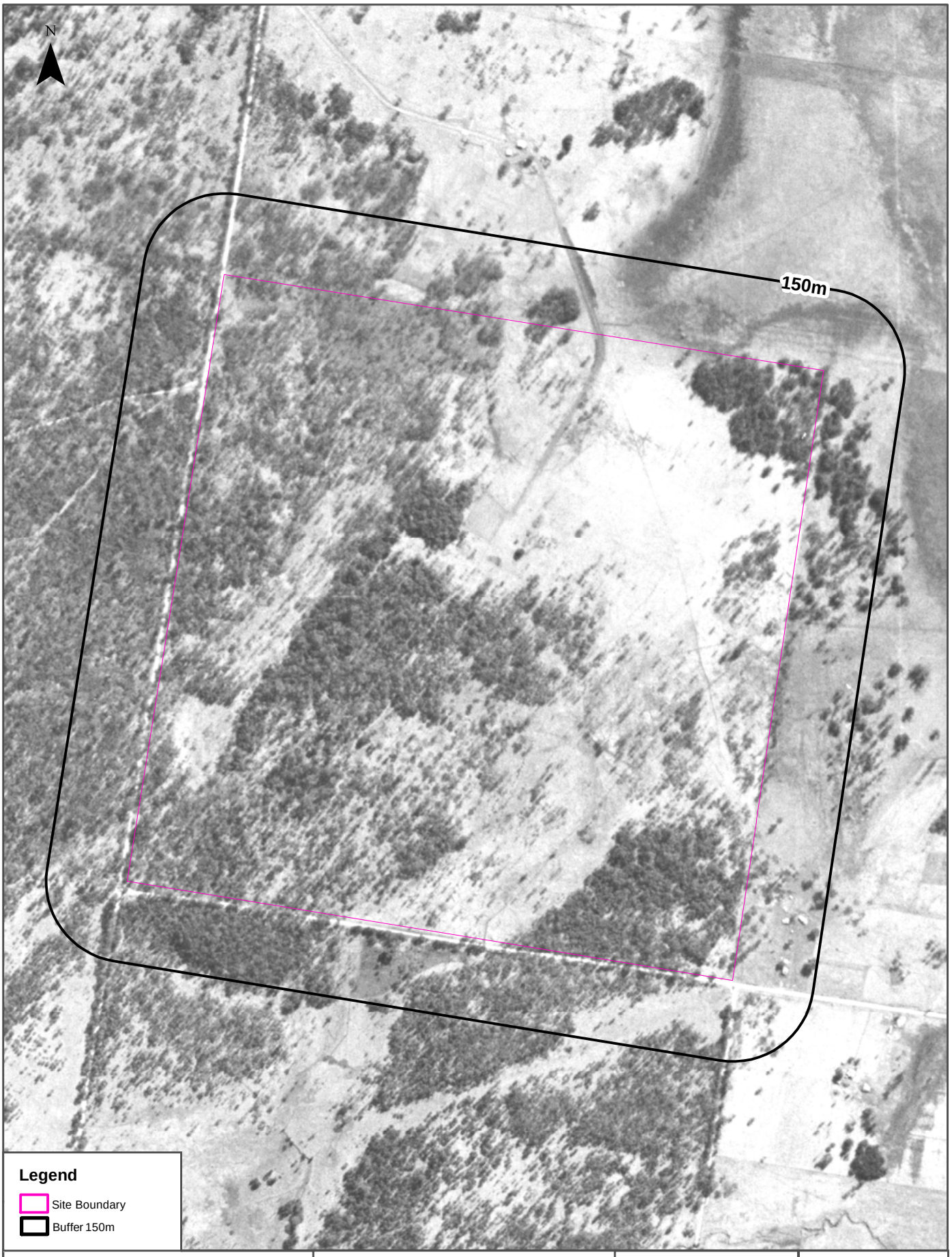
Aerial Imagery 1971

395 Reardons Lane, Swan Bay, NSW 2324



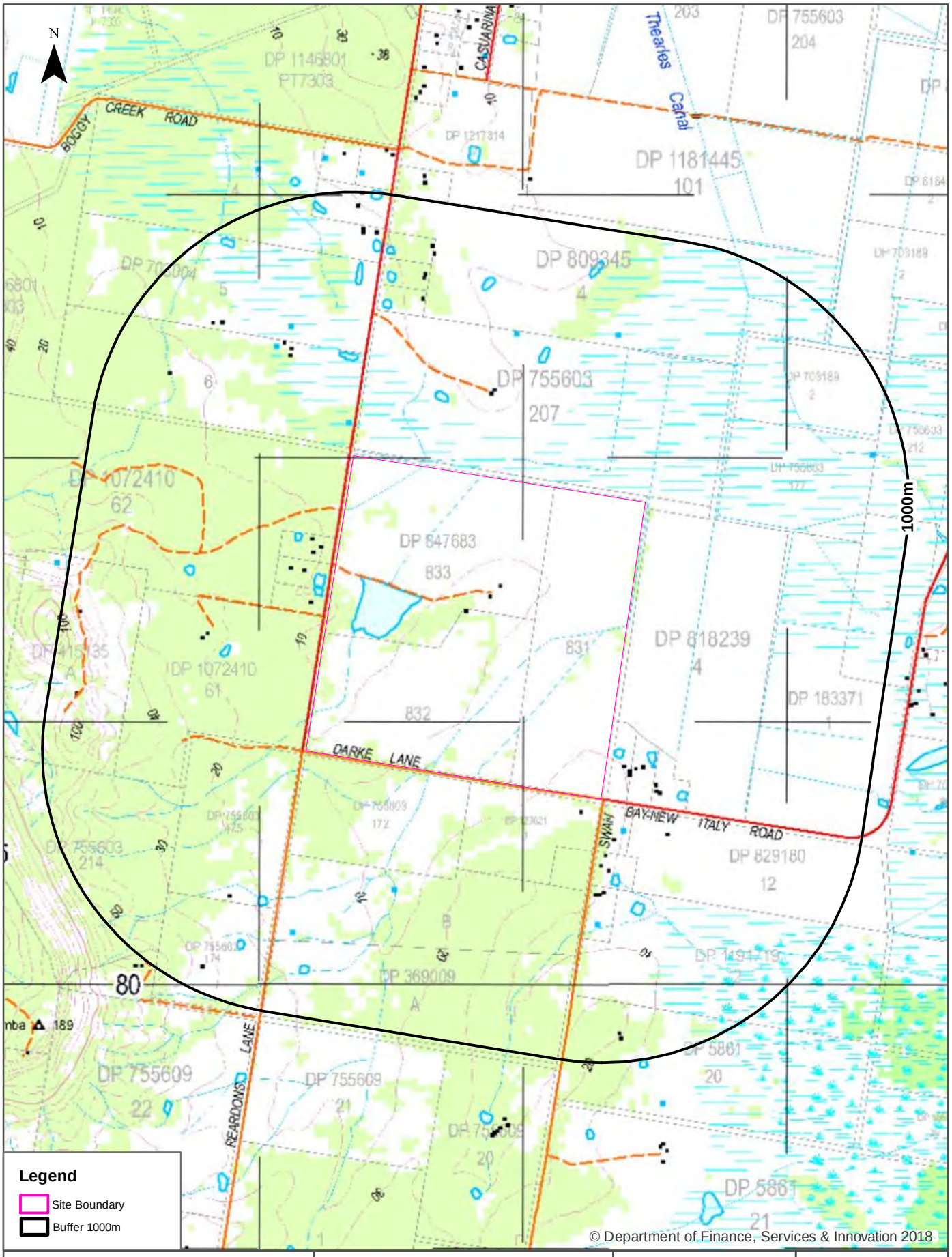
Aerial Imagery 1964

395 Reardons Lane, Swan Bay, NSW 2324



Topographic Map 2015

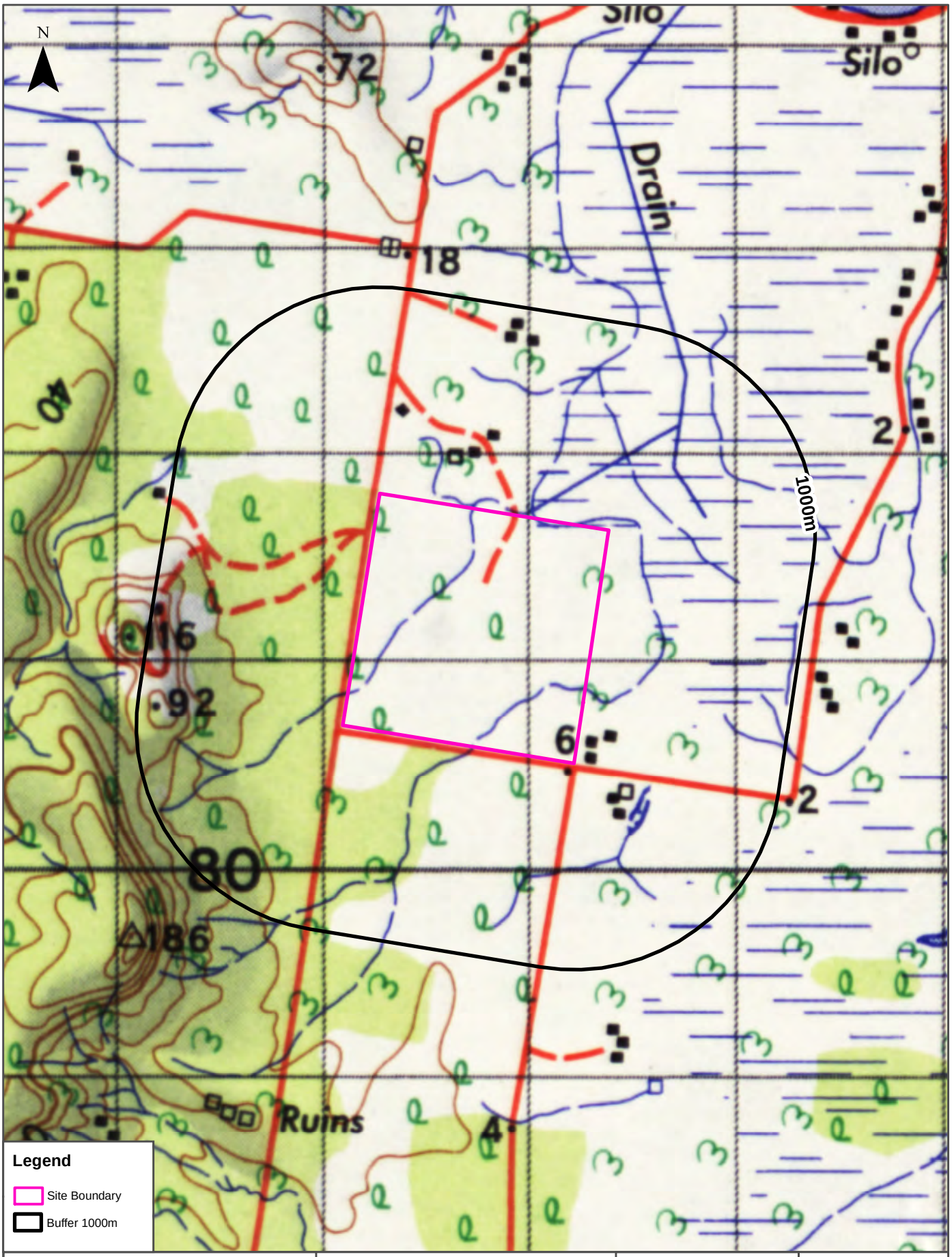
395 Reardons Lane, Swan Bay, NSW 2324



Scale: 0 230 460 690 920 Meters	Data Sources: Topographic Map Data © NSW Land and Property Information	Coordinate System: GDA 1994 MGA Zone 56	Date: 27 October 2021

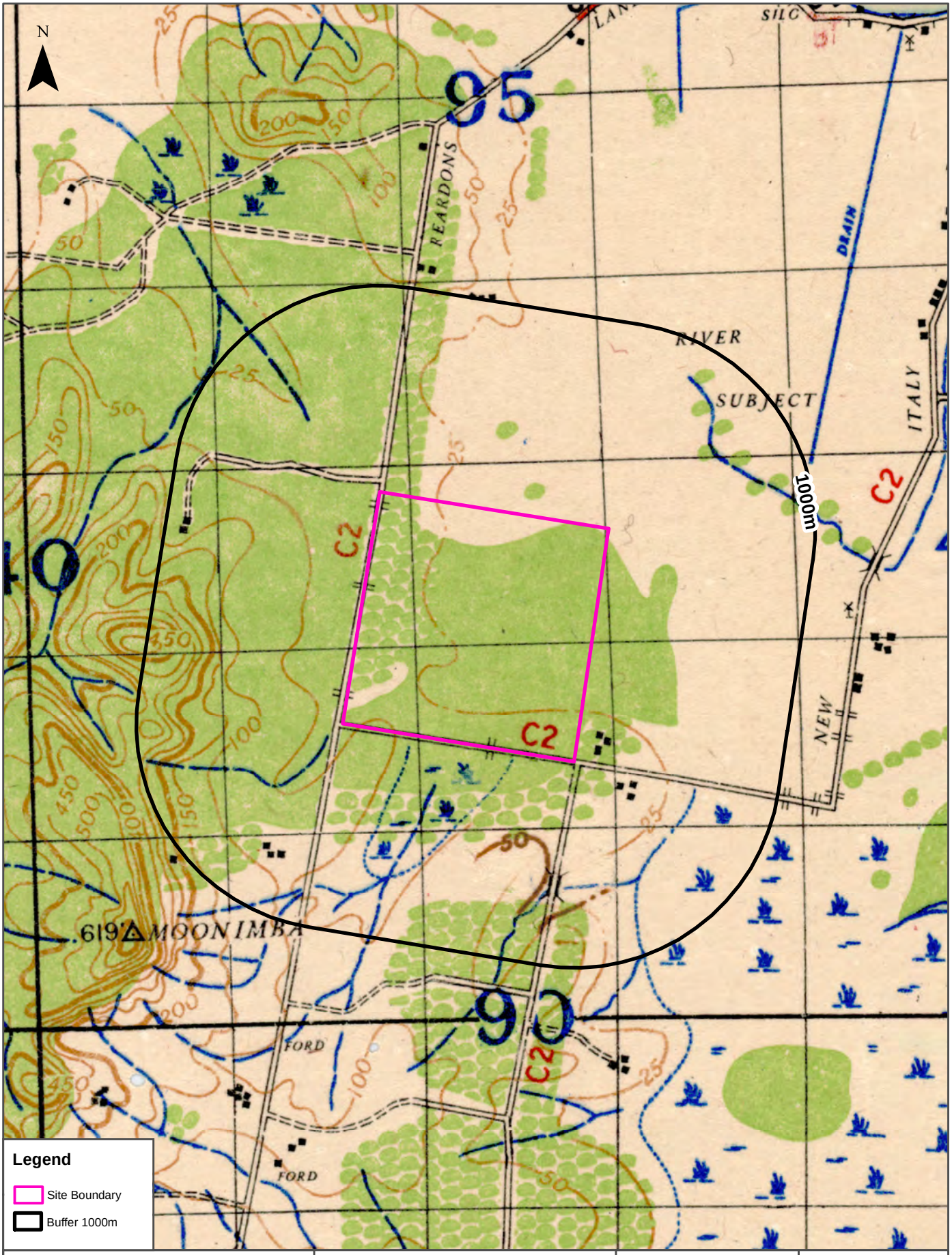
Historical Map 1969

395 Reardons Lane, Swan Bay, NSW 2324



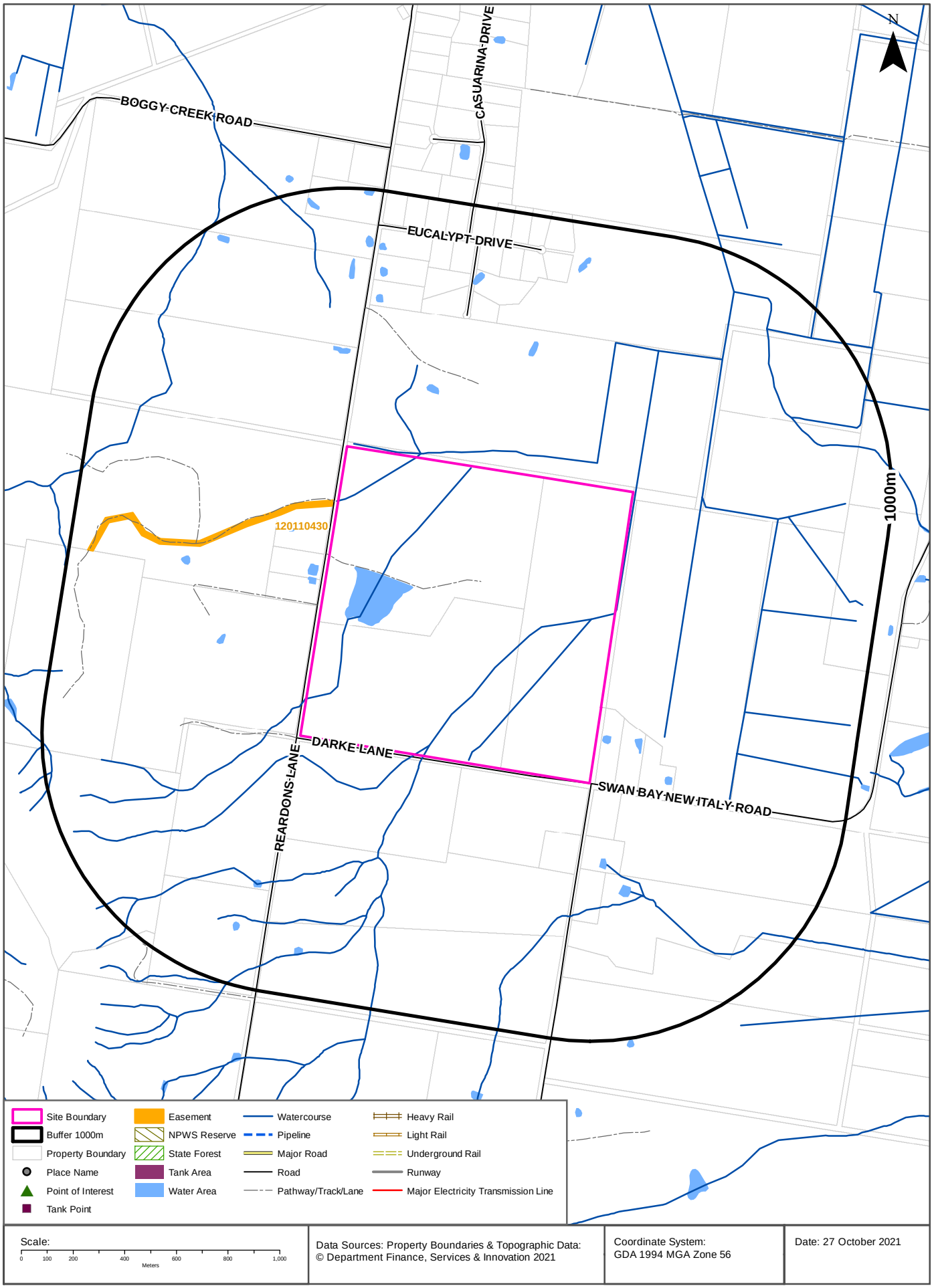
Historical Map c.1942

395 Reardons Lane, Swan Bay, NSW 2324



Topographic Features

395 Reardons Lane, Swan Bay, NSW 2324



Topographic Features

395 Reardons Lane, Swan Bay, NSW 2324

Points of Interest

What Points of Interest exist within the dataset buffer?

Map Id	Feature Type	Label	Distance	Direction
N/A	No records in buffer			

Topographic Features

395 Reardons Lane, Swan Bay, NSW 2324

Tanks (Areas)

What are the Tank Areas located within the dataset buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
N/A	No records in buffer					

Tanks (Points)

What are the Tank Points located within the dataset buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
N/A	No records in buffer					

Major Easements

What Major Easements exist within the dataset buffer?
Note. Easements provided by LPI are not at the detail of local governments. They are limited to major easements such as Right of Carriageway, Electrical Lines (66kVa etc.), Easement to drain water & Significant subterranean pipelines (gas, water etc.).

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
120110430	Primary	Undefined		21m	West

Topographic Features

395 Reardons Lane, Swan Bay, NSW 2324

State Forest

What State Forest exist within the dataset buffer?

State Forest Number	State Forest Name	Distance	Direction
N/A	No records in buffer		

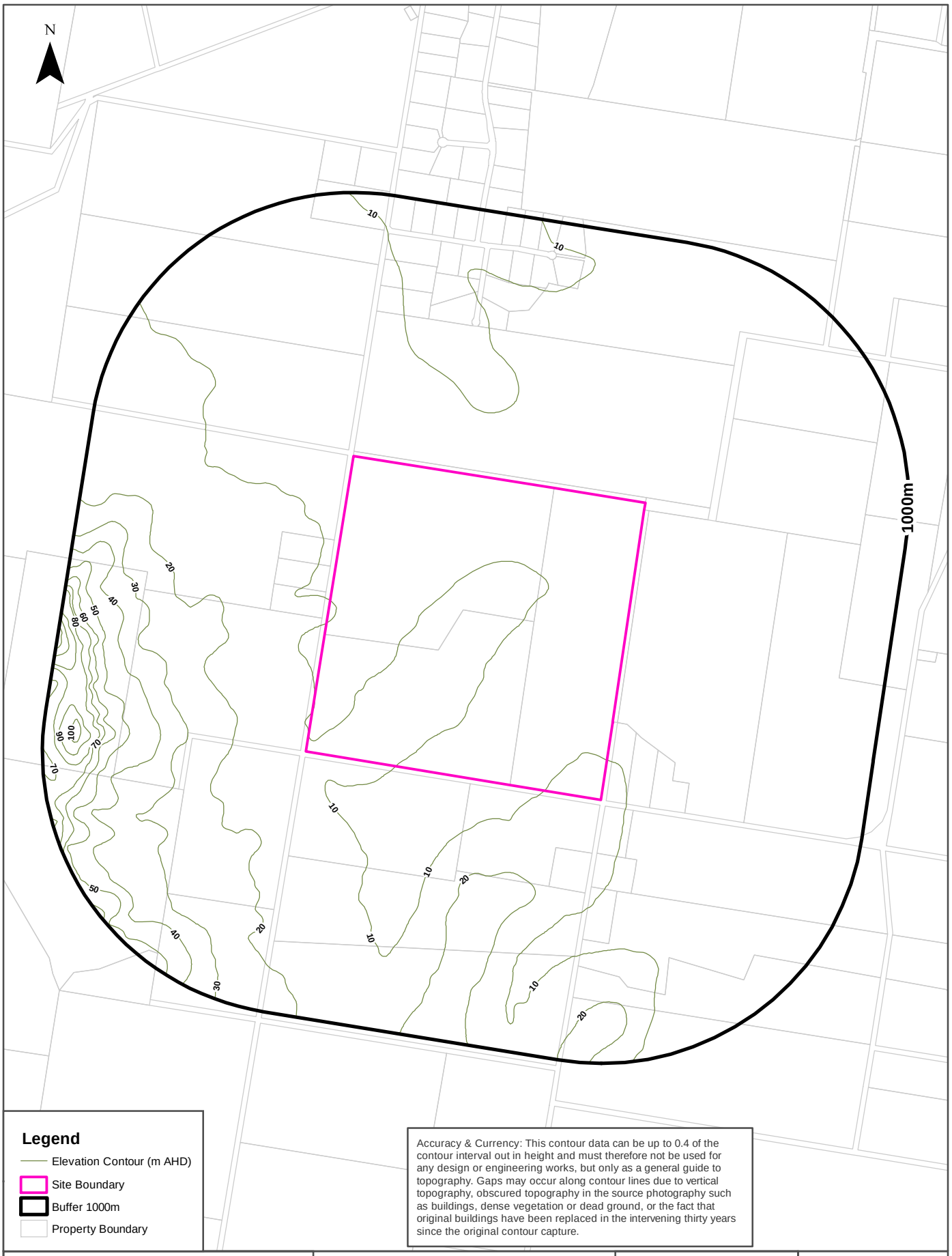
National Parks and Wildlife Service Reserves

What NPWS Reserves exist within the dataset buffer?

Reserve Number	Reserve Type	Reserve Name	Gazetted Date	Distance	Direction
N/A	No records in buffer				

Elevation Contours (m AHD)

395 Reardons Lane, Swan Bay, NSW 2324



Legend

- Elevation Contour (m AHD)
- Site Boundary
- Buffer 1000m
- Property Boundary

Accuracy & Currency: This contour data can be up to 0.4 of the contour interval out in height and must therefore not be used for any design or engineering works, but only as a general guide to topography. Gaps may occur along contour lines due to vertical topography, obscured topography in the source photography such as buildings, dense vegetation or dead ground, or the fact that original buildings have been replaced in the intervening thirty years since the original contour capture.

Scale:	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2021	Coordinate System: GDA 1994 MGA Zone 56	Date: 27 October 2021

0 100 200 400 Meters

Hydrogeology & Groundwater

395 Reardons Lane, Swan Bay, NSW 2324

Hydrogeology

Description of aquifers within the dataset buffer:

Description	Distance	Direction
Porous, extensive aquifers of low to moderate productivity	0m	On-site

Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)

Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018

Temporary water restrictions relating to the Botany Sands aquifer within the dataset buffer:

Prohibition Area No.	Prohibition	Distance	Direction
N/A	No records in buffer		

Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018 Data Source : NSW Department of Primary Industries

Groundwater Boreholes

395 Reardons Lane, Swan Bay, NSW 2324

Hydrogeology & Groundwater

395 Reardons Lane, Swan Bay, NSW 2324

Groundwater Boreholes

Boreholes within the dataset buffer:

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW020496	30BL012256, 30BL027383	Well	Private	Domestic, Stock	Stock			3.60	3.70					0m	On-site
GW072758	30BL155011	Bore	Private	Domestic, Stock	Domestic, Stock		20/06/1994	17.00	17.00	Good	6.00	0.490		103m	North West
GW053329	30BL120553	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/01/1980	27.00		Salty				185m	South East
GW018112	30BL012255	Bore open thru rock	Private	Domestic, Stock	Domestic, Stock		01/04/1962	24.70	24.70	7001-10000 ppm				255m	North
GW047986	30BL116660	Well	Private	Domestic, Irrigation, Stock	Irrigation			5.50		Salty				308m	South East
GW047987	30BL116661	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/10/1979	9.00	9.00	V.Salty				403m	South East
GW026681	30BL019318	Bore open thru rock	Private	Domestic, Stock	Domestic, Stock		01/05/1967	9.80	9.80					454m	North
GW305734	30BL183248	Bore	Private	Domestic	Domestic		01/02/2005	18.00	18.00		13.00	0.600		1371m	North
GW305748	30BL183949	Bore	Private	Domestic	Domestic, Stock		10/05/2006	90.00	90.00		66.00	1.200		1594m	West

Hydrogeology & Groundwater

395 Reardons Lane, Swan Bay, NSW 2324

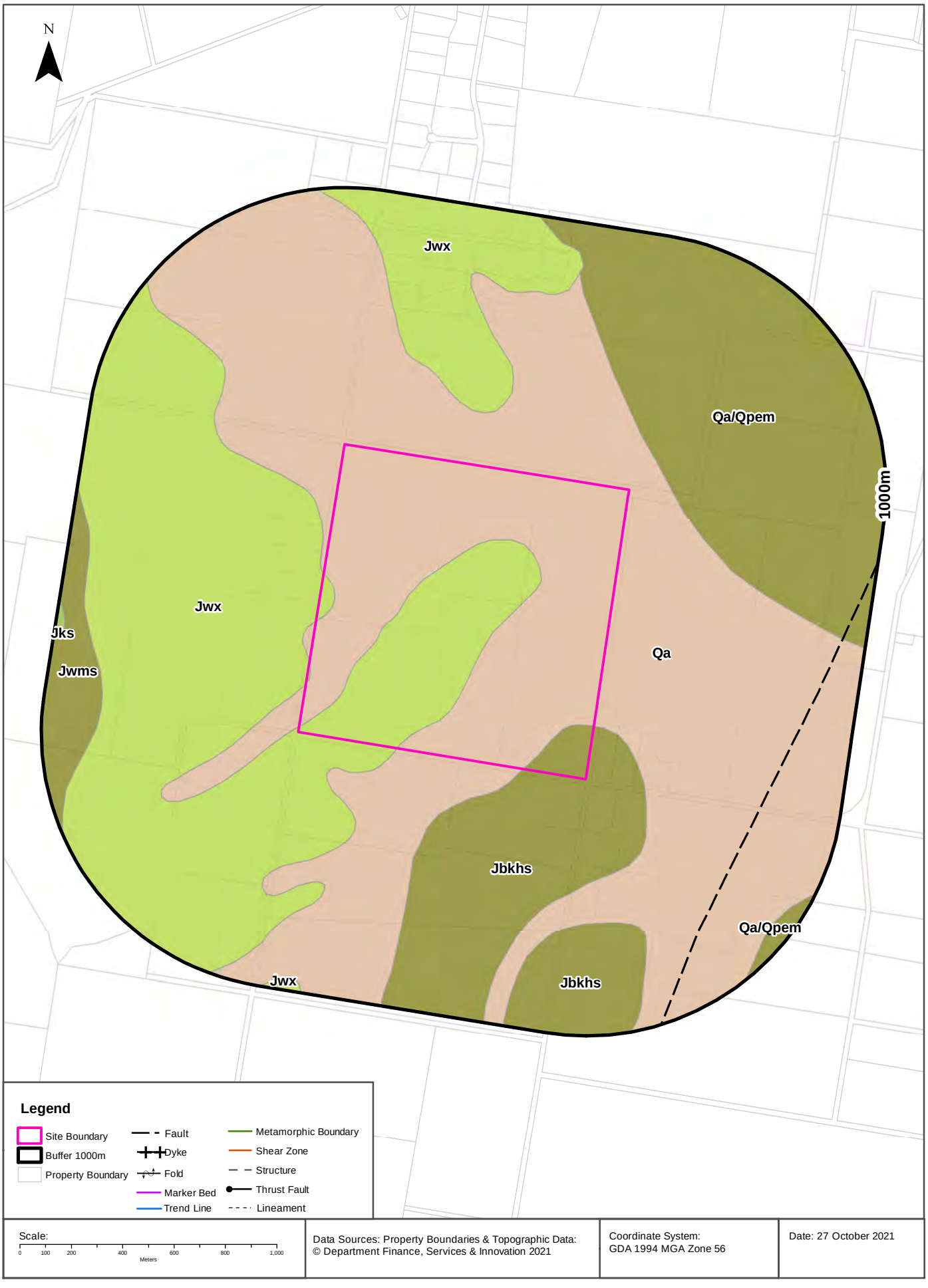
Driller's Logs

Drill log data relevant to the boreholes within the dataset buffer:

Groundwater No	Drillers Log	Distance	Direction
GW020496	0.00m-0.61m Topsoil 0.61m-3.35m Clay 3.35m-3.66m Shale Water Supply	0m	On-site
GW072758	0.00m-6.00m Sandy Clay 6.00m-17.00m Coal Shale	103m	North West
GW018112	0.00m-0.60m Soil 0.60m-10.36m Silt Clayey Gravel Fine 10.36m-12.19m Coal Shale Carbonaceou 12.19m-15.24m Coal Grey Shale 15.24m-21.33m Clay Jointed Carbonaceou 21.33m-24.69m Clay Coalbands	255m	North
GW047987	0.00m-0.40m Soil Black Topsoil 0.40m-5.00m Subsoil Heavy Clayey 5.00m-6.50m Clay Very Hard Gravel 6.50m-9.00m Clay Grey Soft Gravel Water Supply	403m	South East
GW026681	0.00m-0.60m Soil 0.60m-3.04m Clay 3.04m-6.70m Sandstone Yellow Soft 6.70m-7.62m Shale Coal 7.62m-8.23m Shale Fine Gravel Coal Water Supply 8.23m-9.75m Shale	454m	North
GW305734	0.00m-2.40m sandy soil 2.40m-18.00m shale, sandstone & coal layers	1371m	North
GW305748	0.00m-2.00m soil 2.00m-4.50m clay 4.50m-60.00m sanstone, shale 60.00m-90.00m sandstone	1594m	West

Geology

395 Reardons Lane, Swan Bay, NSW 2324



Geology

395 Reardons Lane, Swan Bay, NSW 2324

Geological Units 1:100,000

What are the Geological Units within the dataset buffer?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dist	Dir
Qa	Sand, silt, clay and gravel of alluvial deposits; includes beach, levee and backswamp deposits, point bars, overbank and some residual and colluvial deposits	Undifferentiated alluvial plain	Undifferentiated Alluvial Plain		Quaternary		Woodburn	0m	On-site
Jwx	Shale and minor coal and sandstone: thinnly bedded, grey to purple claystone (some carbonaceous), lithic and sublithic to feldspathic sandstone (arenite and wacke), thin seams and partings of coal; thin nodular ironstone beds	Walloon Coal Measures			Jurassic		Woodburn	0m	On-site
Jbkhs	Coarse quartzose sandstone: fine- to coarse-grained, cross-bedded, thickly to very thickly bedded, quartz to sublithic sandstone (arenite, minor wacke), thin interbeds of siltstone and claystone (some carbonaceous), minor laminite, minor coal	Koukandowie Formation*	Bundamba Group	Marburg Subgroup	Jurassic		Woodburn	0m	On-site
Qa/Qpem	Mud extensively overlain by sand, silt, clay, gravel	Estuarine plain, extensively overlain by alluvial deposits	Estuarine Plain		Quaternary		Woodburn	144m	North East
Jwms	Greenish grey (bronze weathering) sandstone and shale: thickly bedded, low-angle cross-bedded, feldspathic to lithic sandstone (arenite, lesser wacke), with minor pebble conglomerate and siltstone lenses	Walloon Coal Measures			Jurassic		Woodburn	772m	West
Jks	White quartz sandstone: thickly to very thinly bedded, high angle cross-bedding, medium- to very coarse-grained white quartz arenite, minor quartz and lithic conglomerate: commonly with rusty of purple ferruginised weathering profile or with a lateritic	Kangaroo Creek Sandstone			Jurassic		Woodburn	965m	West

Geological Structures 1:100,000

What are the Geological Structures within the dataset buffer?

Feature	Name	Description	Map Sheet	Distance	Direction
Fault		Thrust fault, inferred concealed	Woodburn	657m	South East

Geological Data Source : NSW Department of Industry, Resources & Energy

Naturally Occurring Asbestos Potential

395 Reardons Lane, Swan Bay, NSW 2324

Naturally Occurring Asbestos Potential

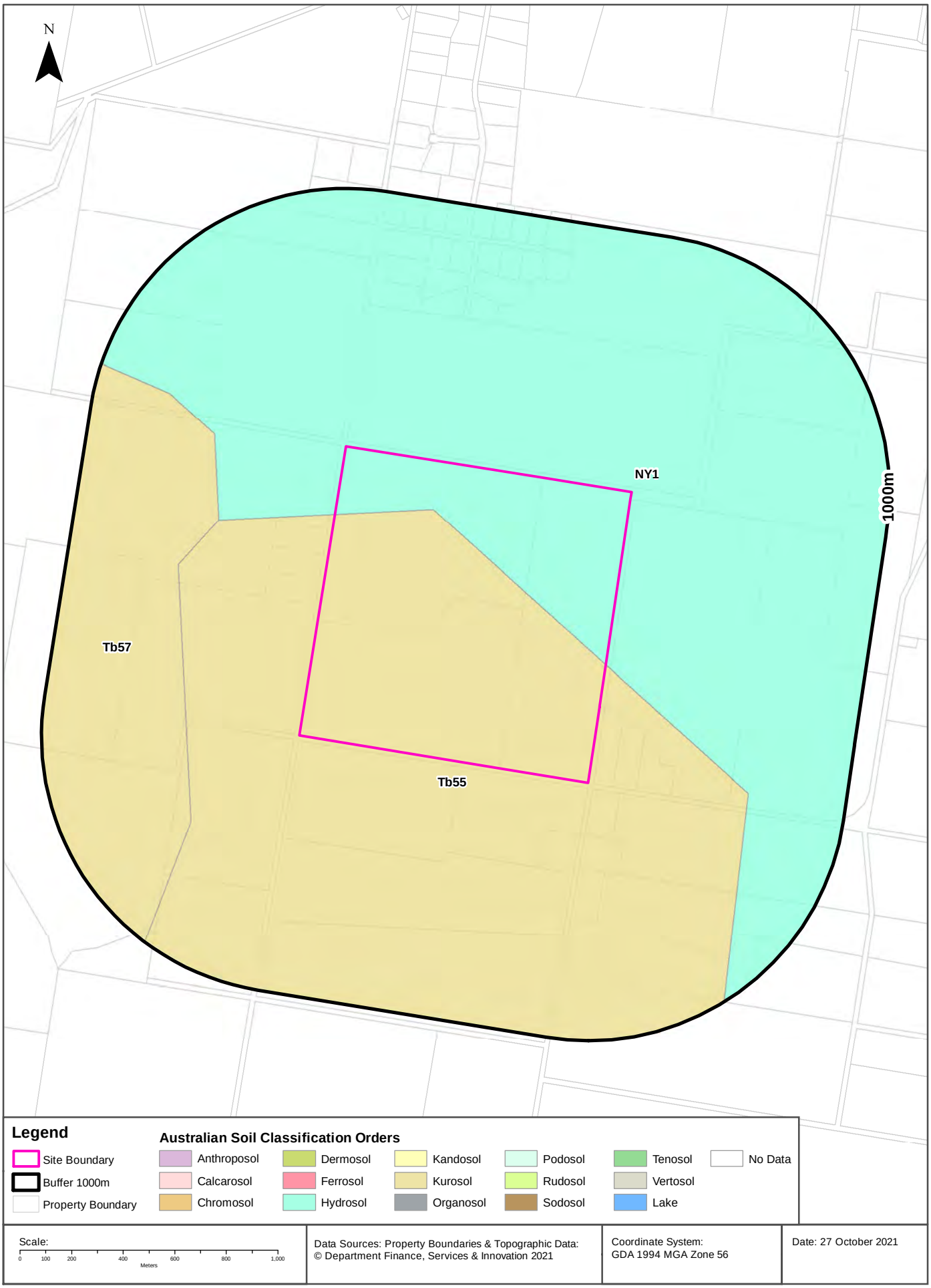
Naturally Occurring Asbestos Potential within the dataset buffer:

Potential	Sym	Strat Name	Group	Formation	Scale	Min Age	Max Age	Rock Type	Dom Lith	Description	Dist	Dir
No records in buffer												

Naturally Occurring Asbestos Potential Data Source: © State of New South Wales through NSW Department of Industry, Resources & Energy

Atlas of Australian Soils

395 Reardons Lane, Swan Bay, NSW 2324



Soils

395 Reardons Lane, Swan Bay, NSW 2324

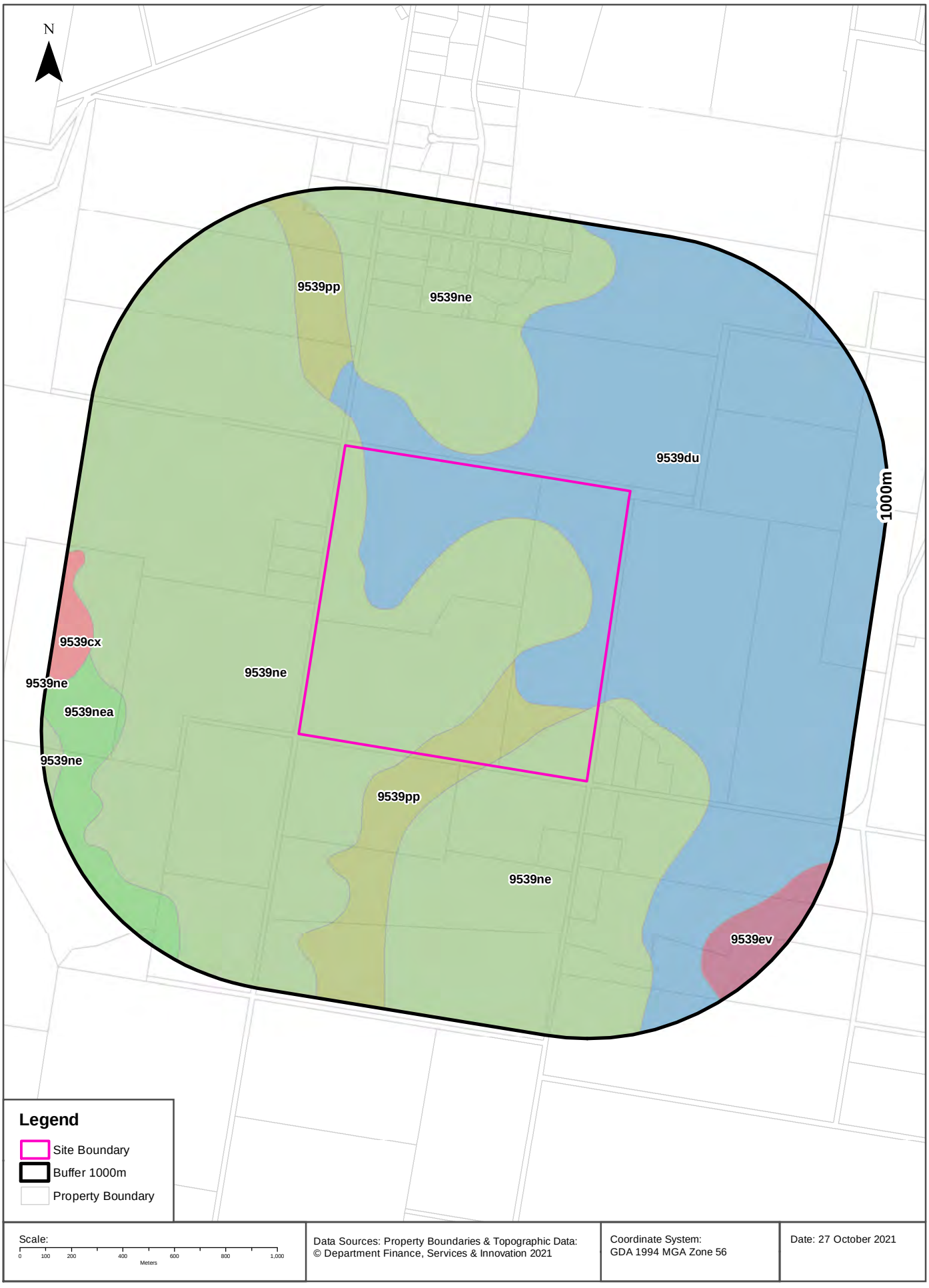
Atlas of Australian Soils

Soil mapping units and Australian Soil Classification orders within the dataset buffer:

Map Unit Code	Soil Order	Map Unit Description	Distance	Direction
Tb55	Kurosol	Undulating to hilly: hard acidic yellow mottled soils (Dy3.41) and hard acidic red and red mottled soils (Dr2.21) and (Dr3.21 and Dr3.41), with generally flatter areas of sandy acidic yellow mottled soils (Dy5.61) often containing ironstone gravels. Soil dominance varies locally. As mapped, areas of units Wc7, Tb57, and minor occurrences of units M12 and Mg24 are included.	0m	On-site
NY1	Hydrosol	Coastal plains, generally low lying, poorly drained, and subject to flooding (lower and middle reaches of river flood-plains, swamps, estuarine areas, and tidal marshes): chief soils seem to be friable acidic gley soils (Dg4.11), (Dg4.41), and (Dg4.81); friable acidic yellow mottled soils (Dy5.11); leached sand soils (Uc2.2) and/or (Uc2.3); and sandy acidic yellow mottled soils (Dy5.61), (Dy5.41), and (Dy5.81) in a complex and not well-known pattern, generally as follows: (i) flat to gently sloping areas of (Dg4.11), (Dg4.41), and (Dg4.81) or (Dy5.11), and/or (Ug5.16) and (Ug5.4), with some (Dd3.11) and (Uf6.41); (ii) sandy flats and swamps of (Uc2.2), and/or (Uc2.3), and/or acid peats (0); and (iii) slightly raised sandy areas of (Dy5.61), (Dy5.41), and (Dy5.81) with (Uc2.2) and (Uc4.2). Small areas of units NY2 (Sheet 3) and B9 are included.	0m	On-site
Tb57	Kurosol	Hilly to steep hilly with rock outcrops: soil dominance seems to vary locally between the following (Dy), (Db), and (Dr) soils, namely, shallow forms of hard acidic yellow mottled soils (Dy3.21 and Dy3.41), hard acidic brown soils (Db2.41), and hard acidic red soils (Dr2.21 and Dr2.41). Associated are shallow (Um4) and (Uc4) soils and areas of unit Wc7. Valleys are steep-sided.	438m	West

Soil Landscapes of Central and Eastern NSW

395 Reardons Lane, Swan Bay, NSW 2324



Soils

395 Reardons Lane, Swan Bay, NSW 2324

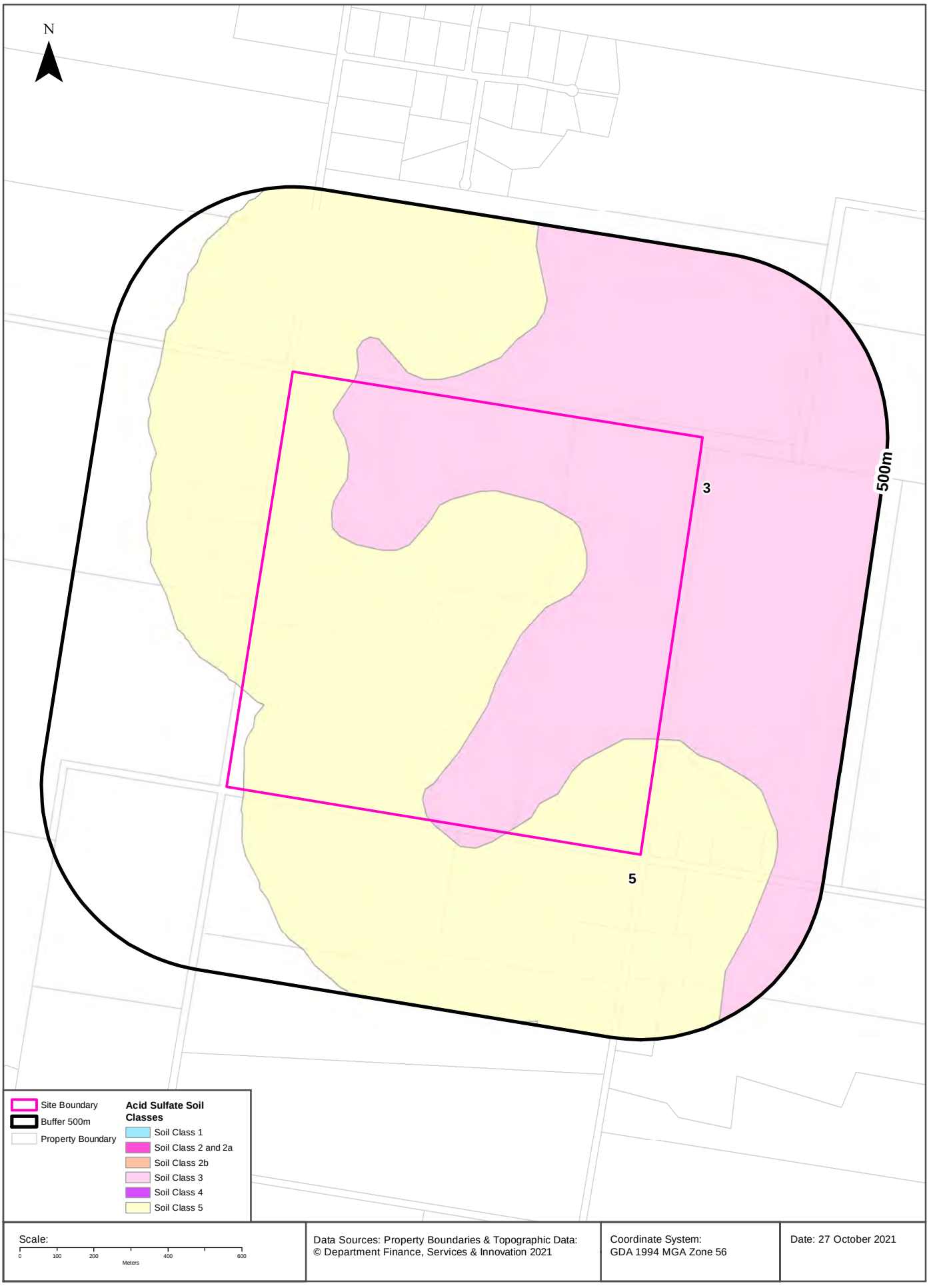
Soil Landscapes of Central and Eastern NSW

Soil Landscapes of Central and Eastern NSW within the dataset buffer:

Soil Code	Name	Distance	Direction
9539ne	New Italy	0m	On-site
9539du	Dungarubba	0m	On-site
9539pp	Pretty Plain	0m	On-site
9539nea	New Italy variant a	677m	South West
9539ev	Everlasting	758m	South East
9539cx	Cliff Road	847m	West

Acid Sulfate Soils

395 Reardons Lane, Swan Bay, NSW 2324



Acid Sulfate Soils

395 Reardons Lane, Swan Bay, NSW 2324

Environmental Planning Instrument - Acid Sulfate Soils

What is the on-site Acid Sulfate Soil Plan Class that presents the largest environmental risk?

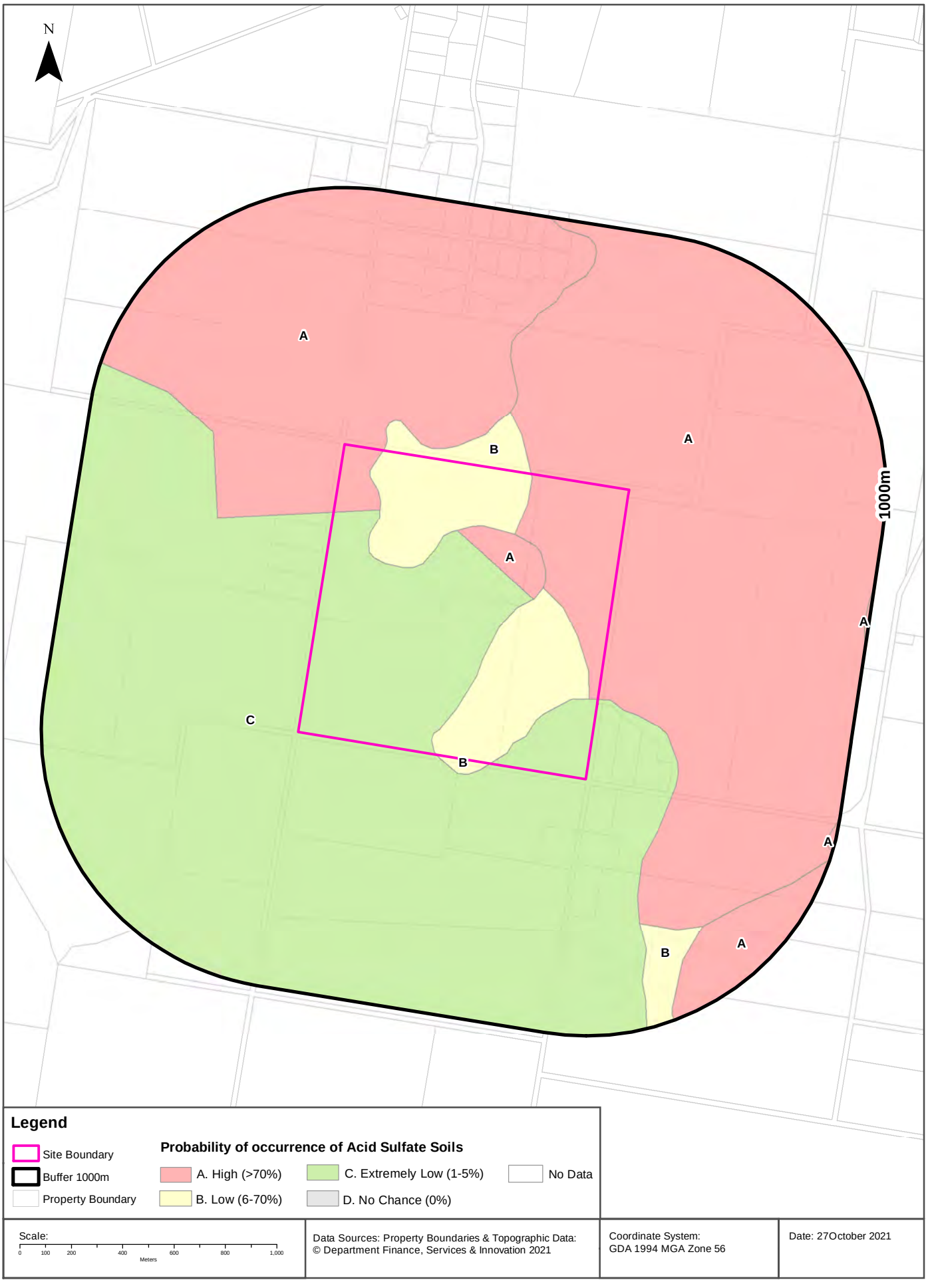
Soil Class	Description	EPI Name
3	Works more than 1 metre below natural ground surface present an environmental risk; Works by which the watertable is likely to be lowered more than 1 metre below natural ground surface, present an environmental risk	Richmond Valley Local Environmental Plan 2012

If the on-site Soil Class is 5, what other soil classes exist within 500m?

Soil Class	Description	EPI Name	Distance	Direction
N/A				

Atlas of Australian Acid Sulfate Soils

395 Reardons Lane, Swan Bay, NSW 2324



Acid Sulfate Soils

395 Reardons Lane, Swan Bay, NSW 2324

Atlas of Australian Acid Sulfate Soils

Atlas of Australian Acid Sulfate Soil categories within the dataset buffer:

Class	Description	Distance	Direction
C	Extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.	0m	On-site
B	Low Probability of occurrence. 6-70% chance of occurrence.	0m	On-site
A	High Probability of occurrence. >70% chance of occurrence.	0m	On-site

Dryland Salinity

395 Reardons Lane, Swan Bay, NSW 2324

Dryland Salinity - National Assessment

Is there Dryland Salinity - National Assessment data onsite?

No

Is there Dryland Salinity - National Assessment data within the dataset buffer?

No

What Dryland Salinity assessments are given?

Assessment 2000	Assessment 2020	Assessment 2050	Distance	Direction
N/A	N/A	N/A		

Dryland Salinity Data Source : National Land and Water Resources Audit
The Commonwealth and all suppliers of source data used to derive the maps of "Australia, Forecast Areas Containing Land of High Hazard or Risk of Dryland Salinity from 2000 to 2050" do not warrant the accuracy or completeness of information in this product. Any person using or relying upon such information does so on the basis that the Commonwealth and data suppliers shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information. Any persons using this information do so at their own risk.
In many cases where a high risk is indicated, less than 100% of the area will have a high hazard or risk.

Mining

395 Reardons Lane, Swan Bay, NSW 2324

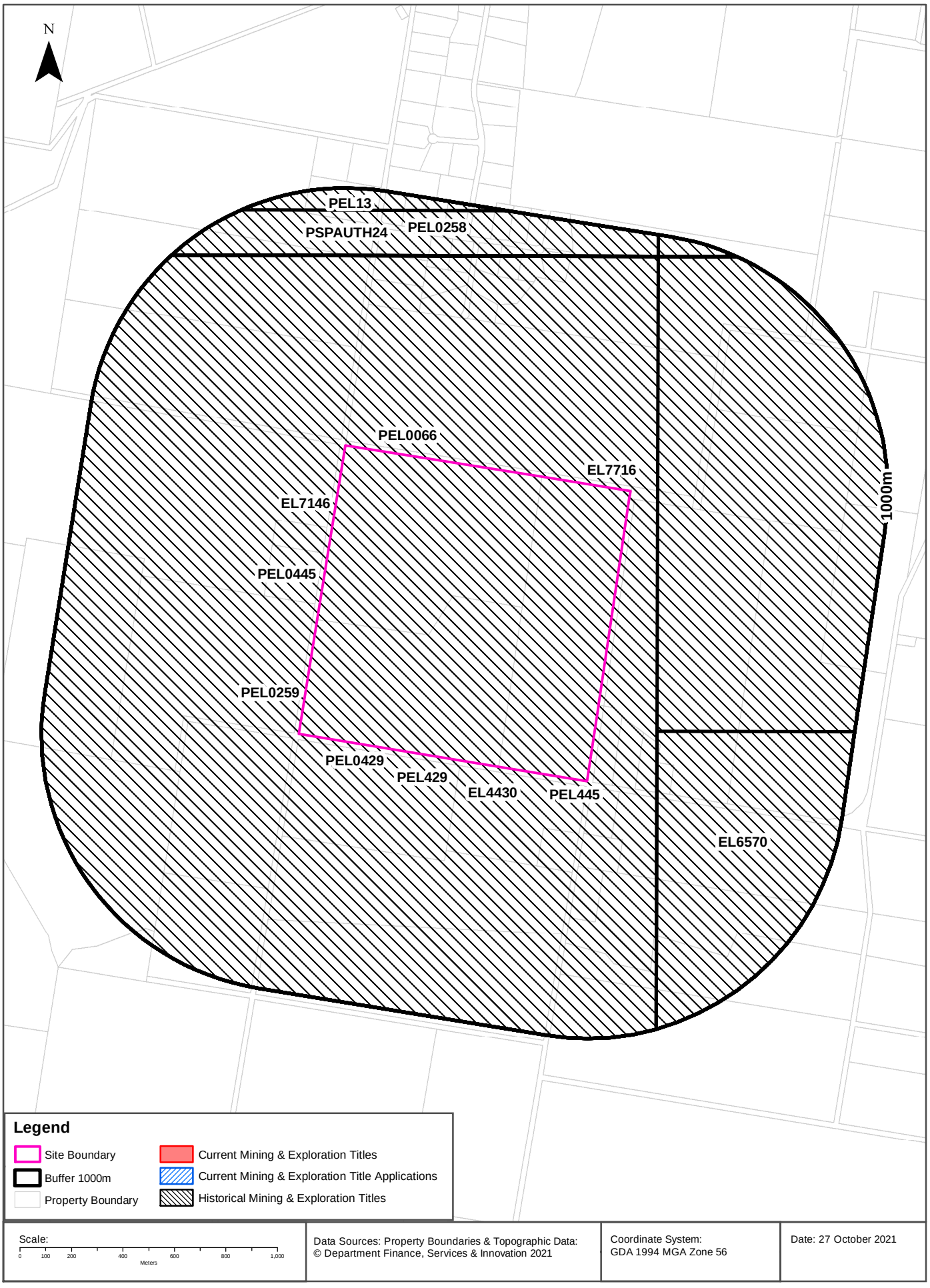
Mining Subsidence Districts

Mining Subsidence Districts within the dataset buffer:

District	Distance	Direction
There are no Mining Subsidence Districts within the report buffer		

Mining & Exploration Titles

395 Reardons Lane, Swan Bay, NSW 2324



Mining

395 Reardons Lane, Swan Bay, NSW 2324

Current Mining & Exploration Titles

Current Mining & Exploration Titles within the dataset buffer:

Title Ref	Holder	Grant Date	Expiry Date	Last Renewed	Operation	Resource	Minerals	Dist	Dir
N/A	No records in buffer								

Current Mining & Exploration Titles Data Source: © State of New South Wales through NSW Department of Industry

Current Mining & Exploration Title Applications

Current Mining & Exploration Title Applications within the dataset buffer:

Application Ref	Applicant	Application Date	Operation	Resource	Minerals	Dist	Dir
N/A	No records in buffer						

Current Mining & Exploration Title Applications Data Source: © State of New South Wales through NSW Department of Industry

Mining

395 Reardons Lane, Swan Bay, NSW 2324

Historical Mining & Exploration Titles

Historical Mining & Exploration Titles within the dataset buffer:

Title Ref	Holder	Start Date	End Date	Resource	Minerals	Dist	Dir
PEL0259	BRIDGE OIL LTD, THE AUSTRALIAN GAS LIGHT CO., CONSOLIDATED PETROLEUM (AUST.) NL, HARTOGEN ENERGY LTD, PROJECT OIL EXPLOR	7/01/1981	6/01/1993	PETROLEUM	Petroleum	0m	On-site
PEL0066	CLARENCE RIVER BASIN OIL EXPLORATION CO. NL			PETROLEUM	Petroleum	0m	On-site
EL7716	NEW ITALY RESOURCES PTY LTD	28 Feb 2011	28 Feb 2013	MINERALS		0m	On-site
EL7146	GRADIENT ENERGY LIMITED	28 May 2008	15 Apr 2011	MINERALS	Geothermal	0m	On-site
PEL0429	SUNOCO INC	26/10/1999	13/11/2002	PETROLEUM	Petroleum	0m	On-site
PEL0445	DART ENERGY (BRUXNER) PTY LTD	19/04/2004	19/10/2015	PETROLEUM	Petroleum	0m	On-site
PEL445	DART ENERGY (BRUXNER) PTY LTD			MINERALS		0m	On-site
EL4430	BHP MINERALS PTY LTD	01 Oct 1992	12 May 1994	MINERALS	Heavy mineral sands	0m	On-site
PEL429	SUNOCO INC.			MINERALS		0m	On-site
EL6570	TIRONZ PTY LIMITED	8 Jun 2006	26 Oct 2013	MINERALS	Ilmenite Rutile Zircon Au	240m	South East
PSPAUTH24	EAST COAST POWER PTY LTD	30/04/2008	30/04/2009	PETROLEUM	Petroleum	737m	North
PEL0258	ENDEAVOUR RESOURCES LTD, CLARENCE PETROLEUM NL, TARGET EXPLORATION PTY LTD, CHARTERHALL OIL AUSTRALIA PTY LTD, OIL COMPA	7/01/1981	27/11/1995	PETROLEUM	Petroleum	737m	North
PEL13	METGASCO LTD			MINERALS		913m	North

State Environmental Planning Policy

395 Reardons Lane, Swan Bay, NSW 2324

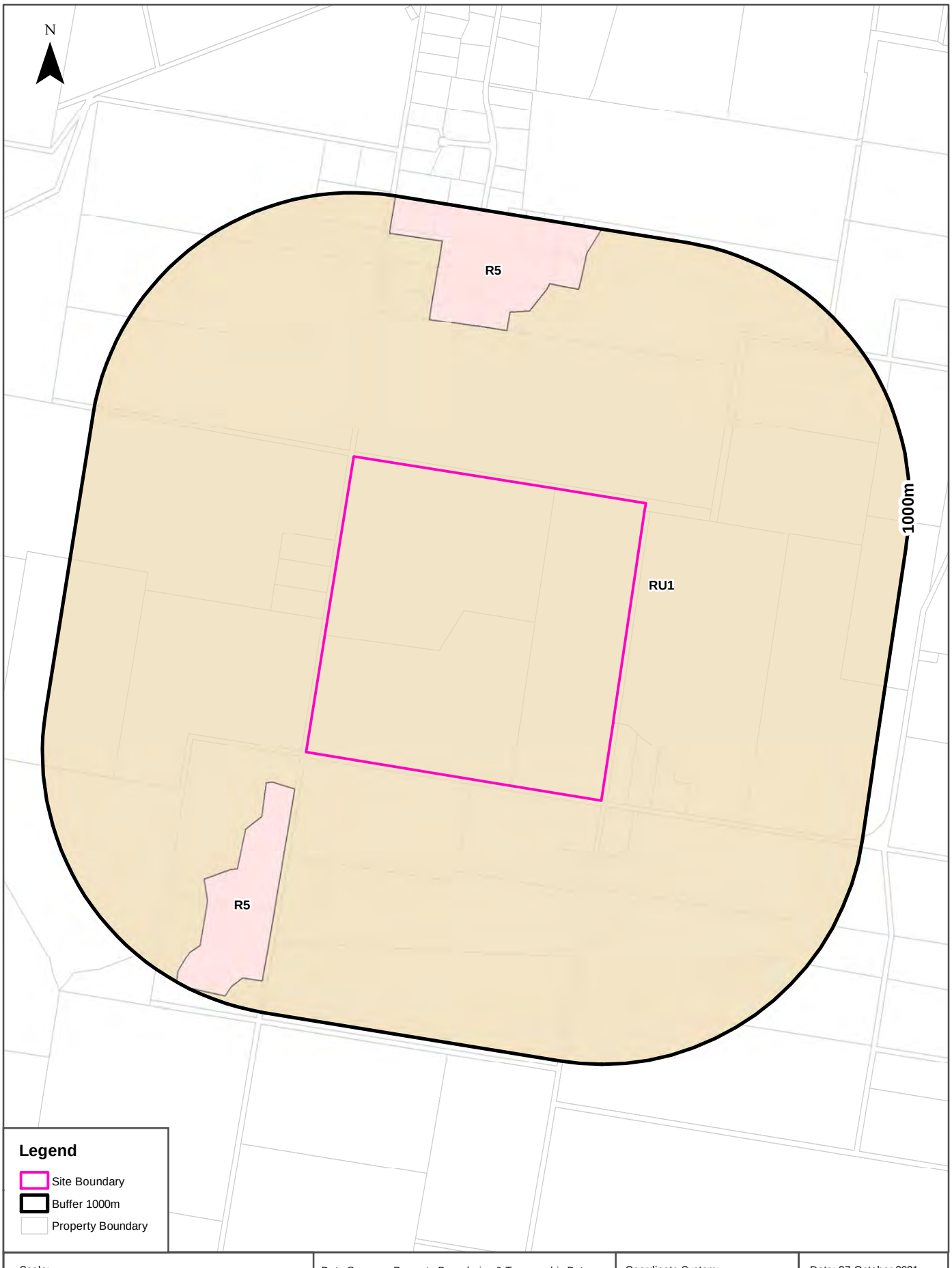
State Significant Precincts

What SEPP State Significant Precincts exist within the dataset buffer?

Map Id	Precinct	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
N/A	No records in buffer							

EPI Planning Zones

395 Reardons Lane, Swan Bay, NSW 2324



Environmental Planning Instrument

395 Reardons Lane, Swan Bay, NSW 2324

Land Zoning

What EPI Land Zones exist within the dataset buffer?

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
RU1	Primary Production		Richmond Valley Local Environmental Plan 2012	01/04/2021	01/04/2021	01/04/2021	Amendment No 10	0m	On-site
R5	Large Lot Residential		Richmond Valley Local Environmental Plan 2012	09/03/2012	21/04/2012	01/04/2021		147m	South West
R5	Large Lot Residential		Richmond Valley Local Environmental Plan 2012	13/06/2014	13/06/2014	01/04/2021	Amendment No 4	559m	North

Heritage

395 Reardons Lane, Swan Bay, NSW 2324

Commonwealth Heritage List

What are the Commonwealth Heritage List Items located within the dataset buffer?

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
N/A	No records in buffer							

National Heritage List

What are the National Heritage List Items located within the dataset buffer?
Note. Please click on Place Id to activate a hyperlink to online website.

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
N/A	No records in buffer							

State Heritage Register - Curtilages

What are the State Heritage Register Items located within the dataset buffer?

Map Id	Name	Address	LGA	Listing Date	Listing No	Plan No	Distance	Direction
N/A	No records in buffer							

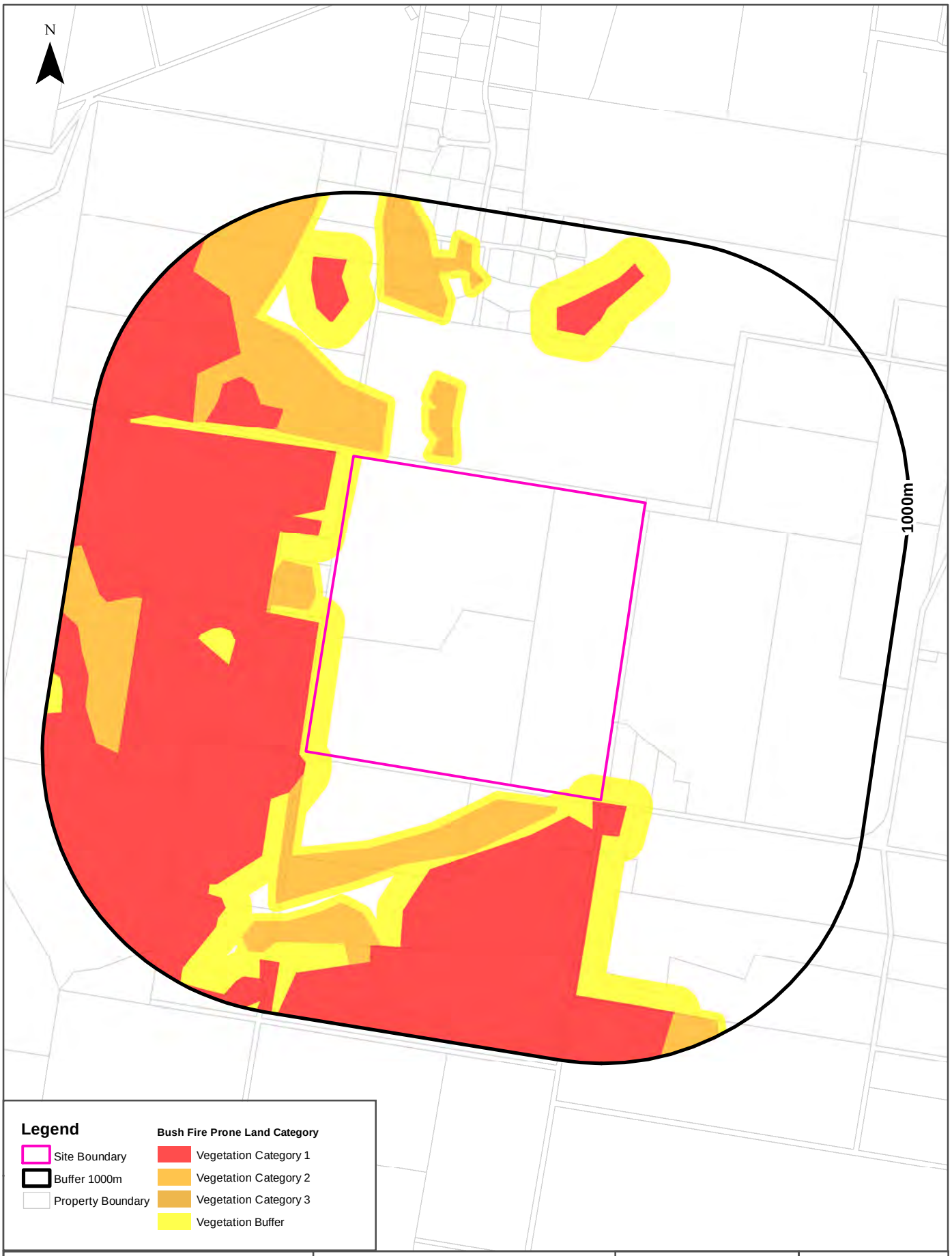
Environmental Planning Instrument - Heritage

What are the EPI Heritage Items located within the dataset buffer?

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
N/A	No records in buffer								

Natural Hazards - Bush Fire Prone Land

395 Reardons Lane, Swan Bay, NSW 2324



Data Sources: Bush Fire Prone Land: © NSW Rural Fire Service 2021. Property Boundaries: © Department Finance, Services & Innovation 2021

Coordinate System: GDA 1994 MGA Zone 56

Date: 27 October 2021

Natural Hazards

395 Reardons Lane, Swan Bay, NSW 2324

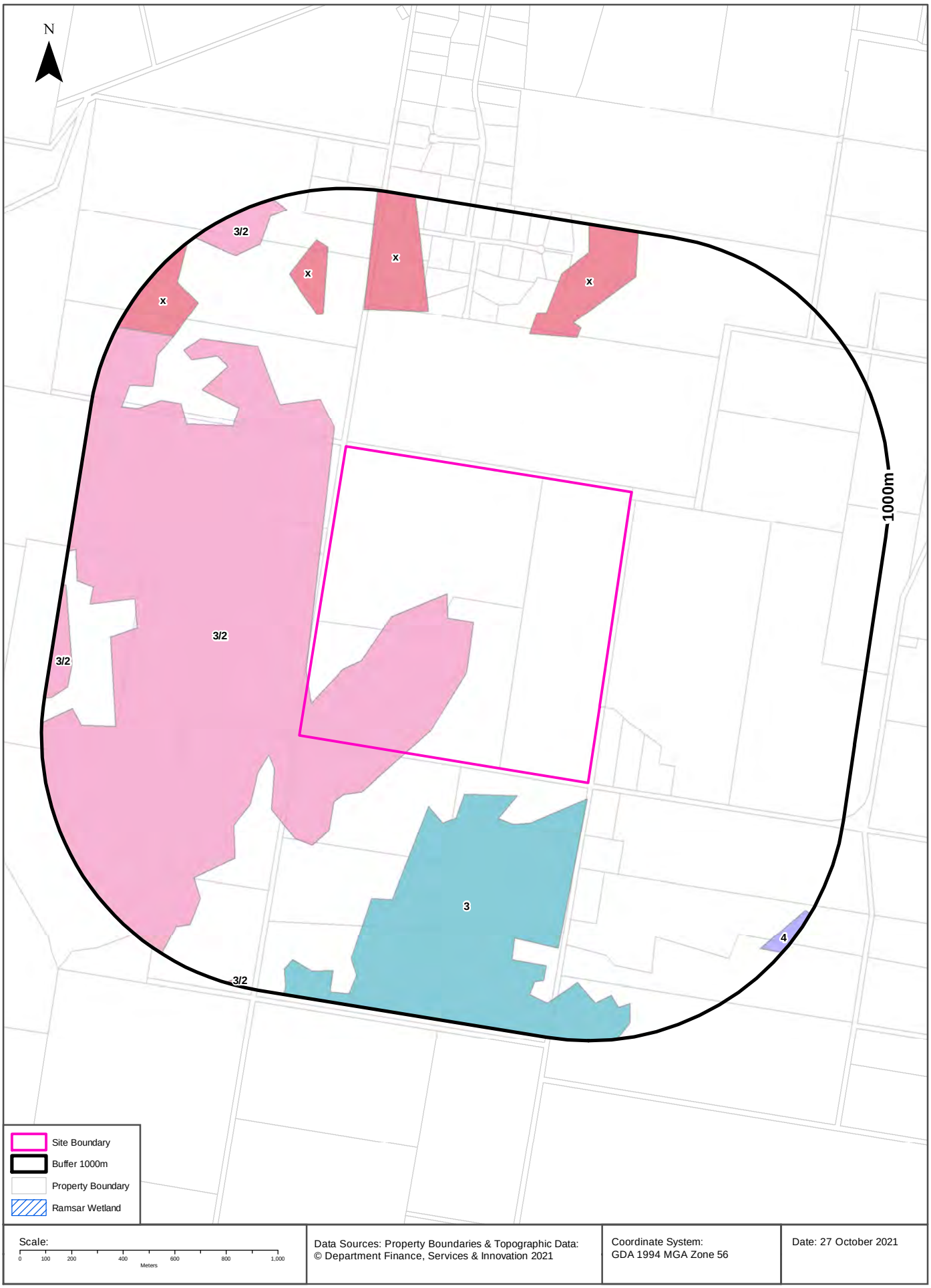
Bush Fire Prone Land

What are the nearest Bush Fire Prone Land Categories that exist within the dataset buffer?

Bush Fire Prone Land Category	Distance	Direction
Vegetation Buffer	0m	On-site
Vegetation Category 1	9m	South
Vegetation Category 2	24m	North West

Ecological Constraints - Vegetation & Ramsar Wetlands

395 Reardons Lane, Swan Bay, NSW 2324



Ecological Constraints

395 Reardons Lane, Swan Bay, NSW 2324

Vegetation - Eastern Bushland Database (North Region)

What Vegetation exists within the dataset buffer?

Veg Code	Veg Desc	NVISCode	NVISDesc	Distance	Direction
3/2	dry open forest / moist forest	4	Dry forest system	0m	On-site
3	dry open forest	4	Dry forest system	61m	South
x	disturbed forest woodland	23	Disturbed bushland	520m	North West
4	coastal complex	2	Coastal complex	926m	South East

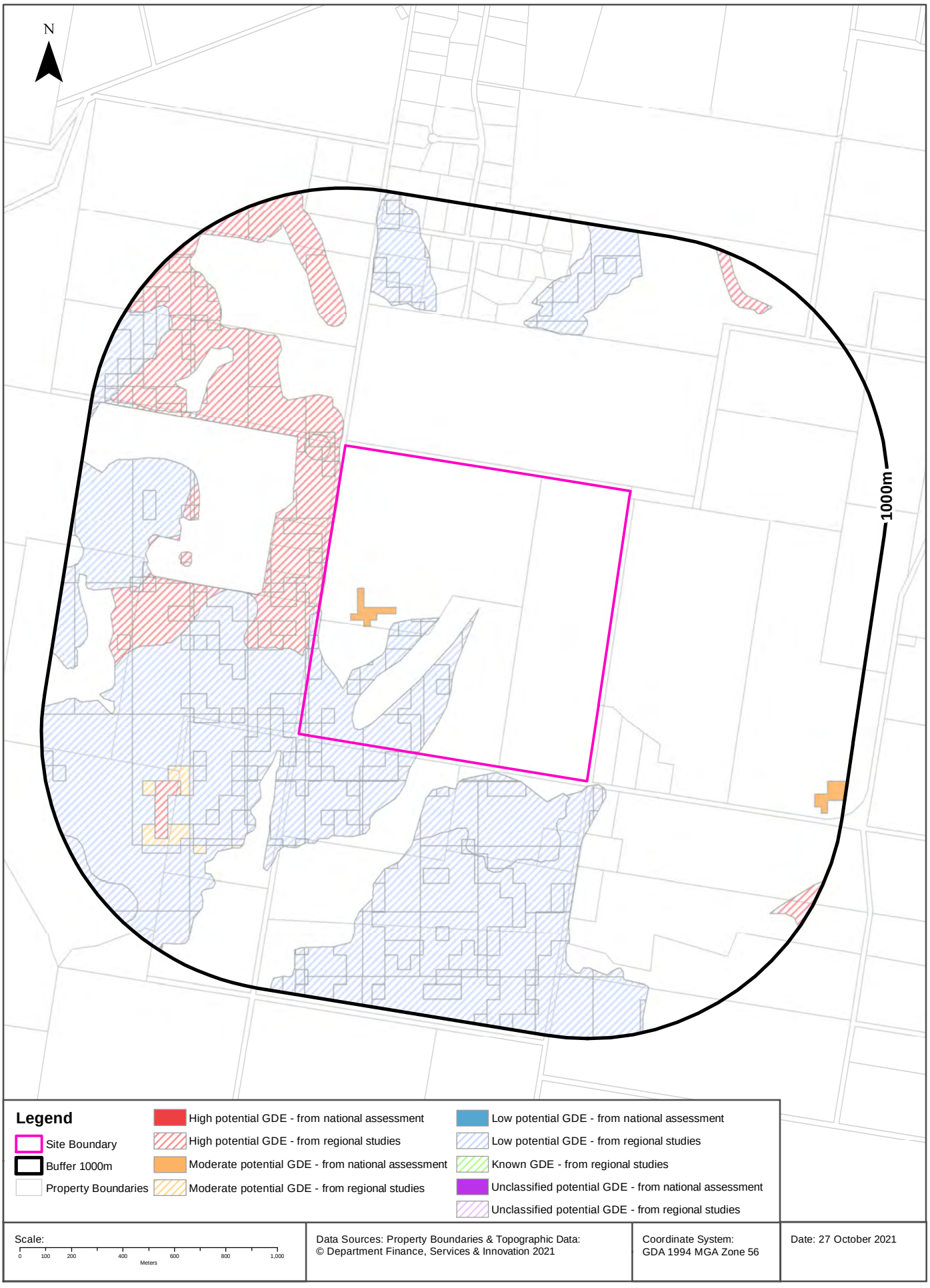
Ramsar Wetlands

What Ramsar Wetland areas exist within the dataset buffer?

Map Id	Ramsar Name	Wetland Name	Designation Date	Source	Distance	Direction
N/A	No records in buffer					

Ecological Constraints - Groundwater Dependent Ecosystems Atlas

395 Reardons Lane, Swan Bay, NSW 2324



Ecological Constraints

395 Reardons Lane, Swan Bay, NSW 2324

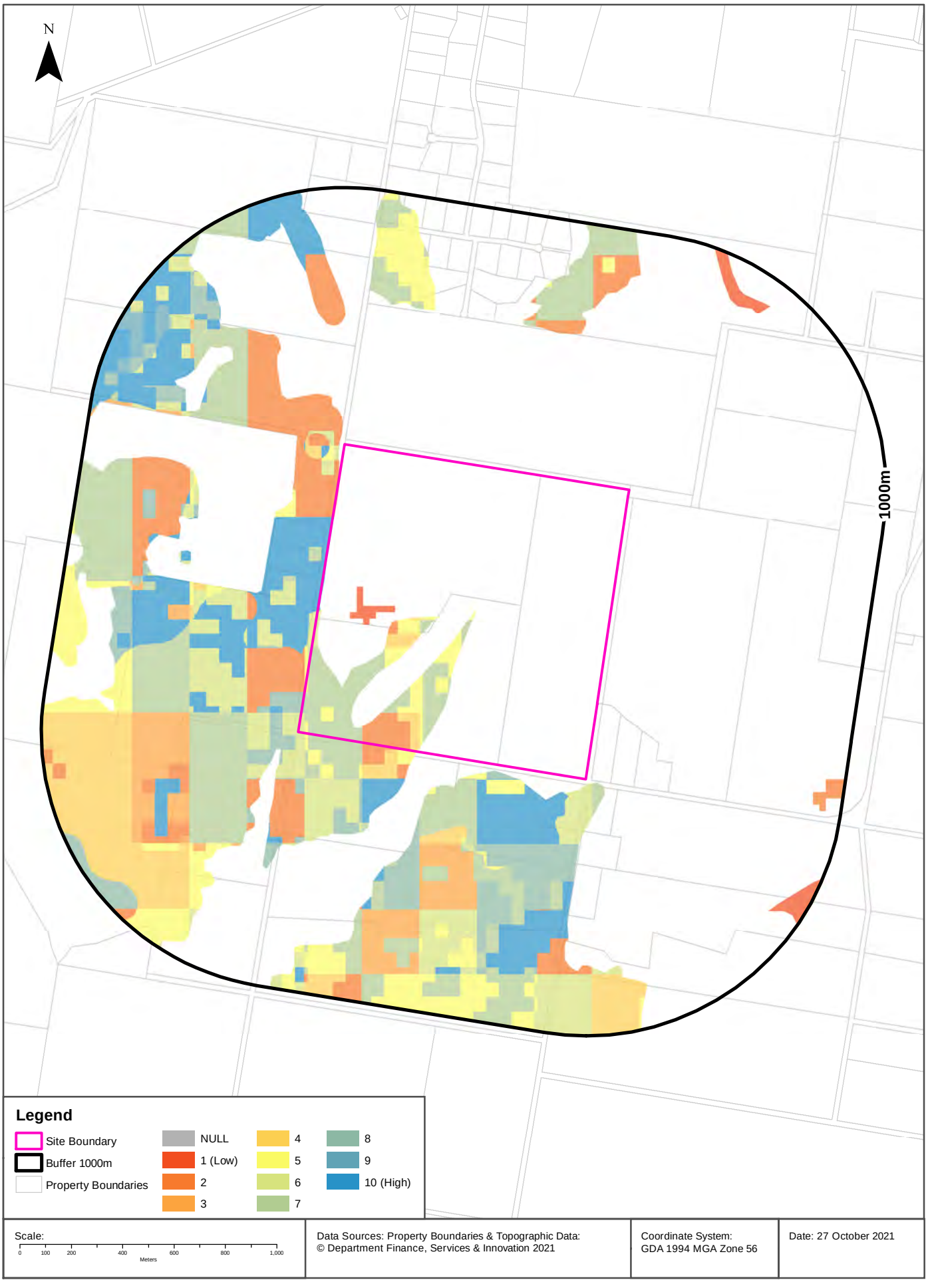
Groundwater Dependent Ecosystems Atlas

Type	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Aquatic	Moderate potential GDE - from national assessment	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Wetland		0m	On-site
Terrestrial	Low potential GDE - from regional studies	Dissected plateau margin on granite and metamorphic rocks.	Vegetation		0m	On-site
Terrestrial	Low potential GDE - from regional studies	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		0m	On-site
Terrestrial	High potential GDE - from regional studies	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		0m	On-site
Terrestrial	Moderate potential GDE - from regional studies	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		442m	South West
Terrestrial	Low potential GDE - from regional studies	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Vegetation		972m	South West

Groundwater Dependent Ecosystems Atlas Data Source: The Bureau of Meteorology

Ecological Constraints - Inflow Dependent Ecosystems Likelihood

395 Reardons Lane, Swan Bay, NSW 2324



Ecological Constraints

395 Reardons Lane, Swan Bay, NSW 2324

Inflow Dependent Ecosystems Likelihood

Type	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Terrestrial	7	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		0m	On-site
Terrestrial	7	Dissected plateau margin on granite and metamorphic rocks.	Vegetation		0m	On-site
Terrestrial	5	Dissected plateau margin on granite and metamorphic rocks.	Vegetation		0m	On-site
Terrestrial	2	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		0m	On-site
Terrestrial	4	Dissected plateau margin on granite and metamorphic rocks.	Vegetation		0m	On-site
Aquatic	1	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Wetland		0m	On-site
Terrestrial	6	Dissected plateau margin on granite and metamorphic rocks.	Vegetation		0m	On-site
Terrestrial	6	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		0m	On-site
Terrestrial	10	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		0m	On-site
Terrestrial	8	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		0m	On-site
Terrestrial	2	Dissected plateau margin on granite and metamorphic rocks.	Vegetation		1m	West
Terrestrial	5	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		30m	North West
Terrestrial	10	Dissected plateau margin on granite and metamorphic rocks.	Vegetation		54m	South
Terrestrial	4	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		81m	North West
Terrestrial	3	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		327m	South
Terrestrial	9	Dissected plateau margin on granite and metamorphic rocks.	Vegetation		814m	North West
Terrestrial	1	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		830m	North East
Aquatic	2	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Wetland		880m	South East
Terrestrial	8	Dissected plateau margin on granite and metamorphic rocks.	Vegetation		894m	South West
Terrestrial	7	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Vegetation		972m	South West

Inflow Dependent Ecosystems Likelihood Data Source: The Bureau of Meteorology

Ecological Constraints

395 Reardons Lane, Swan Bay, NSW 2324

NSW BioNet Atlas

Species on the NSW BioNet Atlas that have a NSW or federal conservation status, a NSW sensitivity status, or are listed under a migratory species agreement, and are within 10km of the site?

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Amphibia	Crinia tinnula	Wallum Froglet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Amphibia	Litoria brevipalmata	Green-thighed Frog	Vulnerable	Not Sensitive	Not Listed	
Animalia	Amphibia	Mixophyes iteratus	Giant Barred Frog	Endangered	Category 2	Endangered	
Animalia	Aves	Amaurornis moluccana	Pale-vented Bush-hen	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Anseranas semipalmata	Magpie Goose	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Apus pacificus	Fork-tailed Swift	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Ardenna pacifica	Wedge-tailed Shearwater	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Botaurus poiciloptilus	Australasian Bittern	Endangered	Not Sensitive	Endangered	
Animalia	Aves	Burhinus grallarius	Bush Stone-curlew	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Calidris acuminata	Sharp-tailed Sandpiper	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Circus assimilis	Spotted Harrier	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Cuculus optatus	Oriental Cuckoo	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Daphoenositta chrysoptera	Varied Sittella	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Dromaius novaehollandiae	Emu	Endangered Population	Not Sensitive	Not Listed	
Animalia	Aves	Ephippiorhynchus asiaticus	Black-necked Stork	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Gallinago hardwickii	Latham's Snipe	Not Listed	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Glossopsitta pusilla	Little Lorikeet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Grus rubicunda	Brolga	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Irediparra gallinacea	Comb-crested Jacana	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ixobrychus flavicollis	Black Bittern	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Limosa lapponica	Bar-tailed Godwit	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Lophoictinia isura	Square-tailed Kite	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Ninox connivens	Barking Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Ninox strenua	Powerful Owl	Vulnerable	Category 3	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Aves	Numenius madagascariensis	Eastern Curlew	Not Listed	Not Sensitive	Critically Endangered	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	Numenius phaeopus	Whimbrel	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	Pandion cristatus	Eastern Osprey	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ptilinopus magnificus	Wompoo Fruit-Dove	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Thalasseus bergii	Crested Tern	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Tringa brevipes	Grey-tailed Tattler	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	Tringa nebularia	Common Greenshank	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	Tyto longimembris	Eastern Grass Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Tyto novaehollandiae	Masked Owl	Vulnerable	Category 3	Not Listed	
Animalia	Mammalia	Aepyprymnus rufescens	Rufous Bettong	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Chalinolobus nigrogriseus	Hoary Wattled Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Not Sensitive	Endangered	
Animalia	Mammalia	Macropus dorsalis	Black-striped Wallaby	Endangered	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus australis	Little Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Myotis macropus	Southern Myotis	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Nyctophilus bifax	Eastern Long-eared Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Petauroides volans	Greater Glider	Not Listed	Not Sensitive	Vulnerable	
Animalia	Mammalia	Petaurus australis	Yellow-bellied Glider	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Petaurus norfolcensis	Squirrel Glider	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Phascogale tapoatafa	Brush-tailed Phascogale	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Phascolarctos cinereus	Koala	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Planigale maculata	Common Planigale	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Syconycteris australis	Common Blossom-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Thylogale stigmatica	Red-legged Pademelon	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Hoplocephalus stephensii	Stephens' Banded Snake	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Arthraxon hispidus	Hairy Jointgrass	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Belvisia mucronata	Needle-leaf Fern	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Centranthera cochinchinensis	Swamp Foxglove	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Coatesia paniculata	Axe-Breaker	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Cyperus aquatilis	Water Nutgrass	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Dendrobium melaleucaphilum	Spider orchid	Endangered	Category 2	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Plantae	Flora	Desmodium acanthocladum	Thorny Pea	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Doryanthes palmeri	Giant Spear Lily	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Gossia fragrantissima	Sweet Myrtle	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Lindernia alsinoides	Noah's False Chickweed	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Lindsaea incisa	Slender Screw Fern	Endangered	Category 3	Not Listed	
Plantae	Flora	Macadamia tetraphylla	Rough-shelled Bush Nut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Marsdenia longiloba	Slender Marsdenia	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Maundia triglochinoides		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Melaleuca irbyana	Weeping Paperbark	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Oberonia complanata	Yellow-flowered King of the Fairies	Endangered	Category 2	Not Listed	
Plantae	Flora	Oberonia titania	Red-flowered King of the Fairies	Vulnerable	Category 2	Not Listed	
Plantae	Flora	Paspalidium grandispiculatum		Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Polygala linariifolia	Native Milkwort	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Prostanthera palustris	Swamp Mint-bush	Vulnerable	Category 3	Vulnerable	
Plantae	Flora	Rhodamnia rubescens	Scrub Turpentine	Critically Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Rhodomyrtus psidioides	Native Guava	Critically Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Rutidosis heterogama	Heath Wrinklewort	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Syzygium hodgkinsoniae	Red Lilly Pilly	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Tinospora tinosporoides	Arrow-head Vine	Vulnerable	Not Sensitive	Not Listed	

Data does not include NSW category 1 sensitive species.

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Where Lotsearch has had to georeference features from supplied addresses, a location confidence has been assigned to the data record. This indicates a confidence to the positional accuracy of the feature. Where applicable, a code is given under the field heading “LC” or “LocConf”. These codes lookup to the following location confidences:

LC Code	Location Confidence
Premise Match	Georeferenced to the site location / premise or part of site
Area Match	Georeferenced to an approximate or general area
Road Match	Georeferenced to a road or rail corridor
Road Intersection	Georeferenced to a road intersection
Buffered Point	A point feature buffered to x metres
Adjacent Match	Land adjacent to a georeferenced feature
Network of Features	Georeferenced to a network of features
Suburb Match	Georeferenced to a suburb boundary
As Supplied	Spatial data supplied by provider

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B Site Photos

Photo A Subject Site

Photo B Subject site looking east

Photo B Subject Western Boundary Looking south

Photo C Soil Sampling

C Chain of Custody

SGS

CHAIN OF CUSTODY & ANALYSIS REQUEST

SGS Environmental Services
Unit 16, 33 Maddox Street
Alexandria NSW 2015
Telephone No: (02) 85940400
Facsimile No: (02) 85940499
Email: au.samplereceipt.sydney@sgs.com

Company Name:	EAL	Project Name/No:	
Address:	PO Box 157	Purchase Order No:	M 2839
	LISMORE NSW 2480	Results Required By:	
		Telephone:	02 6620 3678
Contact Name:	Graham Lancaster	Facsimile:	
		Email Results:	eal@scu.edu.au

Client Sample ID	Date Sampled	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS	CL5 TRH/BTEX C6-C40	CL8 TRH/BTEX/PAH	CL11TRH/BTEX/PAH/ Phenols		SV3 OC/OP	SV6 OC/PCB Low Level	SV9 OC/OP/PCB		Speciated Phenolics	Total Cyanide	Asbestos ID	OC	TRH C10-C40	BTEX C6-C9	Hexavalent Cr Vi
M2839/1	-	1		+		1					+										
				+		↓					+										
↓		↓		+							+										
				+							+										
				+							+										
				+							+										
		↓		+							+										
M2839/49		49		+							+										

Relinquished By:	K Whitney	Received By:	
Date/Time:	27-10-21 1pm.	Date/Time	28.10.21 9:25
Relinquished By:		Received By:	
Date/Time:		Date/Time	
Samples Intact: Yes/No		Temperature: Ambient / Chilled 20.8	Sample Cooler Sealed: Yes/No
Laboratory Quotation No:		Comments:	

SGS EHS Sydney COC
SE225149

D Laboratoy Results

RESULTS OF SOIL ANALYSIS

49 samples supplied by Tim Fitzroy & Associates Pty Ltd on 26/10/2021. Lab Job No. M2839.
Samples submitted by Tim Fitzroy. Your Job: 90/2021 Newman.
61 Pine Avenue EAST BALLINA NSW 2478

ANALYTE	METHOD REFERENCE	Sample 1 TFA1	Sample 2 TFA2	Sample 3 TFA3	Sample 4 TFA4	Sample 5 TFA5	Sample 6 TFA6	Sample 7 TFA7	Sample 8 TFA8	Sample 9 TFA9
	Job No.	*M2839/1*	*M2839/2*	*M2839/3*	*M2839/4*	*M2839/5*	*M2839/6*	*M2839/7*	*M2839/8*	*M2839/9*
TEXTURE (SAND, CLAY, SILT)	** inhouse	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay
MOISTURE %	** c	21	27	24	22	22	18	31	25	29
SILVER (mg/kg DW)	*a*	<1	<1	<1	<1	<1	<1	<1	<1	<1
ARSENIC (mg/kg DW)	*a*	3	2	3	3	3	3	2	2	2
LEAD (mg/kg DW)	*a*	12	9	9	8	9	15	10	10	10
CADMIUM (mg/kg DW)	*a*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHROMIUM (mg/kg DW)	*a*	4	6	9	5	7	6	6	7	10
COPPER (mg/kg DW)	*a*	3	6	7	4	6	5	7	3	8
MANGANESE (mg/kg DW)	*a*	49	181	167	161	252	283	127	150	291
NICKEL (mg/kg DW)	*a*	1	3	3	2	3	2	3	1	4
SELENIUM (mg/kg DW)	*a*	<1	<1	<1	<1	<1	<1	<1	<1	<1
ZINC (mg/kg DW)	*a*	7	22	39	16	24	13	26	10	28
MERCURY (mg/kg DW)	*a*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	0.06
IRON (% DW)	*a*	1.29	1.12	1.90	1.28	1.61	1.48	0.92	1.57	1.42
ALUMINIUM (% DW)	*a*	0.98	0.98	1.78	0.98	1.06	1.23	1.13	1.06	1.34
BERYLLIUM (mg/kg DW)	*a*	<1	<1	<1	<1	<1	<1	<1	<1	<1
BORON (mg/kg DW)	*a*	<1	1	<1	<1	<1	1	2	<1	2
COBALT (mg/kg DW)	*a*	<1	2	3	3	3	7	2	3	5
PESTICIDE ANALYSIS SCREEN										
Hexachlorobenzene (HCB) (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan (mg/kg)	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDE (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin (mg/kg)	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin (mg/kg)	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan (mg/kg)	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Organochlorine Pesticides SUM (mg/kg)	*c*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Dichlorvos (mg/kg)	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate (mg/kg)	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate) (mg/kg)	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos (Chlorpyrifos Ethyl) (mg/kg)	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion (mg/kg)	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion (mg/kg)	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Organophosphate Pesticides SUM (mg/kg)	*c*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*

METHODS REFERENCE:

a. ^{13}Nitric/HCl digest - APHA 3125 ICPMS
b. ^{13}Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - SGS report no. SE225149
*** denotes these test procedure or calculation are as yet not NATA accredited but quality control data is available*

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NOTES:

1. HIL A – Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.
2. HIL B – Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.
3. HIL C – Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space.
4. HIL D – Commercial/industrial, includes premises such as shops, offices, factories and industrial sites.
(REFERENCE: Health Investigation Guidelines from NEPM (National Environmental Protection, Assessment of Site Contamination, Measure), 2013; Schedule B1).
5. Environmental Soil Quality Guidelines, Page 40, ANZECC, 1992.
6. able 1 Maximum values of specific contaminant concentrations for classification without TCLP (NSW EPA 2014, Waste Classification Guidelines Part 1: Classifying Waste)
7. able 2 Maximum values for leachable concentrations and specific contaminant concentrations when used together (NSW EPA 2014, Waste Classification Guidelines Part 1: Classifying Waste)
8. Analysis conducted between sample arrival date and reporting date.
9. ** NATA accreditation does not cover the performance of this service.
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13. Results relate only to the samples tested.
14. This report was issued on 15/11/2021.

Additional NOTES:

DW = Dry Weight. na = no guidelines available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

Sample 10	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15	Sample 16	Sample 17	Sample 18	Sample 19	Sample 20	Sample 21	Sample 22	Sample 23
TFA10	**TFA10 Field Duplicate**	**TFA11**	**TFA12**	**TFA13**	**TFA14**	**TFA15**	**TFA16**	**TFA17**	**TFA18**	**TFA19**	**TFA20**	**TFA21**	**TFA22**
M2839/10	*M2839/11*	*M2839/12*	*M2839/13*	*M2839/14*	*M2839/15*	*M2839/16*	*M2839/17*	*M2839/18*	*M2839/19*	*M2839/20*	*M2839/21*	*M2839/22*	*M2839/23*
Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay
24	28	17	15	21	29	32	22	17	16	20	25	28	25
<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
3	3	3	4	2	5	3	3	3	3	6	5	6	5
9	10	7	10	11	10	9	8	8	8	11	11	9	10
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
11	10	6	7	7	13	9	7	8	7	7	6	7	5
13	11	2	4	5	25	6	1	1	2	6	5	4	3
352	312	20	48	72	922	233	31	25	20	73	58	71	41
6	5	<1	<1	2	6	3	<1	<1	<1	1	1	1	<1
<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
47	39	15	9	12	58	24	4	6	10	9	15	9	4
0.05	0.05	<0.05	<0.05	<0.05	0.05	0.11	<0.05	<0.05	<0.05	0.06	<0.05	0.07	<0.05
1.40	1.47	2.09	2.35	1.41	3.20	1.93	1.94	3.68	2.70	2.22	1.48	1.44	1.57
1.66	1.72	0.84	1.15	1.58	1.92	1.20	1.13	1.28	1.35	1.34	1.65	1.32	1.26
<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4	2	<1	<1	<1	13	2	<1	<1	<1	1	<1	<1	<1
5	6	1	2	5	7	4	<1	<1	<1	1	1	<1	<1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<1	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
<1.7	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*

checked: ....
Graham Lancaster (Nata signatory)
Laboratory Manager

Sample 24	Sample 25	Sample 26	Sample 27	Sample 28	Sample 29	Sample 30	Sample 31	Sample 32	Sample 33	Sample 34	Sample 35	Sample 36	Sample 37
TFA23	**TFA24**	**TFA25**	**TFA26**	**TFA27**	**TFA28**	**TFA29**	**TFA30**	**TFA30 Field Duplicate**	**TFA31**	**TFA32**	**TFA33**	**TFA34**	**TFA35**
M2839/24	*M2839/25*	*M2839/26*	*M2839/27*	*M2839/28*	*M2839/29*	*M2839/30*	*M2839/31*	*M2839/32*	*M2839/33*	*M2839/34*	*M2839/35*	*M2839/36*	*M2839/37*
Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay
30	20	26	27	23	23	19	21	23	26	24	23	24	18
<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
3	5	3	9	3	2	4	4	3	2	3	3	2	4
11	13	13	14	13	10	12	11	10	9	10	11	10	12
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
7	8	8	12	6	4	5	5	4	6	7	5	6	6
2	2	<1	3	4	2	3	4	4	5	2	2	3	4
77	121	33	67	17	14	23	91	81	110	76	36	64	31
<1	1	<1	1	<1	<1	<1	<1	<1	2	1	<1	<1	2
<1	<1	<1	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1
4	7	3	15	4	3	4	6	4	15	7	5	8	18
0.06	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	0.07	0.08	0.07	0.06	<0.05
1.95	2.56	3.40	9.82	2.19	0.61	1.52	1.27	1.10	1.37	1.65	1.45	1.42	2.31
1.22	0.88	0.97	1.21	1.07	1.42	1.04	1.26	1.56	1.05	0.97	0.97	1.37	0.80
<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
<1	1	<1	<1	<1	1	<1	<1	1	<1	<1	<1	<1	<1
<1	1	<1	2	<1	<1	<1	1	1	3	<1	<1	<1	<1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<1	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1.50	<0.2	<0.2	<0.2	<0.2
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
<1.7	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*

checked: ....
Graham Lancaster (Nata signatory)
Laboratory Manager

Sample 38 TFA36	Sample 39 TFA37	Sample 40 TFA38	Sample 41 TFA39	Sample 42 TFA40	Sample 43 TFA41	Sample 44 TFA42	Sample 45 TFA43	Sample 46 TFA44	Sample 47 TFA45	Sample 48 TFA Lab Duplicate 1	Sample 49 TFA Lab Duplicate 2	*RESIDENTIAL A Guideline Limit* *Individual -Column A*
M2839/38	*M2839/39*	*M2839/40*	*M2839/41*	*M2839/42*	*M2839/43*	*M2839/44*	*M2839/45*	*M2839/46*	*M2839/47*	*M2839/48*	*M2839/49*	*See note 1a*
Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	..
18	14	18	31	11	21	18	20	21	25	20	24	..
<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	*na*
5	5	4	6	5	8	2	2	2	4	5	2	*100*
10	11	9	11	10	13	9	10	10	17	11	10	*300*
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	*20*
12	10	8	9	7	10	6	6	6	8	6	8	*(<100)*
3	2	1	2	2	2	7	2	4	2	1	5	*6,000*
60	74	60	60	21	41	157	40	91	37	16	125	*3,800*
<1	<1	<1	<1	<1	2	2	<1	2	<1	<1	3	*400*
<1	1	1	<1	<1	1	<1	<1	<1	<1	<1	<1	*200*
8	5	3	5	5	5	12	3	9	4	12	16	*7,400*
<0.05	<0.05	<0.05	<0.05	<0.05	0.06	0.05	0.05	<0.05	<0.05	<0.05	0.07	*40*
4.96	5.30	2.89	4.69	3.00	6.84	1.89	1.64	0.86	3.65	1.78	1.52	*na*
1.04	1.06	0.76	0.95	0.90	0.93	0.84	0.70	1.23	1.02	0.82	1.09	*na*
<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	*60*
<1	<1	<1	<1	1	1	2	2	1	2	1	<1	*4,500*
<1	<1	<1	<1	<1	<1	2	<1	6	<1	1	3	*100*
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*10*
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*6*
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*6*
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*6*
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*240*
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	..
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*240*
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	*6*
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	*10*
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*240*
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*240*
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	..
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*240*
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*240*
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*270*
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*10*
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*300*
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*10*
<1	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	..
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	..
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	..
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	..
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.30	<0.2	<0.2	<0.2	<0.2	*160*
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	..
<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	..
<1.7	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	*<1.7*	..

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

QA/QC Report for EAL Job M2839

49 samples supplied by Tim Fitzroy & Associates Pty Ltd on 26/10/2021. Lab Job No. M2839.

Samples submitted by Tim Fitzroy. Your Job: 90/2021 Newman.

61 Pine Avenue EAST BALLINA NSW 2478

Digest Date: 28/10/2021

Analysis Date: 1/11/2021

	Method	PQL	Digest Blank	LCS % Recovery AGAL 12				DUPLICATE			
		mg/kg	mg/kg	Result 1	Certified Value	Recovery (%)	Pass Limits	Result 1 - M2839/9	Result 2 - M2839/9d	RPD	Pass Limits
METALS & SALTS											
SILVER (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	1	<1	5.82	**5.63**	**103.4%**	Pass	0.00	0.00	..	Pass
ARSENIC (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	2	<2	3.90	**3.39**	**114.9%**	Pass	2.2	2.5	**13%**	Pass
LEAD (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	1	<1	30.6	**31.4**	**97.6%**	Pass	10.1	10.2	**1%**	Pass
CADMIUM (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	0.5	<0.5	0.74	**0.77**	**96.3%**	Pass	0.03	0.04	**18%**	Pass
CHROMIUM (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	2	<2	32.8	**33**	**99.3%**	Pass	9.3	9.7	**4%**	Pass
COPPER (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	1	<1	155	**150**	**103.6%**	Pass	7.3	7.7	**4%**	Pass
MANGANESE (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	1	<1	493	**500**	**98.7%**	Pass	286	297	**4%**	Pass
NICKEL (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	1	<1	16.8	**16.6**	**101.0%**	Pass	3.7	4.0	**7%**	Pass
SELENIUM (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	2	<2	1.53	**1.50**	**102.2%**	Pass	0.2	0.6	**90%**	Pass
ZINC (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	1	<1	184	**182**	**101.2%**	Pass	28	29	**3%**	Pass
MERCURY (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	0.1	<0.1	0.60	**0.53**	**114.1%**	Pass	0.05	0.07	**35%**	Pass
IRON (%)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	0.005	<0.005	2.39	**2.49**	**95.9%**	Pass	1.39	1.45	**4%**	Pass
ALUMINIUM (%)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	0.005	<0.005	1.08	**1.05**	**102.7%**	Pass	1.28	1.39	**9%**	Pass
BERYLLIUM (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	1	<1	0.66	**0.67**	**98.1%**	Pass	0.54	0.54	**0%**	Pass
BORON (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	5	<5	4.19	**3.46**	**121.0%**	Pass	2.53	1.69	**40%**	Pass
COBALT (mg/kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	1	<1	8.31	**8.67**	**95.8%**	Pass	5.2	5.6	**7%**	Pass

Quality Control Global Acceptance Criteria (GAC)

Accuracy

LCS - 1 per analytical batch

LCS - general analytes 70% - 130% recovery

Precision

Laboratory duplicate - 1 every 10 samples, minimum one per analytical batch

Laboratory duplicate RPD GAC - 30%, also applicable - No Limit (<10x PQL), 0-50% (10-20x PQL), 0-20% (>20x PQL)

Notes:

This QA/QC report is specific to job number specified above

LCS: Laboratory Control Standard - Reported as percent recovery

RPD: Relative Percent Difference between two duplicate pieces of analysis

PQL: Practical Quantification Limit also referred to as Limit of Reporting LOR

.. - denotes no sufficient data available

This report was issued on 15/11/2021.

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked:.....
Graham Lancaster

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Graham Lancaster	Manager	Huong Crawford
Client	ENVIRONMENTAL ANALYSIS LABORATORY	Laboratory	SGS Alexandria Environmental
Address	PO BOX 157 LISMORE NSW 2480	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	61 2 6620 3678	Telephone	+61 2 8594 0400
Facsimile	(Not specified)	Facsimile	+61 2 8594 0499
Email	Graham.Lancaster@scu.edu.au	Email	au.environmental.sydney@sgs.com
Project	**M2839**	SGS Reference	**SE225149 R0**
Order Number	**M2839**	Date Received	28 Oct 2021
Samples	49	Date Reported	08 Nov 2021

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Akheeqar BENIAMEEN
Chemist

Shane MCDERMOTT
Inorganic/Metals Chemist

Teresa NGUYEN
Organic Chemist

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE225149.001 Soil 27 Oct 2021 M2839/1	SE225149.002 Soil 27 Oct 2021 M2839/2	SE225149.003 Soil 27 Oct 2021 M2839/3	SE225149.004 Soil 27 Oct 2021 M2839/4
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**98**	**95**	**94**	**93**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**90**	**94**	**94**	**92**
d14-p-terphenyl (Surrogate)	%	-	**92**	**88**	**94**	**96**
Moisture Content Method: AN002 Tested: 1/11/2021						
% Moisture	%w/w	1	**21.4**	**26.6**	**23.8**	**21.9**

Parameter	Units	LOR	Sample Number: SE225149.005 Sample Matrix: Soil Sample Date: 27 Oct 2021 Sample Name: M2839/5	SE225149.006 Soil 27 Oct 2021 M2839/6	SE225149.007 Soil 27 Oct 2021 M2839/7	SE225149.008 Soil 27 Oct 2021 M2839/8
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**91**	**93**	**92**	**92**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**92**	**92**	**92**	**100**
d14-p-terphenyl (Surrogate)	%	-	**96**	**96**	**90**	**96**
Moisture Content Method: AN002 Tested: 1/11/2021						
% Moisture	%w/w	1	**21.8**	**17.8**	**31.3**	**24.5**

Parameter	Units	LOR	Sample Number: SE225149.009 Sample Matrix: Soil Sample Date: 27 Oct 2021 Sample Name: M2839/9	SE225149.010 Soil 27 Oct 2021 M2839/10	SE225149.011 Soil 27 Oct 2021 M2839/11	SE225149.012 Soil 27 Oct 2021 M2839/12
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**93**	**94**	**91**	**90**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**88**	**90**	**96**	**94**
d14-p-terphenyl (Surrogate)	%	-	**80**	**86**	**90**	**98**
Moisture Content Method: AN002 Tested: 1/11/2021						
% Moisture	%w/w	1	**29.2**	**24.2**	**27.7**	**16.5**

Parameter	Units	LOR	Sample Number: SE225149.013 Sample Matrix: Soil Sample Date: 27 Oct 2021 Sample Name: M2839/13	SE225149.014 Soil 27 Oct 2021 M2839/14	SE225149.015 Soil 27 Oct 2021 M2839/15	SE225149.016 Soil 27 Oct 2021 M2839/16
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**88**	**91**	**88**	**91**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**92**	**96**	**74**	**97**
d14-p-terphenyl (Surrogate)	%	-	**92**	**100**	**46**	**90**
Moisture Content Method: AN002 Tested: 1/11/2021						
% Moisture	%w/w	1	**15.1**	**21.2**	**29.1**	**32.4**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE225149.017 Soil 27 Oct 2021 M2839/17	SE225149.018 Soil 27 Oct 2021 M2839/18	SE225149.019 Soil 27 Oct 2021 M2839/19	SE225149.020 Soil 27 Oct 2021 M2839/20
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**89**	**89**	**90**	**97**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**89**	**92**	**90**	**84**
d14-p-terphenyl (Surrogate)	%	-	**95**	**95**	**94**	**71**
Moisture Content Method: AN002 Tested: 1/11/2021						
% Moisture	%w/w	1	**21.8**	**16.6**	**16.4**	**19.9**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE225149.021 Soil 27 Oct 2021 M2839/21	SE225149.022 Soil 27 Oct 2021 M2839/22	SE225149.023 Soil 27 Oct 2021 M2839/23	SE225149.024 Soil 27 Oct 2021 M2839/24
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**101**	**103**	**96**	**100**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**90**	**96**	**104**	**107**
d14-p-terphenyl (Surrogate)	%	-	**99**	**101**	**93**	**97**
Moisture Content Method: AN002 Tested: 1/11/2021						
% Moisture	%w/w	1	**24.5**	**27.7**	**24.7**	**29.6**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE225149.025 Soil 27 Oct 2021 M2839/25	SE225149.026 Soil 27 Oct 2021 M2839/26	SE225149.027 Soil 27 Oct 2021 M2839/27	SE225149.028 Soil 27 Oct 2021 M2839/28
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**100**	**101**	**98**	**96**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**107**	**107**	**107**	**101**
d14-p-terphenyl (Surrogate)	%	-	**98**	**97**	**93**	**95**
Moisture Content Method: AN002 Tested: 1/11/2021						
% Moisture	%w/w	1	**20.4**	**25.9**	**27.2**	**22.9**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE225149.029 Soil 27 Oct 2021 M2839/29	SE225149.030 Soil 27 Oct 2021 M2839/30	SE225149.031 Soil 27 Oct 2021 M2839/31	SE225149.032 Soil 27 Oct 2021 M2839/32
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**102**	**94**	**99**	**99**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**105**	**100**	**90**	**103**
d14-p-terphenyl (Surrogate)	%	-	**96**	**89**	**97**	**91**
Moisture Content Method: AN002 Tested: 1/11/2021						
% Moisture	%w/w	1	**22.9**	**18.8**	**21.3**	**22.9**

Parameter	Units	LOR	Sample Number: SE225149.033 Sample Matrix: Soil Sample Date: 27 Oct 2021 Sample Name: M2839/33	SE225149.034 Soil 27 Oct 2021 M2839/34	SE225149.035 Soil 27 Oct 2021 M2839/35	SE225149.036 Soil 27 Oct 2021 M2839/36
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**102**	**99**	**103**	**101**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	**1.5**	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**89**	**102**	**108**	**106**
d14-p-terphenyl (Surrogate)	%	-	**92**	**92**	**98**	**93**
Moisture Content Method: AN002 Tested: 1/11/2021						
% Moisture	%w/w	1	**26.2**	**23.5**	**23.4**	**24.2**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	SE225149.037 Soil 27 Oct 2021 M2839/37	SE225149.038 Soil 27 Oct 2021 M2839/38	SE225149.039 Soil 27 Oct 2021 M2839/39	SE225149.040 Soil 27 Oct 2021 M2839/40
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021							
Hexachlorobenzene (HCB)	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1		<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1		<1	<1	<1	<1
Surrogates							
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-		**98**	**99**	**94**	**100**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021							
Dichlorvos	mg/kg	0.5		<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5		<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5		<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5		<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7		<1.7	<1.7	<1.7	<1.7
Surrogates							
2-fluorobiphenyl (Surrogate)	%	-		**102**	**103**	**85**	**86**
d14-p-terphenyl (Surrogate)	%	-		**92**	**96**	**92**	**93**
Moisture Content Method: AN002 Tested: 1/11/2021							
% Moisture	%w/w	1		**18.3**	**17.8**	**13.5**	**18.0**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE225149.041 Soil 27 Oct 2021 M2839/41	SE225149.042 Soil 27 Oct 2021 M2839/42	SE225149.043 Soil 27 Oct 2021 M2839/43	SE225149.044 Soil 27 Oct 2021 M2839/44
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**96**	**92**	**90**	**93**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**100**	**100**	**98**	**98**
d14-p-terphenyl (Surrogate)	%	-	**108**	**108**	**100**	**106**
Moisture Content Method: AN002 Tested: 1/11/2021						
% Moisture	%w/w	1	**30.5**	**10.7**	**21.3**	**18.0**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE225149.045 Soil 27 Oct 2021 M2839/45	SE225149.046 Soil 27 Oct 2021 M2839/46	SE225149.047 Soil 27 Oct 2021 M2839/47	SE225149.048 Soil 27 Oct 2021 M2839/48
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**89**	**93**	**103**	**89**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021						
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	**0.3**	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**100**	**106**	**106**	**100**
d14-p-terphenyl (Surrogate)	%	-	**102**	**104**	**104**	**104**
Moisture Content Method: AN002 Tested: 1/11/2021						
% Moisture	%w/w	1	**20.2**	**21.4**	**25.2**	**20.3**

Parameter	Units	LOR	Sample Number SE225149.049 Sample Matrix Soil Sample Date 27 Oct 2021 Sample Name M2839/49
OC Pesticides in Soil Method: AN420 Tested: 1/11/2021			
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1
Lindane	mg/kg	0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1
Aldrin	mg/kg	0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2
Endrin	mg/kg	0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1
Isodrin	mg/kg	0.1	<0.1
Mirex	mg/kg	0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1
Total OC VIC EPA	mg/kg	1	<1
Surrogates			
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**91**
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021			
Dichlorvos	mg/kg	0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2
Malathion	mg/kg	0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2
Methidathion	mg/kg	0.5	<0.5
Ethion	mg/kg	0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7

Parameter	Units	LOR	Sample Number SE225149.049 Sample Matrix Soil Sample Date 27 Oct 2021 Sample Name M2839/49
OP Pesticides in Soil Method: AN420 Tested: 1/11/2021 (continued)			
Surrogates			
2-fluorobiphenyl (Surrogate)	%	-	**100**
d14-p-terphenyl (Surrogate)	%	-	**100**
Moisture Content Method: AN002 Tested: 1/11/2021			
% Moisture	%w/w	1	**24.4**

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Moisture Content Method: ME-(AU)-[ENV]AN002

Parameter	QC Reference	Units	LOR	DUP %RPD
% Moisture	LB236002	%w/w	1	2%
	LB236003	%w/w	1	0 - 2%
	LB236004	%w/w	1	0 - 2%

OC Pesticides in Soil Method: ME-(AU)-[ENV]AN420

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Hexachlorobenzene (HCB)	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Alpha BHC	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Lindane	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Heptachlor	LB235955	mg/kg	0.1	<0.1	0%	97%	90%
	LB235956	mg/kg	0.1	<0.1	0%	98%	140%
	LB235958	mg/kg	0.1	<0.1	0%	107%	108%
Aldrin	LB235955	mg/kg	0.1	<0.1	0%	90%	81%
	LB235956	mg/kg	0.1	<0.1	0%	91%	129%
	LB235958	mg/kg	0.1	<0.1	0%	103%	106%
Beta BHC	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Delta BHC	LB235955	mg/kg	0.1	<0.1	0%	96%	82%
	LB235956	mg/kg	0.1	<0.1	0%	94%	139%
	LB235958	mg/kg	0.1	<0.1	0%	106%	104%
Heptachlor epoxide	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
o,p'-DDE	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Alpha Endosulfan	LB235955	mg/kg	0.2	<0.2	0%	NA	NA
	LB235956	mg/kg	0.2	<0.2	0%	NA	NA
	LB235958	mg/kg	0.2	<0.2	0%	NA	NA
Gamma Chlordane	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Alpha Chlordane	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
trans-Nonachlor	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
p,p'-DDE	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Dieldrin	LB235955	mg/kg	0.2	<0.2	0%	97%	86%
	LB235956	mg/kg	0.2	<0.2	0%	95%	133%
	LB235958	mg/kg	0.2	<0.2	0%	105%	102%
Endrin	LB235955	mg/kg	0.2	<0.2	0%	102%	94%
	LB235956	mg/kg	0.2	<0.2	0%	94%	134%
	LB235958	mg/kg	0.2	<0.2	0%	102%	102%
o,p'-DDD	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

OC Pesticides in Soil Method: ME-(AU)-[ENV]AN420 (continued)

				MB	DUP %RPD	LCS %Recovery	MS %Recovery
o,p'-DDD	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
o,p'-DDT	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Beta Endosulfan	LB235955	mg/kg	0.2	<0.2	0%	NA	NA
	LB235956	mg/kg	0.2	<0.2	0%	NA	NA
	LB235958	mg/kg	0.2	<0.2	0%	NA	NA
p,p'-DDD	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
p,p'-DDT	LB235955	mg/kg	0.1	<0.1	0%	82%	91%
	LB235956	mg/kg	0.1	<0.1	0%	101%	136%
	LB235958	mg/kg	0.1	<0.1	0%	105%	112%
Endosulfan sulphate	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Endrin Aldehyde	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Methoxychlor	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Endrin Ketone	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Isodrin	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Mirex	LB235955	mg/kg	0.1	<0.1	0%	NA	NA
	LB235956	mg/kg	0.1	<0.1	0%	NA	NA
	LB235958	mg/kg	0.1	<0.1	0%	NA	NA
Total CLP OC Pesticides	LB235955	mg/kg	1	<1	0%	NA	NA
	LB235956	mg/kg	1	<1	0%	NA	NA
	LB235958	mg/kg	1	<1	0%	NA	NA
Total OC VIC EPA	LB235955	mg/kg	1	<1	0%	NA	NA
	LB235956	mg/kg	1	<1	0%	NA	NA
	LB235958	mg/kg	1	<1	0%	NA	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Tetrachloro-m-xylene (TCMX) (Surrogate)	LB235955	%	-	93%	2 - 7%	92%	83%
	LB235956	%	-	92%	4 - 5%	90%	100%
	LB235958	%	-	92%	0 - 2%	91%	95%

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

OP Pesticides in Soil Method: ME-(AU)-[ENV]AN420

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Dichlorvos	LB235955	mg/kg	0.5	<0.5	0%	67%	69%
	LB235956	mg/kg	0.5	<0.5	0%	69%	67%
	LB235958	mg/kg	0.5	<0.5	0%	75%	70%
Dimethoate	LB235955	mg/kg	0.5	<0.5	0%	NA	NA
	LB235956	mg/kg	0.5	<0.5	0%	NA	NA
	LB235958	mg/kg	0.5	<0.5	0%	NA	NA
Diazinon (Dimpylate)	LB235955	mg/kg	0.5	<0.5	0%	95%	99%
	LB235956	mg/kg	0.5	<0.5	0%	86%	90%
	LB235958	mg/kg	0.5	<0.5	0%	101%	106%
Fenitrothion	LB235955	mg/kg	0.2	<0.2	0%	NA	NA
	LB235956	mg/kg	0.2	<0.2	0%	NA	NA
	LB235958	mg/kg	0.2	<0.2	0%	NA	NA
Malathion	LB235955	mg/kg	0.2	<0.2	0%	NA	NA
	LB235956	mg/kg	0.2	<0.2	0%	NA	NA
	LB235958	mg/kg	0.2	<0.2	0%	NA	NA
Chlorpyrifos (Chlorpyrifos Ethyl)	LB235955	mg/kg	0.2	<0.2	0%	95%	101%
	LB235956	mg/kg	0.2	<0.2	0%	90%	95%
	LB235958	mg/kg	0.2	<0.2	0%	102%	109%
Parathion-ethyl (Parathion)	LB235955	mg/kg	0.2	<0.2	0%	NA	NA
	LB235956	mg/kg	0.2	<0.2	0%	NA	NA
	LB235958	mg/kg	0.2	<0.2	0%	NA	NA
Bromophos Ethyl	LB235955	mg/kg	0.2	<0.2	0%	NA	NA
	LB235956	mg/kg	0.2	<0.2	0%	NA	NA
	LB235958	mg/kg	0.2	<0.2	0%	NA	NA
Methidathion	LB235955	mg/kg	0.5	<0.5	0%	NA	NA
	LB235956	mg/kg	0.5	<0.5	0%	NA	NA
	LB235958	mg/kg	0.5	<0.5	0%	NA	NA
Ethion	LB235955	mg/kg	0.2	<0.2	0%	82%	89%
	LB235956	mg/kg	0.2	<0.2	0%	68%	67%
	LB235958	mg/kg	0.2	<0.2	0%	120%	105%
Azinphos-methyl (Guthion)	LB235955	mg/kg	0.2	<0.2	0%	NA	NA
	LB235956	mg/kg	0.2	<0.2	0%	NA	NA
	LB235958	mg/kg	0.2	<0.2	0%	NA	NA
Total OP Pesticides*	LB235955	mg/kg	1.7	<1.7	0%	NA	NA
	LB235956	mg/kg	1.7	<1.7	0%	NA	NA
	LB235958	mg/kg	1.7	<1.7	0%	NA	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
2-fluorobiphenyl (Surrogate)	LB235955	%	-	88%	0 - 7%	88%	92%
	LB235956	%	-	106%	1 - 10%	92%	92%
	LB235958	%	-	90%	6%	92%	94%
d14-p-terphenyl (Surrogate)	LB235955	%	-	92%	5 - 15%	92%	94%
	LB235956	%	-	95%	3 - 10%	88%	94%
	LB235958	%	-	96%	4%	98%	102%

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
***	Indicates that both * and ** apply.	NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

E Quality Assurance

Data Usability Summary Assessment

All site work was completed in accordance with standard *TFA sampling protocols*, including a quality assurance/quality control (QA/QC) programme and standard operating procedures.

A data usability assessment was performed for the soil data collected by TFA, as summarised in the following tables:

- Table E.1, field QC samples summary,
- Table E.2, summary of field QA/QC, and
- Table E.3, summary of laboratory QA/QC.

Table I.1: Field quality control samples summary

	Total samples	Field duplicates	Lab duplicates
Heavy metals[1]	45	4	4
OPs	45	4	4
OCs	45	4	4

Table I.2: Summary of field QA/QC

Parameter	Complies	Comments[1]
Precision		
Standard operating procedures (SOPs) appropriate and complied with	Yes	All sampling was conducted under standard TFA operating procedures.
Field duplicates	Yes	≥ 5%. RPD[2] criteria < 30% – 50%.
Inter-laboratory duplicates	Yes	≥ 5%. RPD[2] criteria < 30% – 50%.
Accuracy		
Matrix spikes samples appropriate	Yes	≥ 1/media type.
Representativeness		
Sample collection - preservation	Yes	All samples were collected directly into laboratory supplied jars with no headspace. All samples were placed immediately into eskies containing ice.
Field equipment calibrated	N/A	No field equipment that required calibration was used.
Decontamination procedures	Yes	Soil samples were collected using a trowel and gloved hand, which was washed with Decon 90 between locations.
Comparability		
Consistent sampling staff	Yes	All field work was conducted by Tim Fitzroy
Consistent weather/field conditions	Yes	No extreme weather conditions occurred during or before/after the investigation.
Completeness		
Sample logs and field data	Yes	-

Parameter	Complies	Comments[1]
Chain of Custody	Yes	Refer to Appendix C

Notes:
1. For QC samples, specified frequency and acceptance criteria shown.
2. RPD = relative percentage difference.

Table I.3: Summary of laboratory QA/QC

Parameter	Complies	Comments[1]
Precision		
Laboratory duplicates	Yes	≥ 10%, laboratory specified. All laboratory duplicates were within the laboratory specified global acceptance criteria.
Accuracy		
Surrogate spikes	Yes	Organics by GC, 70% - 130%. All surrogates were within the laboratory specified global acceptance criteria.
Matrix spikes analysis appropriate	Yes	≥ 70% - 130%.
Laboratory control samples (LCSs)	Yes	≥ 1/lab batch, 70% - 130%.
Certified reference material (CRM)	N/A	-
Representativeness		
Sample condition	Yes	
Holding times	Yes	
Laboratory blanks	Yes	≥ 1/lab batch, < LORs.
Comparability		
NATA accredited laboratory	Yes	EAL Laboratory Services is a NATA accredited laboratory (Accreditation number 14960).
NEPM methods or similar	Yes	LORs were consistent and appropriate.
Completeness		
Sample receipt	Yes	
Laboratory reports	Yes	

Notes:
1. For QC samples, acceptance criteria shown. Acceptance criteria can vary based on analyte, statistical data and laboratory specific methods. Laboratory specified relates to detected concentrations based on LORs, e.g., result < 10 x LOR = no limit, 10 – 20 x LOR = 0 - 50%, > 20 x LOR = 0 - 20%. See laboratory reports for specific details.

Summary and Discussion
The following issues were identified with the data:

- **Precision:** The data shows no significant variability.
- **Accuracy**: The accuracy of the analysis is confirmed by surrogate, matrix spike and LCS recoveries within the acceptance criteria.
- **Representativeness**: No outliers have been reported for QC samples collected to assist in the qualification of representativeness. It should be noted that no trip spikes or blanks were analysed during the works, but no volatile compounds were PCOCs.
- **Comparability:** The data is considered to be acceptable, with consistent sampling staff and NATA accredited laboratory used and all LORs below the relevant criteria.

- **Completeness**: Laboratory and field documentation is considered to be complete.

Agricultural & Property Management Consultants

Allen & Associates

Allen & Associates
209 Ballina Road
Alstonville NSW 2477

P: 0416 241 513
E: jallen@agrimac.com.au

ABN 14 625 275 025

30th November 2017

Mr. Luke Fittock
Newton Denny Chapelle
PO Box 1138
Lismore
NSW 2480

Dear Luke

RE: Richmond Valley Council letter dated 12th September 2017, NSW Department of Primary Industries letter dated 9th August 2017. Planning Proposal – Lots 831, 832 and 833 DP847683.

I refer to the letters from Richmond Valley Council (12th September 2017) and the NSW Department of Primary Industries (9th August 2017) in relation to the proposed rezoning of portions of lands (described above) from RU1 (Primary Production) to R5 (Large Lot Residential).

In particular I refer to quoted sections from their correspondence as they relate to the ultimate decision to not allow the proposal to proceed.

NSW Department of Primary Industries

> The farmland mapping was undertaken at a 1:100000 mapping scale and was developed for strategic mapping purposes. Discrepancies at the mapping boundaries can occur. Nevertheless, the site has been used for sugar cane production consistently for many years and is surrounded by sugarcane lands further identified as regionally significant farmland.

In relation to the 1:100,000 mapping scale utilised by the Northern Rivers Farmland Protection Project, the NSW Agriculture's Agricultural Land Classification publication states that agricultural land classification maps produced at small scales (1:50,000 to 1:100,000) are inappropriate for making decisions relating to individual development applications or minor rezoning proposals[1]. And again the Northern Rivers Farmland Mapping Project methodology report states that the mapping should not be used for the purposes of assessing development applications as it is expected that some inclusions of lesser quality lands within the classification will occur.[2]

[1] Hulme, T., Grosskopf, T., and Hindle, J. (2002) *Agricultural Land Classification. Agfact AC.25.* NSW Agriculture.
[2] *Ibid.*

From the above the publications are very clear in that large scale agricultural mapping systems should not solely be used for decisions relating to property development and or rezoning proposals.

The NSW Department of Primary Industries also provide comments about the historical land use of the site as further rationale for their recommendation.

Existing or previous agricultural use of lands is a factor that may be utilised for preliminary land classification purposes. However site specific surveys and inspections provide a better opportunity to determine the real agricultural capability and or classification of land.

For instance just because a particular crop is grown on a portion of land does not mean that that land is capable of sustained profitable production of that crop. For instance and hypothetically the production of a crop that requires continuous cultivation, on land which has a 2% or greater degree of slope does not give that land a Class 1 classification. Similarly and in this instance the production of a sugar cane crop on highly erodible, poorly drained, soils of low moisture holding capacity and high input requirements does not automatically give that land a Prime Agricultural land classification. Nonetheless there are instances where agricultural enterprises such as these (and others) are being carried out on lands that are not suited to those specific enterprises.

Previously supplied historical yield figures provide further evidence of the site being poor quality land for sugar cane production. Relevant figures are shown in Table 1 below. For the seasons provided (2004, 2005, 2015) the farm performed in the bottom 11%, 18% and 10% of all farms in the particular zone. Production figures provided for the current season are also shown and further demonstrate the poor productivity of the site in comparison to the average achieved for the associated harvesting zone (refer to Appendix 2 for further information).

Table 1: Farm Ranking and Returns per Hectare

Broadwater Farm Ranking Report - Zone 7

		Dollar Return per Cultivated Ha	
Season	**Rank**	**This Farm**	**Average for Zone**
2004	32nd out of 36	$372/Ha	$870/Ha
2005	28th out of 34	$693/Ha	$1050/Ha
2015	44th out of 49	$521/Ha	$1131/Ha
		Yield per Ha^	
		This Farm	**Average for Zone**
2017		25.6 tonne/Ha	Approximately 150 tonne/Ha

^ Refer to Appendix 2

Ultimately the land may be utilised for sugar cane production, however that does not mean that it is a profitable land use decision and it certainly does not mean that it achieves the same level of productivity as other farms in the area that are also utilised for sugar cane production.

As an example of the above the share farmer of the property has indicated that extensive efforts have been made in the past to try and improve production of the site through varying soil amendments and general fertilisers but this has been met with little success. Similarly other crops have been pursued with a similar outcome. Refer to Appendix 2 which shows an email from the

share farmer of the property Mr Noel Newman in which he makes comments about the existing and surrounding land uses and also the actual productivity of the site.

The NSW Department of Primary Industries state that the site is surrounded by sugar cane lands identified as regionally significant farmland. Appendix 1 being an extract from the initial agricultural report provide by Wilkie Fleming (2007) suggests otherwise and showed that at the time of the writing of that report (2007) and in terms of immediately adjacent land uses, sugar cane lands existed only directly east of the site. Lands directly to the north, west and south were and still are characterised by low intensity grazing, rural residential, open/closed forest and rural residential land uses respectively.

Communication with the share farmer of the property Mr. Newman has since indicated that the sugar cane lands directly adjacent to the east of the site (referenced above and shown in Appendix 1) have not been utilised for sugar cane production for 6 or more years. Refer to Appendix 2. The site is therefore not surrounded by sugar cane lands and has no immediately adjacent sugar cane land next to any portion of the site's boundary.

Ultimately the site is characterised by poorer forest soils which are a continuation of the New Italy soil type to the south. Soils of this nature are poor quality agricultural soils and are capable of only low intensity agricultural pursuits such as grazing or forestry. Neighbouring land uses to the west and south would agree with this assessment. It could also be concluded that the pattern of land use decisions on lands immediately to the north and east provide further evidence of the poor agricultural capability of the soils of the immediate locality.

And;

> Rezoning of this site will result in the loss of this land for agricultural production in perpetuity and will cause fragmentation of the agricultural landscape. Fragmentation increases land use conflict risk which can impact on agricultural operations surrounding the proposal.

The land will not cause fragmentation of the sugar cane production landscape. The site is not situated within the wider sugar producing lands; rather it is situated on the edge.

The rezoning of the land will take the pressure of other better quality agricultural lands that exist separate to the site for this purpose.

Lands immediately to the west and south of the site are poor quality agricultural lands that have a low potential for higher agricultural pursuits than low intensity grazing. Low intensity grazing operations have a much lower risk of conflict with alternative land uses such as rural residential.

Finally the risk of land use conflict that may arise as a result of this proposal (residential development of the site adjacent to sugar cane production to the east) will be no different than that which exists currently between the existing rural residential land that is situated immediately to the west and south east of the site's current sugar cane operation.

And;

> Industry mass is critical for the continued supply of product to the region's sugar mills. It is important that local councils consider the cumulative impact of agricultural land loss in their LGA and the impact this has on the available supply of product for secondary industries, in this case sugar mill production.

We draw the Department's attention to the communication provided by the share farmer of the property within Appendix 2 which explains that sugar cane planting on the proposed area to be rezoned ceased in 2014 due to being unproductive. Furthermore that the ratoon cane that remains on the property when cut is being ploughed out.

Previous and current production figures have clearly demonstrated that the site has a significantly lower sugar cane production potential than the average farms in the particular zone. The level of sugar cane production that will be lost as a result of this development proposal (i.e. the loss of sugar cane only from the area of the land proposed to be rezoned) being approved will surely not affect the Industry's critical mass requirement.

Richmond Valley Council

> Council believes the land is prime Agricultural land as defined as evidenced through the recent and present day use of the properties for cane production. The land is presently used for this purpose and the agricultural use has high prospect to be ongoing.

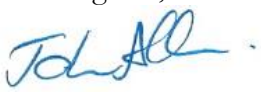
The land is not Prime Agricultural Land. Recent and current land use does not automatically provide this classification. Soils inherent to the bulk of the site are poor quality Podzolic soils that are lightly textured, massively structured, highly erodible, have low moisture holding capacities, high input requirements and a general low suitability to cultivation. The soils are a continuation of the poorer quality soils of the New Italy area to the south that are utilised for grazing or forestry at best.

Historical and current production figures provided demonstrate that the continued use of the site for sugar cane production has a much lower probability than the greater majority of the farms in the relevant production zone.

****

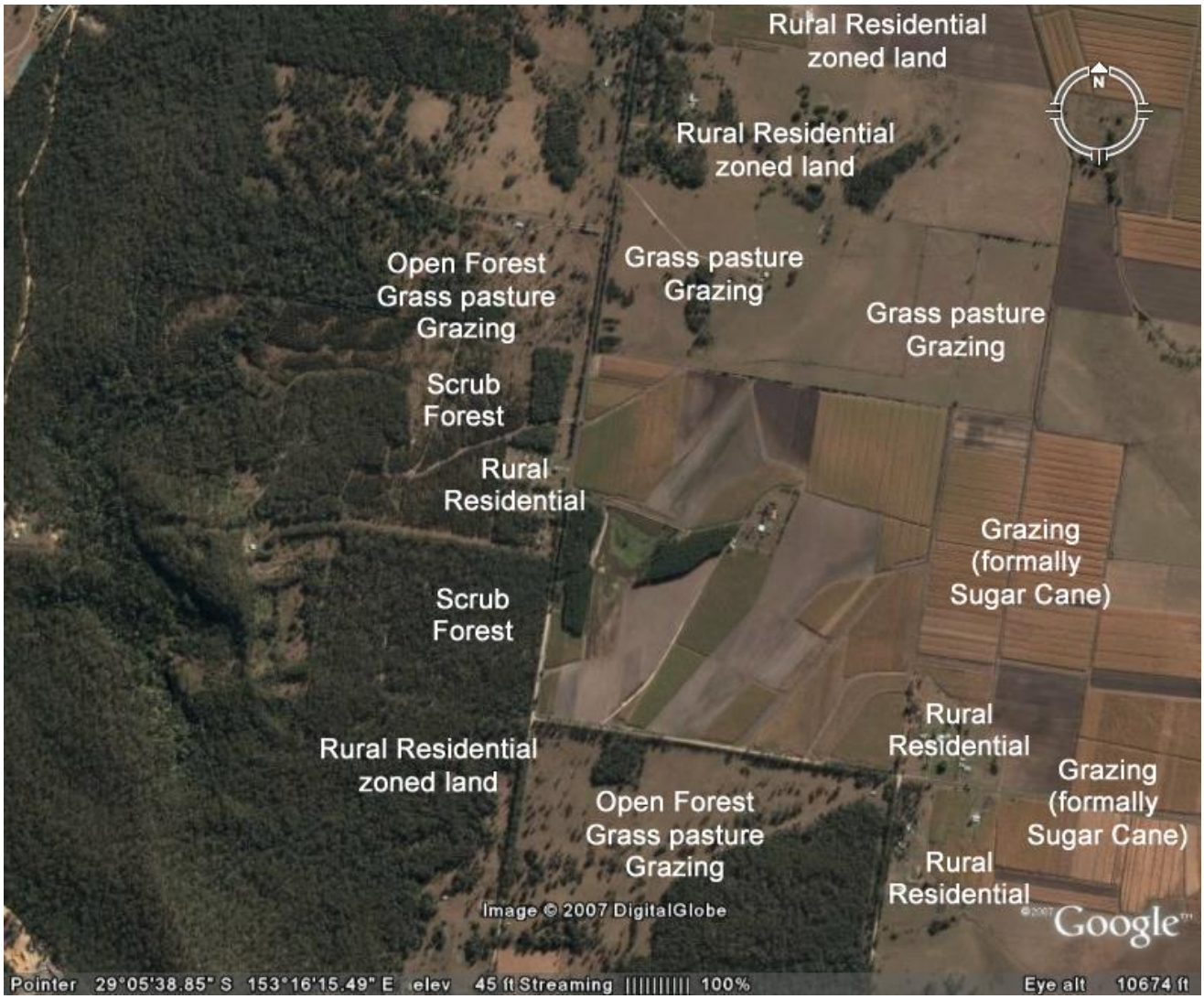
Luke, if you require any further comments in relation to this matter please do not hesitate to contact me.

Kind regards,



John Allen

Appendix 1: Surrounding Land Uses



Appendix 2: Personal Communication - Noel Newman email - 8th October 2017

1. The land on all sides has no sugar cane growing on it.
There was sugar cane on the property to the east and property to south east. These properties went out of production at least 6 or more years ago because the land was found to be unproductive and not viable for cane production.

2. The share farmer of the land to be rezoned decided to cease planting sugar cane on this part of the property in 2014 because it is unproductive.The ratoon cane on the property when cut is being plowed out.The share farmer has tried very hard to increase production by adding compost, filter mud, trace elements and green manure crops to the soil, all to no avail.Other crops to be tried are soy beans, lupins, maize, sorghum, barley. None of these crops thrived because the soil type is just not suitable for cropping. It is very marginal farming land.

3. The yield this year on the first round of harvesting
Block 141 3.94 ha
Block 231 5.9 ha
Block 233 1.2 ha
Block 232 2.2 ha
Total 13.24 ha total tonnes 339 which is 25.6 tonne per ha.
The mill average in our harvesting group is approx 150 tonne per ha.

Regards, Noel

BMT Commercial Australia Pty Ltd
Level 4, 4-14 Foster Street, Surry Hills, NSW 2010
Australia

ABN: 54 010 830 421

Our ref: L.003064.001.03_FIRA.docx

30 November 2023

Newton Denny Chapelle (NDC) Pty Ltd
31 Carrington Street
Lismore NSW 2480

Attention: Luke Fittock

Dear Luke

RE: PP-2022-502 REARDONS/DARKES LANE, SWAN BAY – QUALITATIVE FLOOD IMPACT AND RISK ASSESSMENT

This letter documents a high-level qualitative Flood Impact and Risk Assessment (FIRA) that has been undertaken by BMT to accompany an application to the NSW Department of Planning and Environment (DPE) for a Planning Proposal (PP-2022-502) for the land at corner of Reardons Lane & Darke Lane, Swan Bay.f

We trust that this assessment is adequate for your purposes. If you require further information or clarification regarding any aspect of this assessment, please do not hesitate to contact me by email (Netsanet.Shiferaw@apac.bmt.org).

Yours Sincerely,

BMT

Netsanet Shiferaw
Principal Flood Engineer

1 Introduction

The Planning Proposal PP-2022-502 relates to the land at corner of Reardons Lane & Darke Lane, Swan Bay (hereafter referred as the “Site”). It seeks to rezone part of the land presently zoned “RU1 – Primary Production” to “R5 – Large Lot Residential” in accordance with the provisions of the Richmond Valley Local Environmental Plan 2012.

1.1 Site Description and Applicable Existing Flood Study Report

The Site is located approximately 3 km south of Richmond River and east of Bungawalbin Creek. It is bounded by large rural lots to the north and east, Darke Lane to the south and Reardons Lane to the west. Figure 1.1 shows the locality map.

BMT Commercial Australia Pty Ltd (“BMT”) has recently completed the final ‘Richmond Valley Flood Study (RVFS)’ (BMT, September 2023). This study defines flood behaviour for a range of Annual Exceedance Probability (AEP) and Probable Maximum Flood (PMF) events across the Richmond Valley Local Government Area (LGA) of which the Site is part. This RVFS has replaced historic studies previously used by Richmond Valley Council (RVC) within the different parts of the LGA.

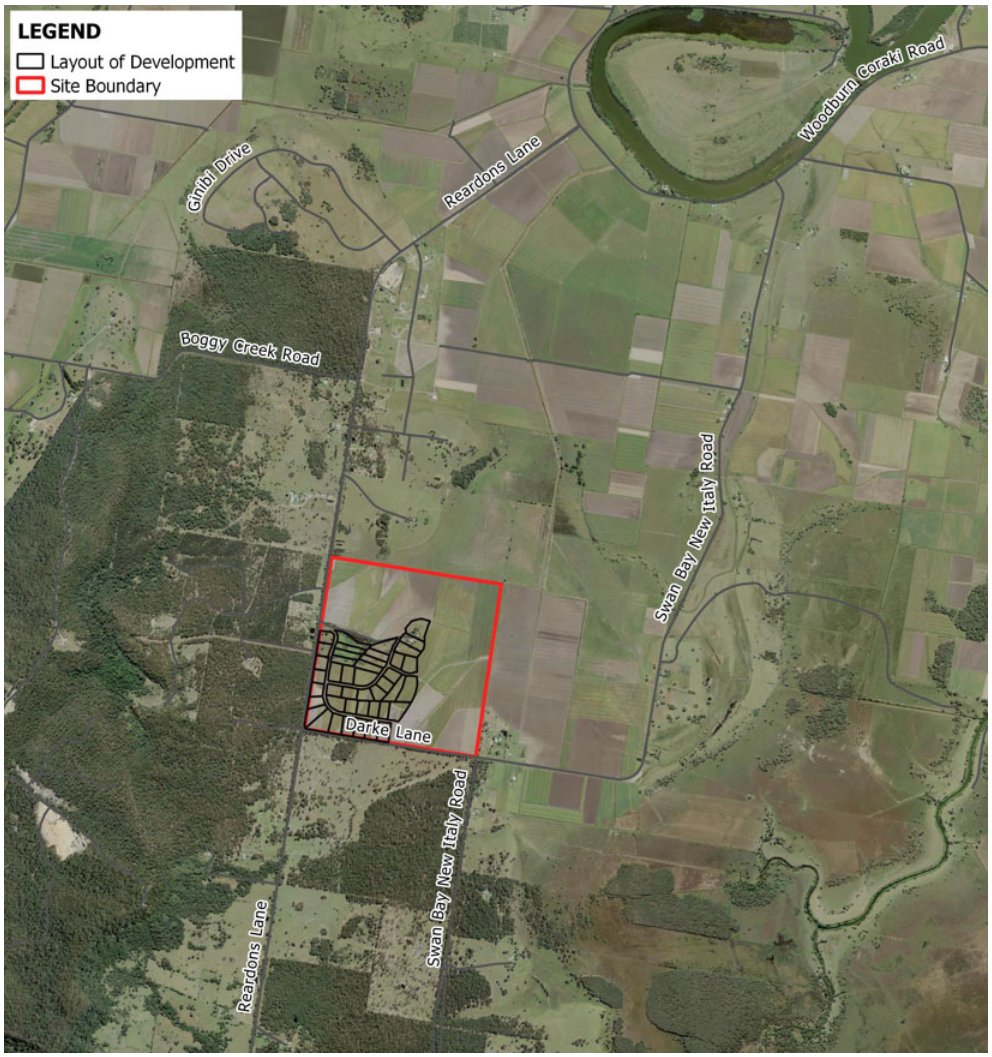


Figure 1.1 Site Locality Map

1.2 Existing Topography and Proposed Development Plan

Topographic (ground elevation) information was sourced from the RVFS model output. Figure 1.2 shows ground elevations across the Site. The minimum ground elevation is 1.4 m AHD, at the northwest corner. There is an existing ridge in the middle of the Site (with elevations ranging from 14.0m AHD to 16.2m AHD) that falls east or west.

Figure 1.3 shows the concept subdivision plan supplied by NDC that envisages 43 large residential lots. The lots are proposed to be situated on relatively higher grounds, with the low-lying land (below 5m AHD) retained as a farmland (not proposed to be rezoned).

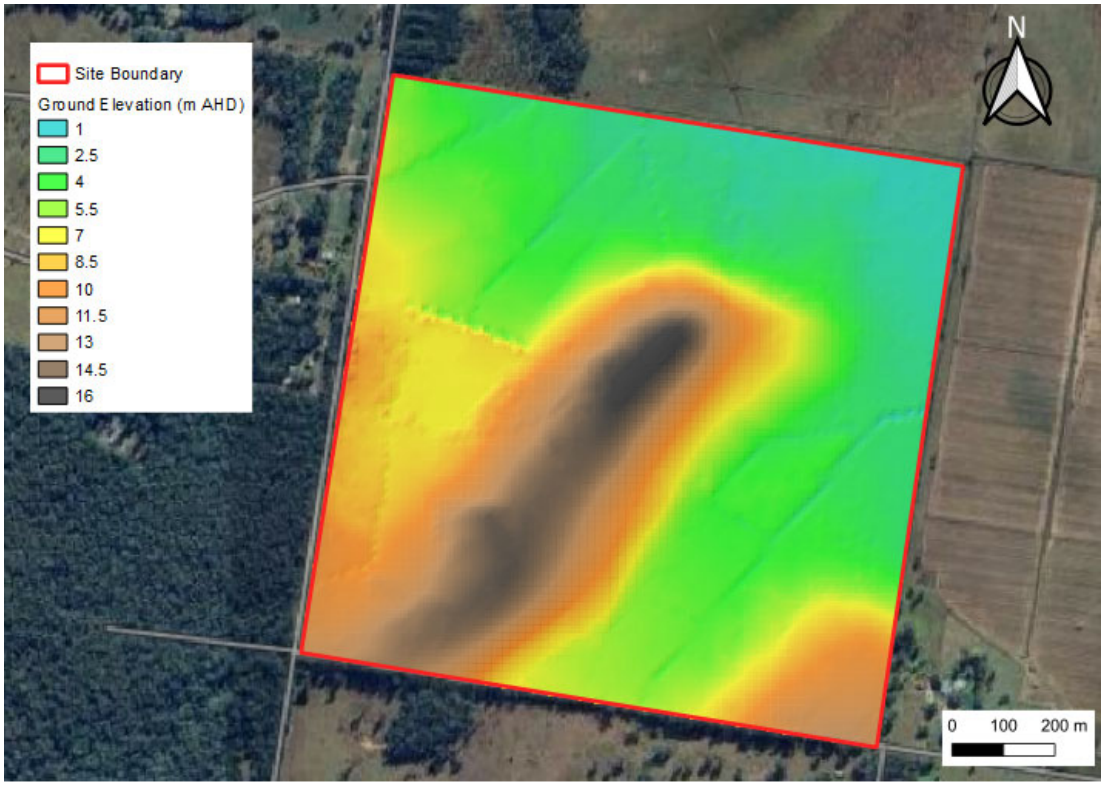


Figure 1.2 Modelled Exiting Topography (Sourced: RVFS BMT 2023)

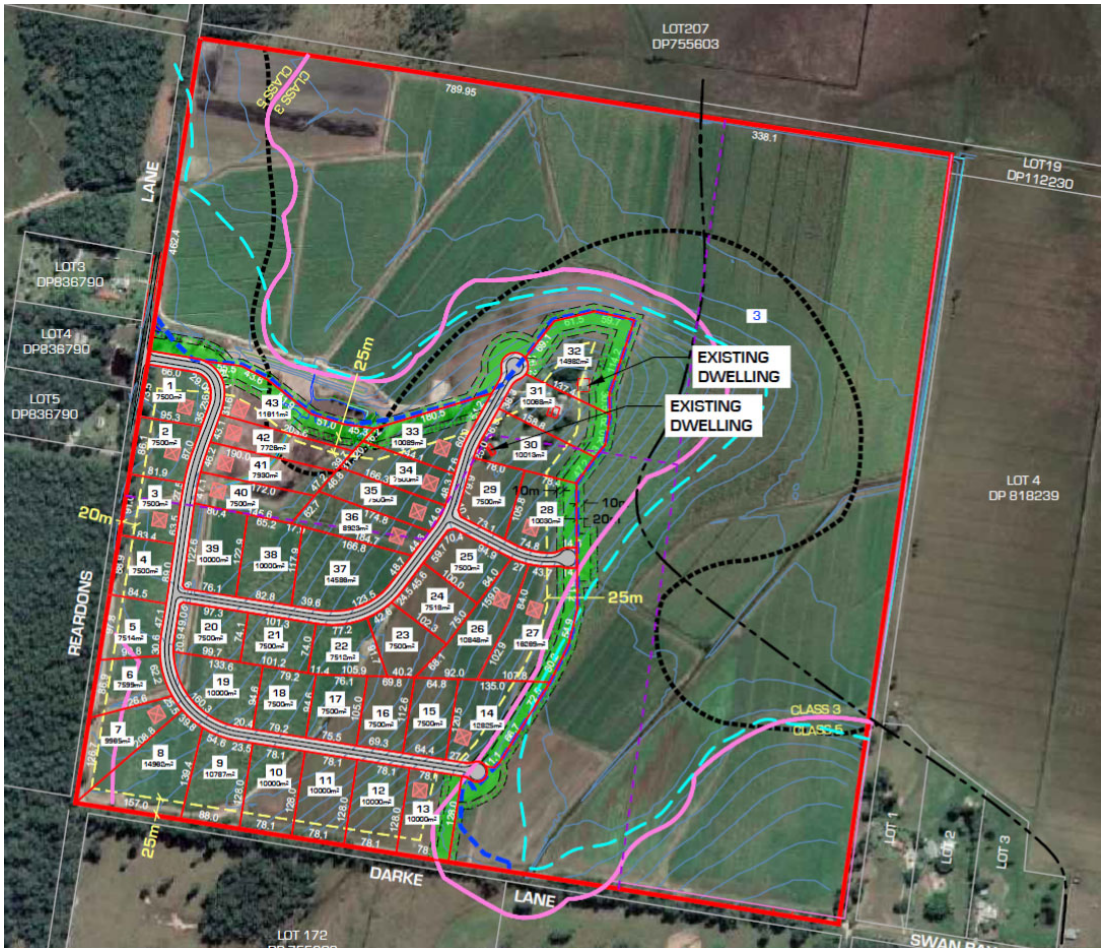


Figure 1.3 Concept Subdivision Plan (Revision J) (Source: NDC)

1.3 DPE's Flooding Requirements

Based on information supplied by NDC, DPE requires the following site-specific flood related requirements to assess the PP for a Gateway determination:

- Identify the flood risk up to and including the PMF level for the site;
- assess all flood and flood related hazards and risks;
- assess the impacts of any proposed filling on surrounding properties; and
- identify and evaluate evacuation routes including any areas proposed for shelter in place.

DPE recently released the Flood Impact and Risk Assessment (FIRA) guideline LU01 (DPE, 2023) which has two main assessment approaches, namely a detailed assessment or a simple assessment. NDC liaised with RVC and obtained confirmation of DPE agreement that the simple FIRA approach is adequate for the PP.

2 Defining Existing Flood Behaviour

2.1 Assessment Methodology

As per DPE's agreement, BMT has undertaken this FIRA based on the simple assessment approach. To that effect, a qualitative assessment of mainstream flood behaviour within and around the Site has been conducted based on an understanding of existing flood behaviour from the recently completed RVFS (BMT, September 2023). The assessment is detailed in the following sections.

2.2 Design Flood Conditions

2.2.1 Flood Mechanism

The flood mechanism at the Site was identified based on modelling results from the RVFS (BMT, September 2023) for a range of Annual Exceedance Probabilities (AEPs) and the probable maximum flood (PMF) event. The flood mechanism is described below, and the associated peak flood levels are shown in Figure 2.1 to Figure 2.5.

- **Richmond River flooding** - during the PMF, 0.2% AEP, 1% AEP, 2% AEP, and 5% AEP events, floodwaters break Richmond River's banks and spreads out to the floodplain, flowing southerly and inundating the Site across the northern and eastern Site boundaries.

- **Creek Tributary Overflow** - during the PMF, 0.2% AEP, 1% AEP and 2% AEP events, overflow from a small tributary of Bungawalbin Creek overtops Reardons Lane and flows into the Site in the northwest corner.

Figure 2.1 Design Peak Flood Levels - 5% AEP Event

Figure 2.2 Design Peak Flood Levels – 2% AEP Event

Figure 2.3 Design Peak Flood Levels – 1% AEP Event

Figure 2.4 Design Peak Flood Levels – 0.2% AEP Event

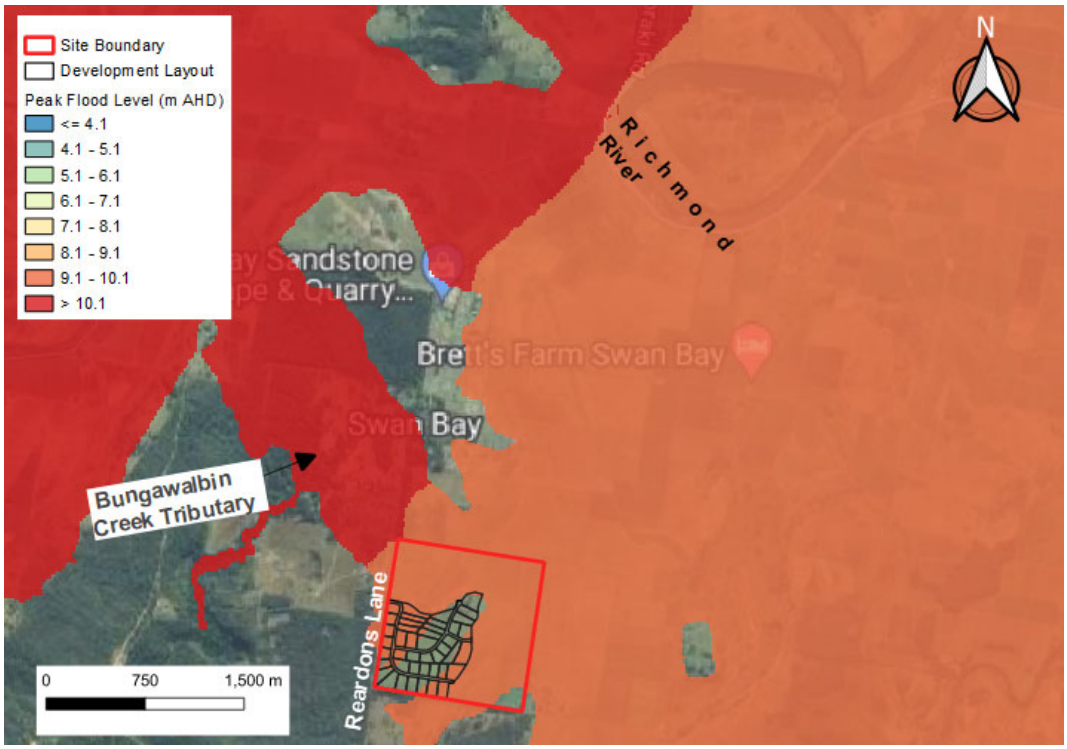


Figure 2.5 Design Peak Flood Levels – PMF Event

2.2.2 Peak Flood Levels

Design peak flood levels at the Site extracted from the RVFS (BMT, September 2023) are summarised in Table 2.1. Table 2.2 identifies the proposed lots that are significantly or fully inundated (orange highlighted), slight to minor inundated (yellow highlighted) and flood-free (green highlighted). With reference to Table 2.1, Table 2.2 and Figure 2.1 to Figure 2.5, commentary on flood effect (i.e. inundation) of the proposed conceptual subdivision plan is provided as follows:

- All of the 43 proposed lots are flood-free up to and including the 1% AEP event (green highlighted).
- There are 15 lots that are flood-free during the PMF event (green highlighted).
- There are 3 lots that are very slightly affected during the 0.2% AEP event (yellow highlighted).
- Thre are 11 lots that are slightly or partially inundated during the PMF event (yellow highlighted).
- There are 17 lots that are significantly or fully inundated during the PMF event (orange highlighted).

Table 2.1 Design Peak Flood Levels at the Site

Design Flood Event	Peak Flood Level at the northwest corner (m AHD)	Peak Flood Level at the northeast corner (m AHD)
5% AEP	4.15	4.15
2% AEP	4.61	4.61
1% AEP	5.02	5.01
0.2% AEP	5.99	5.98
PMF	10.10	10.08

Table 2.2 Level of Flood Affection of Proposed Lots

Flood Affection	1% AEP	0.2% AEP	PMF
Flood-free lots	All lots	All lots except for 13, 14 and 27	8, 9, 10, 16, 17, 18, 21, 22, 23, 24, 25, 29, 30, 31 and 37
Slightly to partially inundated lots	None	13, 14 and 27	7, 11, 15, 19, 26, 28, 32, 33, 34, 35, and 36
Fully inundated lots	None	None	1, 2, 3, 4, 5, 6,12, 13, 14, 27, 20, 38, 39, 40, 41, 42 and 43

2.3 Flood Depth and Flood Hazard

Peak flood depth maps are contained in Annex A of this letter, as listed below:

- Figure A-01 Peak Flood Depth - 5% AEP Event
- Figure A-02 Peak Flood Depth - 2% AEP Event
- Figure A-03 Peak Flood Depth - 1% AEP Event
- Figure A-04 Peak Flood Depth – 0.2% AEP Event
- Figure A-05 Peak Flood Depth - PMF Event

The Flood Hazard Guideline 7-3 of the Australian Disaster Resilience Handbook 7, *Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia* (AIDR, 2017) represents current industry best practice with regards to defining flood hazard. The guideline recommends a composite six-tiered hazard classification that is determined based on predicted depth and velocity of floodwaters, and corresponds to the potential vulnerability of people, vehicles and structures (as reproduced in Figure 2.6 and listed in Table 2.3).

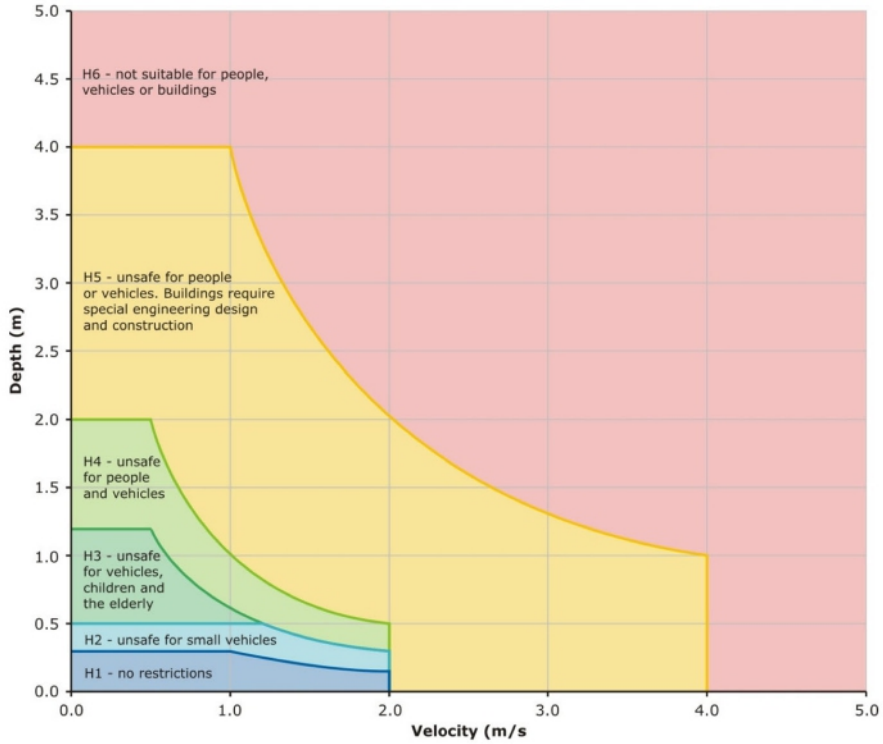


Figure 2.6 AIDR (2017) Combined Flood Hazard Curves

Table 2.3 Best Practice Provisional Flood Hazards (AIDR, 2017)

Hazard	Criteria	Description
H1	Depth < 0.3 m and Velocity < 2.0 m/s and Velocity*Depth ≤ 0.3 m^2/s	Generally safe for vehicles, people and buildings.
H2	Depth < 0.5 m and Velocity < 2.0 m/s and Velocity*Depth ≤ 0.6 m^2/s	Unsafe for small vehicles.
H3	Depth < 1.2 m and Velocity < 2.0 m/s and Velocity*Depth ≤ 0.6 m^2/s	Unsafe for vehicles, children and the elderly.
H4	Depth < 2.0 m and Velocity < 2.0 m/s and Velocity*Depth ≤ 1.0 m^2/s	Unsafe for vehicles and people.
H5	Depth < 4.0 m and Velocity < 4.0 m/s and Velocity*Depth ≤ 4.0 m^2/s	Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Depth > 4.0 m OR Velocity > 4.0 m/s OR Velocity*Depth > 4.0 m^2/s	Unsafe for vehicles and people. All building types considered vulnerable to failure.

Peak flood hazard maps are contained in Annex A of this letter, as listed below:

- Figure A-06 Peak Flood Hazard - 5% AEP Event
- Figure A-07 Peak Flood Hazard - 2% AEP Event
- Figure A-08 Peak Flood Hazard - 1% AEP Event
- Figure A-09 Peak Flood Hazard – 0.2% AEP Event
- Figure A-10 Peak Flood Hazard – PMF Event

Key results are summarised below.

- The land that is proposed to be retained as a farmland (not proposed to be rezoned) is classified predominately as H3 to H5 flood hazard during the 1% AEP event.
- The proposed lots subject to PMF inundation are classified as high hazard (predominately H3 to H5, with a maximum of H6 on the eastern lots).
- The land that is proposed to be retained as a farmland (not proposed to be rezoned) is classified as H6 flood hazard during PMF event.

2.4 Proposed Site Access

Located approximately 0.5 km south of the northern Site Boundary, the proposed site access is via Reardons Lane. The access is:

- Flood-free up to and including the 0.2% AEP event.
- Inundated and classified as H4 to H5 flood hazard during the PMF event.

2.5 Flood Behaviour of Regional Evacuation Routes

There are three potential evacuation routes from the Site. Flooding characteristics along these routes are described below.

North Bound Via Reardons Lane

Evacuation to the north via Reardons Lane is not considered viable during a major flood. Sections of Reardons Lane that are subject to flooding include:

- Reardons Lane between its intersection with Casuarina Drive to Woodburn-Coraki Road (hereafter referred as “North-Bound 1” and shown in Figure 2.7). It is cut off during the 5% AEP event.
- Reardons Lane between the proposed Lot 6 and the intersection with Eucalypt Drive (hereafter referred as “North-Bound 2” and shown in Figure 2.7). This section is:
  - Flood-free during the 5% AEP event.
  - Classified as H1 hazard (deemed generally safe for small vehicles and people) during the 2% AEP event.
  - Cut off during the 1% AEP event.

East Via Darke Lane and then South Via Swan Bay-New Italy Road

Flooding characteristics of Darke Lane halfway between intersections with Reardons Lane and Swan Bay-New Italy Road (hereafter referred as “East-Bound 1” and shown in Figure 2.7) is described below.

- It is flood-free up and including the 1% AEP event.
- During the 0.2% AEP event, it is classified as H1 flood hazard.
- During the PMF event, it is classified predominately as H5 flood hazard.

Whilst the Darke Lane (“East-Bound 1”) is flood-free up to and including 1% AEP event, Swan Bay-New Italy Road will be cut off during the 5% AEP approximate 2.5 km south of its intersection with Darke Lane (hereafter referred as “South-Bound 1” and shown Figure 2.7). Hence, this road cut off location will prohibit the ability to evacuate via Darke Lane to the south.

South Bound Via Reardons Lane

Heading south, Reardons Lane (starting from adjacent to the proposed Lot 6) leads to Moonem New Italy Road that in turn leads to an unnamed Road that leads to Cypress Road which ultimately connects with the M1 Pacific Motorway, spanning a distance of approximately 11 km. This route (hereafter referred as “South-Bound 2” and shown Figure 2.7) is predicted to be flood-free during the Richmond River PMF event.

Figure 2.8 to Figure 2.10 show stage hydrographs (flood depth over time) at the road cut off locations extracted from TUFLOW modelling results from the RVFS (BMT, September 2023). It is noted that the stage hydrographs were not simulated to zero flood depth. Thus, the stage hydrographs have been extrapolated based on the rate of drawdown, to approximate the total periods of inundation. Table 2.4 summarises the approximated total periods of inundation at the road cut off locations.

Table 2.4 Periods of Inundation at Road Cut Off Locations

Evacuation Route	5% AEP	1% AEP	PMF
North-Bound 1	3 to 5 days	5 to 6 days	9 days
North-Bound 2	Flood-free	2 days	8 days
East-Bound 1	Flood-free	Flood-free	6 days
South-Bound 1	3 days	4 to 5 days	8 days
South-Bound 2	Flood-free	Flood-free	Flood-free

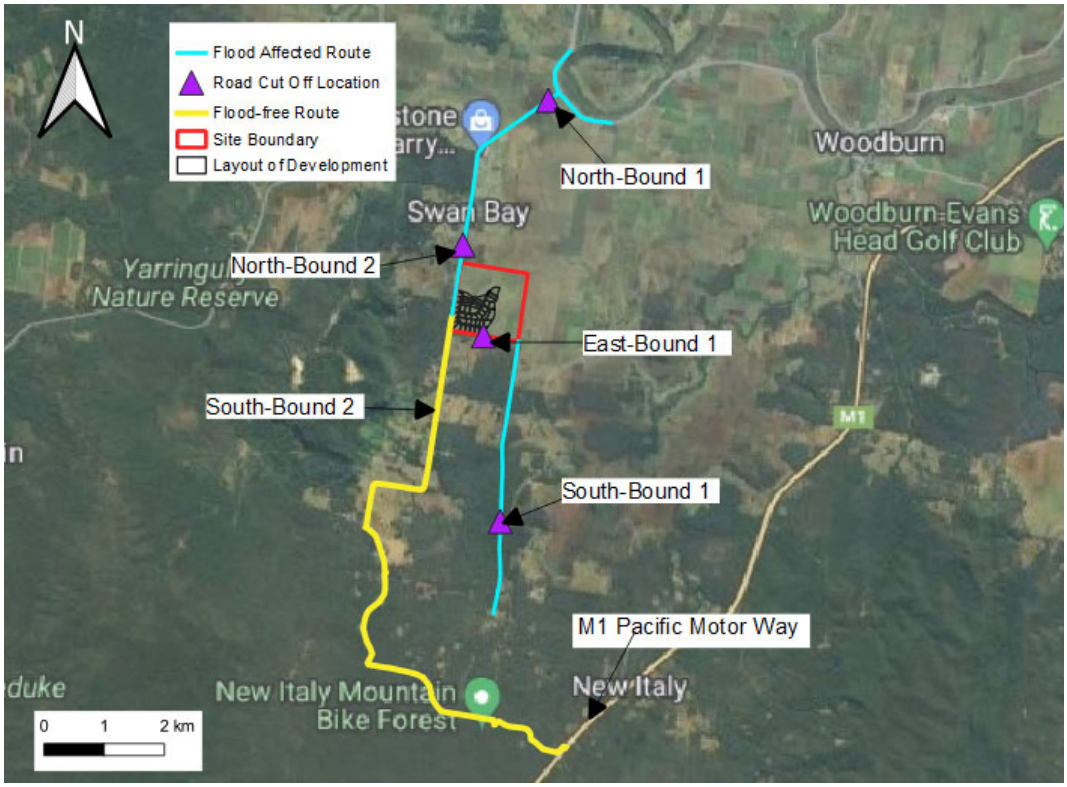


Figure 2.7 Regional Evacuation Routes and Road Cut Off Locations

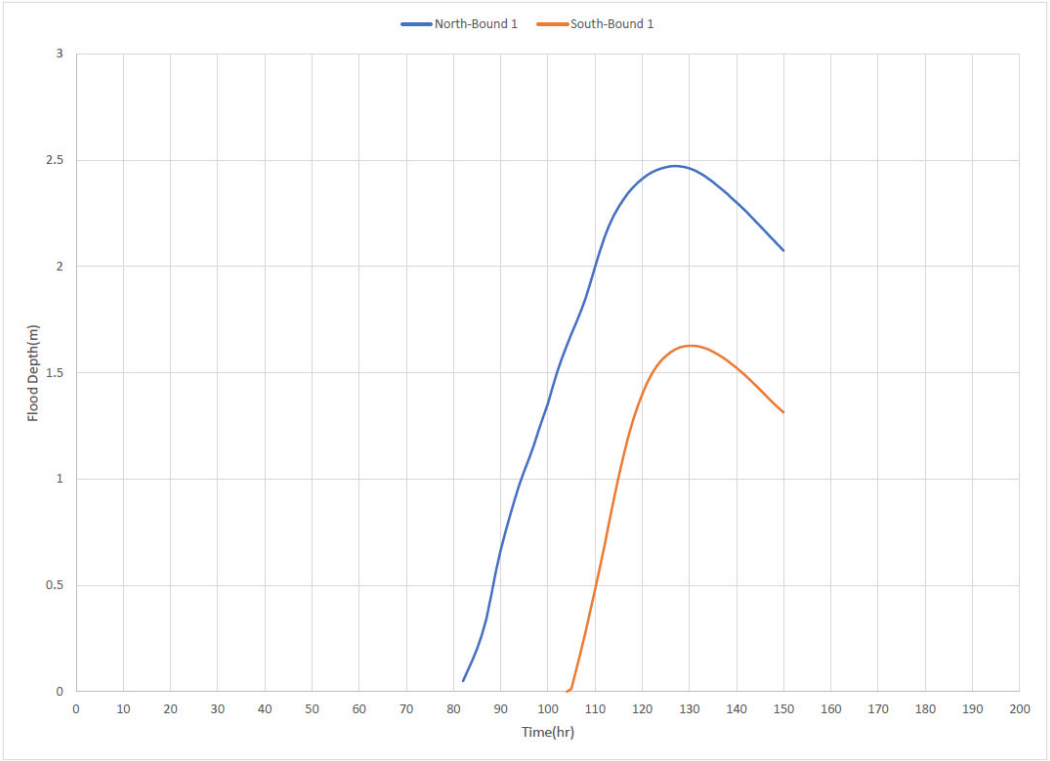


Figure 2.8 Flood Depth Hydrograph at Road Cut Off Locations – 5% AEP Event

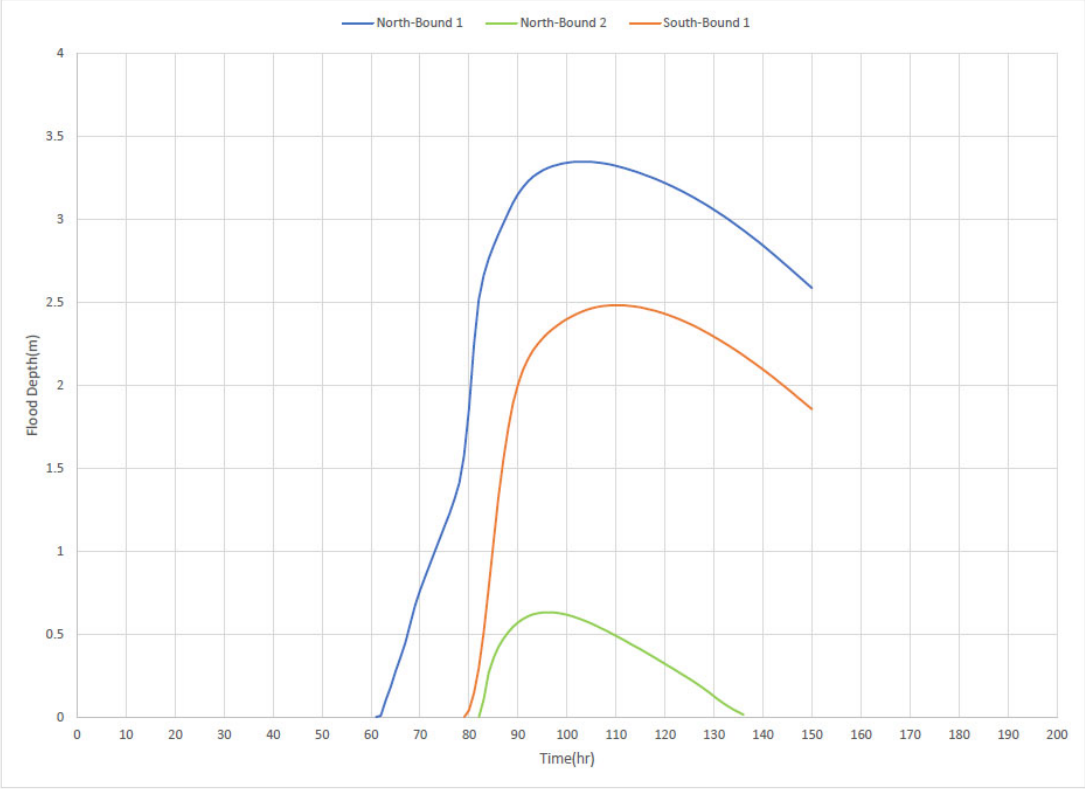


Figure 2.9 Flood Depth Hydrograph at Road Cut Off Locations – 1% AEP Event

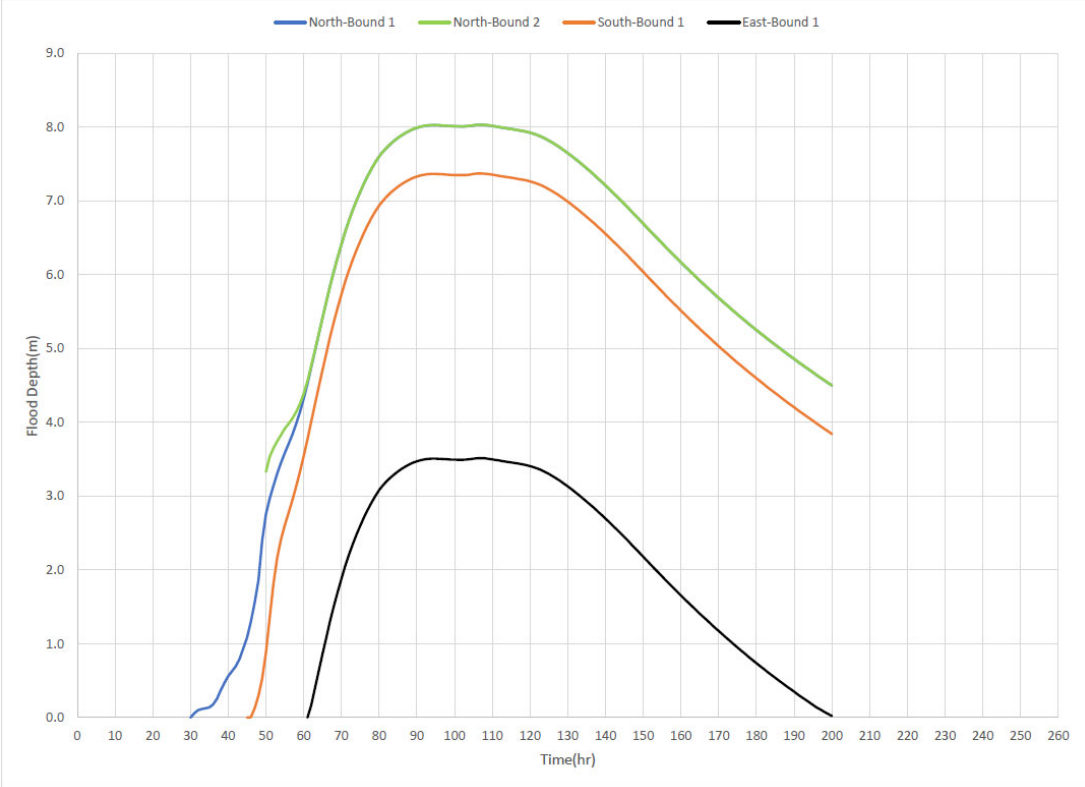


Figure 2.10 Flood Depth Hydrograph at Road Cut Off Locations – PMF Event

2.6 Bureau of Meteorology

The Bureau of Meteorology (BOM) provides flood information to assist with evacuation. BOM indicates that warning time for a Richmond River flood is typically 3-4 days. BOM provides the following flood gauge and associated information based on the gauge at Woodburn that can be used as a guide for riverine flood levels pertinent to Swan Bay:

- Station details**:** Station Number: 058061 Name: Richmond River at Woodburn
- Flood levels: Minor: 3.20 Moderate: 3.70 Major: 4.20. Refer to Figure 2.11.

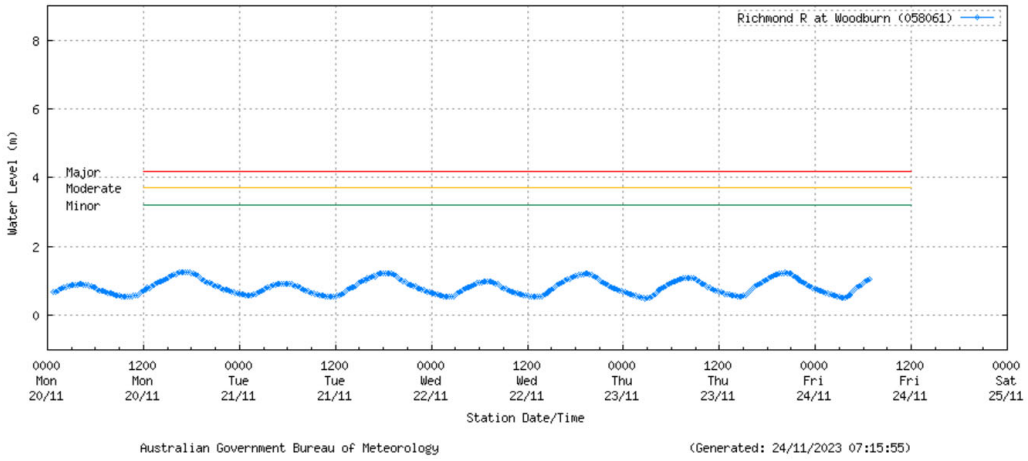


Figure 2.11 Flood Indicator at Woodburn Gauge (Source: BOM)

2.7 Review of Richmond Valley Flood Emergency Sub Plan 2023

The Richmond Valley Flood Emergency Sub Plan (NSW SES, 2023) sets out the RVC level emergency management arrangements for prevention, preparedness, response and initial recovery for flooding in the LGA. Flood intelligence available within this plan, and pertinent to the Site, are summarised below.

- The Woodburn flood gauge provides flood information relevant for Swan Bay.
- Swan Bay may experience inundation of property from a 5% AEP flood event (approximately 1 property). In a 1% AEP event, this increases to approximately 17 properties in Swan Bay.
- At 3.4m on the Woodburn gauge, some roads may begin to close, including the Woodburn-Coraki Rd.
- At 3.95m Woodburn gauge, many rural areas are already affected by inundation or isolation, including Swan Bay.
- In a modelled 5% AEP event (equivalent to 4.4m at the Woodburn Gauge), flood depths affecting main access routes for Swan Bay range from 0.3m to >1m.
- In an event corresponding to a 5% AEP, there would be significant disruptions with many localised stretches of roads being inundated in the RVC LGA. In a 1% AEP flood, the majority of key roads in the LGA are affected by deep inundation to a depth greater than one metre.
- Potential periods of isolation for Swan Bay are estimated to be 3-5 days.

SES provides riverine flood levels and consequences based on flood gauge at Richmond River at Woodburn. This indicates that at moderate flood height Evacuation warnings will begin to be issued by NSW SES.

Heights at gauge	Expected consequence
5.22m	**Peak Height - Flood of record 1954**
5.12m	About 90% of Woodburn is now isolated.
5.07m	**Peak Height - February 1956**
4.91m	**Peak Height - March 1974**
4.70m	**Peak Height - April 1989**
4.40m	About 20 shops experience flooding.
4.20m	**Major Flood Height.** Approximate height at which water flows over the highway at the IGA Supermarket in River Street. The majority of the elevated residences in Woodburn will have water in the lower levels.
4.14m	Rocky Mount Creek breaks its banks flooding the lower areas in southern Woodburn.
4.12m	Flood water start to flow underneath the houses in the northern section of Woodburn.
4.04m	**Peak Height - April 1989**
3.70m	**Moderate Flood Height.** Evacuation warnings will begin to be issued by the NSW SES.
3.40m	Woodburn to Coraki Road could close from around this height.
3.20m	**Minor Flood Height.** Water starts to build over the road between Woodburn and Coraki.

Key heights in metres at the Woodburn flood gauge

Figure 2.12 Riverine Flood Levels and Consequences (Source: NSW SES)

3 Flood Impact and Risk Assessment

3.1 Offsite Flood Impact Assessment

3.1.1 Rare Food Event

As discussed in the preceding sections, the proposed concept subdivision plan avoids land affected by Richmond River flooding up to and including the 0.2% (1 in 500) AEP event. Hence, during these events, the proposed development is not expected to have an adverse offsite flood impact up to and including the 1 in 500 AEP events.

3.1.2 Extreme Event

During the PMF event, of the 43 proposed lots:

- 15 are predicted to be flood-free.
- 17 are predicted to be significantly inundated.
- 11 are predicted to be slightly/partially inundated.

The flood affected (flood prone) lots are classified as high hazard (predominately H3 to H5, with a maximum of H6 on the eastern lots). Given this, potential filling or proposed building structures could alter flood conditions during the PMF event. It is recommended to avoid significant filling or flow-obstruction within these lots. If filling or building support structures are proposed, it is necessary to undertake a detailed flood modelling, at the DA application stage, to demonstrate that the works will not cause an adverse flood impact to adjoining properties.

3.2 On-Site Flood Risk Appraisal

3.2.1 Approach

A flood risk assessment specific to the Site was therefore undertaken to confirm whether the likely development of the land, including appropriate risk mitigation measures, is compatible with the flood hazard. The risk assessment was prepared in accordance with recommendations and guidance included in the following document:

- Australian Institute for Disaster Resilience (AIDR) (2020). *National Emergency Risk Assessment Guidelines*.

The consequence and likelihood levels employed in the risk appraisal were also drawn from the *National Emergency Risk Assessment Guidelines* (AIDR, 2020). The adopted consequence and likelihood levels are listed in Table 3.1 and Table 3.2. It can be noted that the consequence and likelihood levels nominated for each identified risk relate to conditions without management measures in place.

Table 3.1 People Consequence Level

Consequence Level	Qualitative Description
Insignificant	Minor injuries; Deaths less than 1 in 10,000,000; no environmental impact detected.
Minor	Serious injuries greater than 1 in 1,000,000 people; Deaths greater than 1 in 10,000,000; minor impact on the environment.
Moderate	Serious injuries greater than 1 in 100,000 people; Deaths greater than 1 in 1,000,000; significant damage to environmental values; widespread inconveniences.
Major	Serious injuries greater than 1 in 10,000 people; Deaths greater than 1 in 100,000; severe damage to environmental values.
Catastrophic	Critical injuries for greater than 1 in 10,000 people; Deaths greater than 1 in 10,000; permanent destruction of environmental values.

Table 3.2 Likelihood Level

Likelihood Level	AEP	Average recurrence interval	Events extracted from RVFS (BMT, 2023)
Unlikely	1% to < 10%	10 to < 100-year	5% AEP
Rare	0.1% to < 1%	100 to < 1000-year	1% AEP and 0.2% AEP
Extremely rare	Less than 0.01%	10,000 years or more	PMF

The level of risk depends on the likelihood of the risk occurring and its consequence. The risk criteria employed for this assessment, which were drawn from the qualitative risk matrix presented the National Emergency Risk Assessment Guidelines (AIDR, 2020) are shown in Table 3.3.

Table 3.3 Qualitative Risk Matrix (Source: AIDR, 2020)

	CONSEQUENCE LEVEL				
LIKELIHOOD	INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC
ALMOST CERTAIN	Medium	Medium	High	Extreme	Extreme
LIKELY	Low	Medium	High	Extreme	Extreme
UNLIKELY	Low	Low	Medium	High	Extreme
RARE	Very low	Low	Medium	High	High
VERY RARE	Very low	Very low	Low	Medium	High
EXTREMELY RARE	Very low	Very low	Low	Medium	High

Table 3.4 Site-Specific Flood Risk

Proposed Lots	Flood Hazard			Period of Isolation		
	5% AEP	1% AEP	PMF	5% AEP	1% AEP	PMF
8, 9, 10, 16, 17, 18, 21, 22, 23, 24, 25, 29, 30, 31 and 37	None	None	None	3 to 5 days	5 to 6 days	8 to 9 days
7, 11, 15, 19, 26, 28, 32, 33, 34, 35, and 36 (Partially inundated)	None	None	H3 to H5	3 to 5 days	5 to 6 days	8 to 9 days
1, 2, 3, 4, 5, 6, 12, 13, 14, 27, 20, 38, 39, 40, 41, 42 and 43 (Fully inundated)	None	None	H3 to H5	3 to 5 days	5 to 6 days	8 to 9 days

Table 3.5 Site-Specific Flood Risk Matrix Without Adoption of Treatment Options

Proposed Lots	Flood Hazard			Isolation		
	Likelihood	Consequence	Risk rating	Likelihood	Consequence	Risk rating
8, 9, 10, 16, 17, 18, 21, 22, 23, 24, 25, 29, 30, 31 and 37	None	None	None	Unlikely	Minor	Low
7, 11, 15, 19, 26, 28, 32, 33, 34, 35, and 36 (Partially inundated)	Extremely rare	Moderate	Low	Unlikely	Moderate	Low
1, 2, 3, 4, 5, 6,12, 13, 14, 27, 20, 38, 39, 40, 41, 42 and 43 (Fully inundated)	Extremely rare	Major	High	Extremely rare	Catastrophic	High

3.2.2 Identification and Flood Risk Treatment Options

Possible treatment options have been considered to manage the existing flood risks. Table 3.6 presents available treatment options.

With reference to Table 3.6, buildings must demonstrate structural stability up to the PMF so as to withstand the hydrostatic, hydrodynamic, buoyancy and debris loads of PMF conditions. Verification by a suitably qualified structural engineer and compliance with the Building Code of Australia would be required.

Table 3.7 shows site-specific residual risk matrix with the adoption of the proposed treatment options. It is noted that as off-site evacuation is proposed to be the primary flood emergency response strategy, and habitable floor levels are proposed to be above PMF, potential injury or death directly caused by flood hazard is unlikely, but there would be a risk of isolation for some of the lots that do not have PMF flood-free access (if off-site evacuation fails for various reasons). Given this, the 'moderate' consequence level was conservatively adopted for these lots with respect to risk of isolation.

Table 3.6 Site-Specific Flood Risk Treatment Options

Proposed Lots	Overall Risk Rating	Treatment Option	Evaluation of treatment option
8, 9, 10, 16, 17, 18, 21, 22, 23, 24, 25, 29, 30, 31 and 37	Low	-Early evacuation based on BOM flood warning. -Providing a secondary emergency access road at the south-west corner. -prepare a detailed FERP.	-It will avoid risk of long periods of isolation. -This will enable residents to evacuate off-site during PMF event. -to outline triggers and procedures for off-site evacuation.
7, 11, 15, 19, 26, 28, 32, 33, 34, 35, and 36 (Partially inundated)	Low	-Construct habitable floor on PMF flood-free land. -early evacuation based on BOM flood warning -prepare a detailed FERP.	-It will avoid direct exposure to high flood hazard -enables early off-site evacuation prior to major flooding. -outlines triggers and procedures for off-site evacuation.
1, 2, 3, 4, 5, 6,12, 13, 14, 27, 20, 38, 39, 40, 41, 42 and 43 (Fully inundated)	High	-Construct habitable floor level above the PMF level. -early evacuation based on BOM flood warning. -prepare a detailed FERP.	-It will avoid direct exposure to high flood hazard. -enables early off-site evacuation prior to major flooding -to outline triggers and procedures for off-site evacuation.

Table 3.7 Specific Flood Risk Matrix with Adoption of Treatment Options

Proposed Lots	Flood Hazard			Isolation		
	Likelihood	Consequence	Risk rating	Likelihood	Consequence	Risk rating
8, 9, 10, 16, 17, 18, 21, 22, 23, 24, 25, 29, 30, 31 and 37	None	None	None	Extremely rare	None	Low

Proposed Lots	Flood Hazard			Isolation		
	Likelihood	Consequence	Risk rating	Likelihood	Consequence	Risk rating
7, 11, 15, 19, 26, 28, 32, 33, 34, 35, and 36 (Partially inundated)	None	None	None	Extremely rare	Moderate	Low
1, 2, 3, 4, 5, 6,12, 13, 14, 27, 20, 38, 39, 40, 41, 42 and 43 (Fully inundated)	None	None	None	Extremely rare	Moderate	Low

4 High Level Flood Emergency Response Strategy

Based on the existing flood behaviour and risk at the Site and potential flood risk treatment options discussed in preceding sections, the following constraints and opportunities have been taken into consideration to formulate an appropriate flood risk management and emergency response approach.

4.1.1 Assessment of Available Strategies

There are two primary flood emergency response strategies, namely evacuation off-site and shelter-in-place (SIP), where SIP is the movement of occupants to a suitable flood-free location to shelter during a flood event (e.g., vertical refuge on the Site or near the Site at an elevation above the PMF level).

In accordance with the Department of Planning and Environment (DPE)'s 'Support for emergency management planning - Flood risk management guideline EM01' (DPE, 2023), the preferred emergency management approach is evacuation, where evacuation capacity and capability has been demonstrated as the most effective strategy to manage risks.

The following factors have been considered to formulate a high-level flood emergency response strategy for the proposed development:

- Warning time for a Richmond River flood is typically 3 to 4 days, providing adequate warning and preparation time for an early off-site evacuation.
- Most of regional evacuation routes are predicted to be cut off during the 5% AEP event. Hence, off-site evacuation is anticipated to be required more frequently than the 1 in 20 year event.
- The proposed development Site will be liable to long periods of isolation (up to 8 days during the 1% AEP event) if residents do not evacuate. There is potential risk of sewerage, power, phones and internet being lost during flood events, in addition to inadequate provisions of food, water and medication.
- 15 of the proposed lots are predicted to be flood-free during the PMF event. For the remainder of the lots, it is proposed that habitable floor levels be set above the PMF level. Proposed buildings must demonstrate structural stability up to the PMF so as to withstand the hydrostatic, hydrodynamic, buoyancy and debris loads of PMF conditions. Verification by a suitably qualified structural engineer and compliance with the National Construction Code (NCC) would be required.
- The "South-Bound 2" route is predicted to be flood-free during the PMF event. This route can serve as access to or egress from the Site during rare or extreme events for the lots that have PMF flood-free drive and access.

Based on the flooding behaviour and risk at the Site and along regional evacuation routes, and the proposed flood risk treatment options, the following strategies are proposed:

- Evacuation off-site is proposed as the primary flood emergency response strategy.
- Provision of refuge (habitable flood level) above the PMF in lots partially or fully inundated in the PMF event will also be provided as a secondary flood emergency response strategy. The requirement to construct lots in this fashion can be tied to land title at the time of sale and retained in perpetuity.

A detailed operational plan should be prepared outlining the proposed strategy for flood emergency response, including flood warning and trigger systems, what actions are required before, during and after a flood.

Education is critical to ensuring that the occupants of the Site are aware of actions to be taken before, during and after off-site evacuation and the key triggers that require these.

5 Conclusions

BMT has prepared this qualitative Flood Impact and Risk Assessment (FIRA) to accompany an application to the NSW Department of Planning and Environment (DPE) for a Planning Proposal (PP-2022-502). The Planning Proposal relates to the land at corner of Reardons Lane & Darke Lane, Swan Bay and seeks to rezone part of the land presently zoned Primary Production to Large Lot Residential in accordance with the provisions of the Richmond Valley Local Environmental Plan 2012. The proposed concept subdivision plan envisages 43 large residential lots.

The FIRA was based on the simple assessment approach in accordance with the FIRA guideline LU01 (DPE, 2023). The assessment was conducted based on an understanding of existing flood behaviour from the recently completed Richmond River Flood Study (RVFS) (BMT, September 2023).

Key findings of the FIRA are summarised below:

- The proposed residential lots are situated on relatively higher grounds, with the low-lying land (below 5m AHD) retained as a farmland (not proposed to be rezoned).
- The proposed concept plan avoids land affected by Richmond River flooding up and including the 0.2% (1 in 500) AEP events. Hence, during these events, the proposed development is not expected to have an adverse offsite flood impact up to and including the 1 in 500 AEP events.
- During the probable maximum flood (PMF), of the proposed 43 lots, 15 are predicted to be flood-free, 11 are predicted to be slightly/partially inundated and 17 are predicted to be significantly or total inundated. Flood affected (flood prone) lots are classified as high hazard (H3 to H5, with a maximum of H6 on the eastern lots). Filling or building works within the flood prone area has the potential to alter the flood behaviour. Thus, it is recommended to avoid significant filling or flow-obstruction within the flood prone land. If filling or building support structures are proposed, it is necessary to undertake a detailed flood modelling, at the DA application stage, to demonstrate that the works will not cause an adverse flood impact to adjoining properties.
- As habitable floor levels are proposed to be above the PMF level for all the proposed lots, the development will exceed the Flood Planning Level (FPL) requirement which is 1% AEP + 0.5m freeboard.
- Regional evacuation routes around the Site are predicted to be cut off in the 5% AEP event, resulting in 3 to 5 days period of isolation during this event. During the PMF event, the period of isolation can increase up to 9 days.
- Heading south, Reardons Lane (starting from adjacent to the proposed Lot 6) leads to the M1 Pacific Motor Way (spanning a distance of approximately 11 km) is predicted to be flood-free during the Richmond River PMF event. This route can serve as access to or egress from the Site during rare or extreme events.
- Warning time for a Richmond River flood is typically 3 to 4 days, providing adequate warning and preparation time for an early off-site evacuation.
- The major flood risks (without mitigation options) involve the direct exposure of the 28 proposed lots to high flood hazard (H3 to H5, with a maximum of H6 on the eastern lots) during the PMF event), and liability to periods of long isolation for all the proposed lots.

- As part of flood risk treatment options:
    - It is proposed that all habitable floor level be set above the PMF flood level, ensuring the buildings are to be designed and constructed commensurate with the hydrostatic, hydrodynamic, buoyancy and debris loads of PMF event.
    - It is recommended to provide a secondary flood emergency access at the southwest corner of the site that is flood-free during the PMF event.
    - The primary flood emergency response strategy is off-site evacuation prior to major flooding based on BOM's and SES flood warning system. It is proposed to prepare a detailed flood emergency response plan to outline triggers and procedures for initiating off-site evacuation consistent with current flood emergency planning outlined in the Richmond Valley Flood Emergency Sub Plan (NSW SES, 2023).
- Following implementation of the flood risk treatment options described above, the residual flood risk is deemed to be low.

Annex B contains our responses to Table 5 of Appendix A ("Analysis, reporting and handover requirements") of the Flood risk management guideline LU01.

Overall, the proposed concept subdivision plan (incorporating the proposed flood risk treatment options) is considered to be compatible with the flood hazard.

6 References

- AIDR (2017). Guideline 7-3 Flood Hazard.
- AIDR (2020). National Emergency Risk Assessment Guidelines.
- BMT (September 2023). Richmond Valley Flood Study (RVFS), Volume 1.
- Richmond Valley Flood Emergency Sub Plan (NSW SES, 2023).

Annex A Flood Depth and Hazard Maps

LEGEND

- Layout of Development
- Site Boundary

Peak Flood Level (m AHD)

0.5m

Peak Flood Depth (m)

- < 0.25
- 0.25 to 0.5
- 0.5 to 0.75
- 0.75 to 1.0
- 1.0 to 2.0
- 2.0 to 4.0
- > 4.0

Reardons Lane

Woodburn Coraki Road

Swan Bay New Italy Road

Darke Lane

Reardons Lane

Swan Bay New Italy Road

Reardons Lane

Title:

Peak Flood Depth and Level Contours - 5% AEP Event

Figure: A-01

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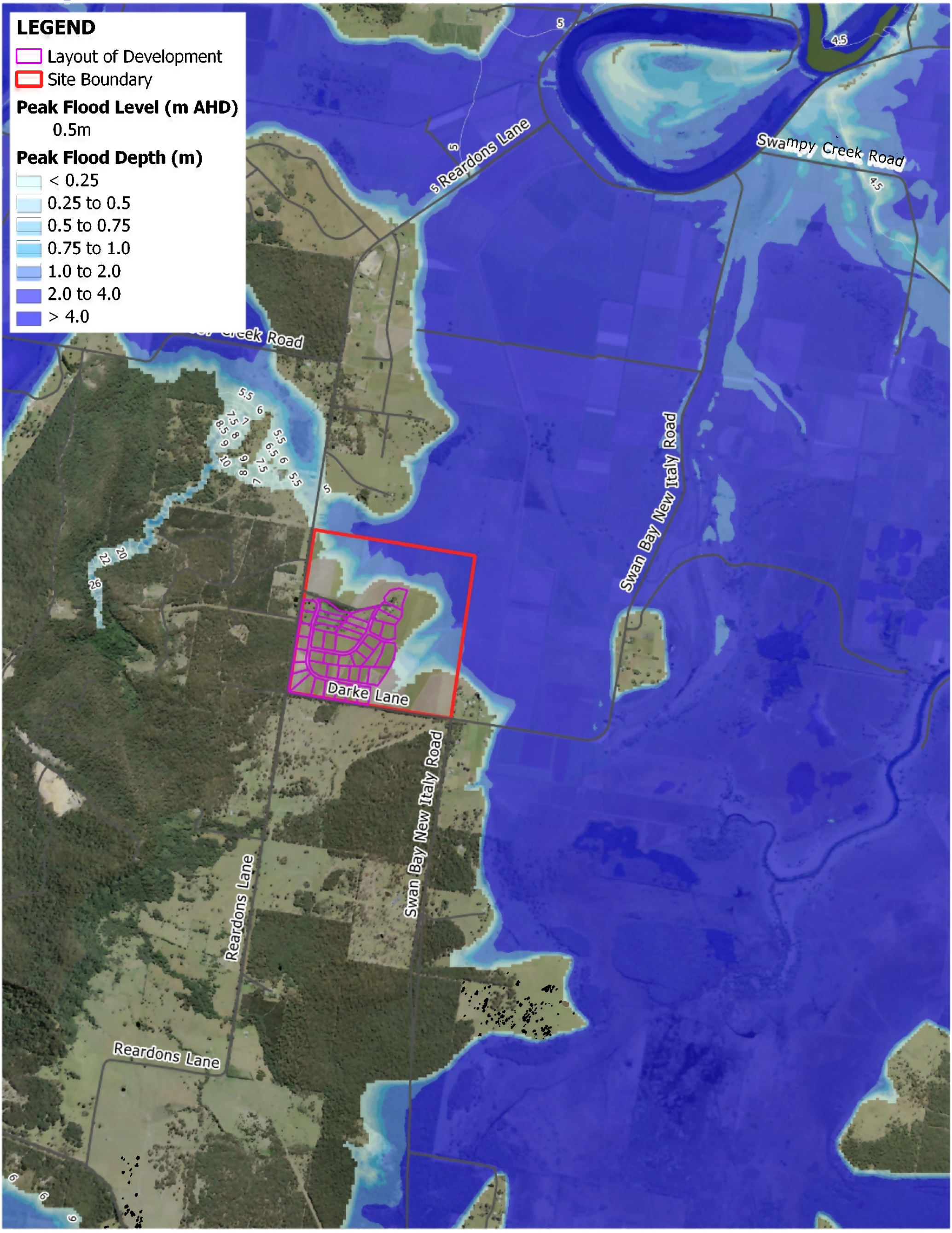

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Peak Flood Depth and Level Contours - 2% AEP Event

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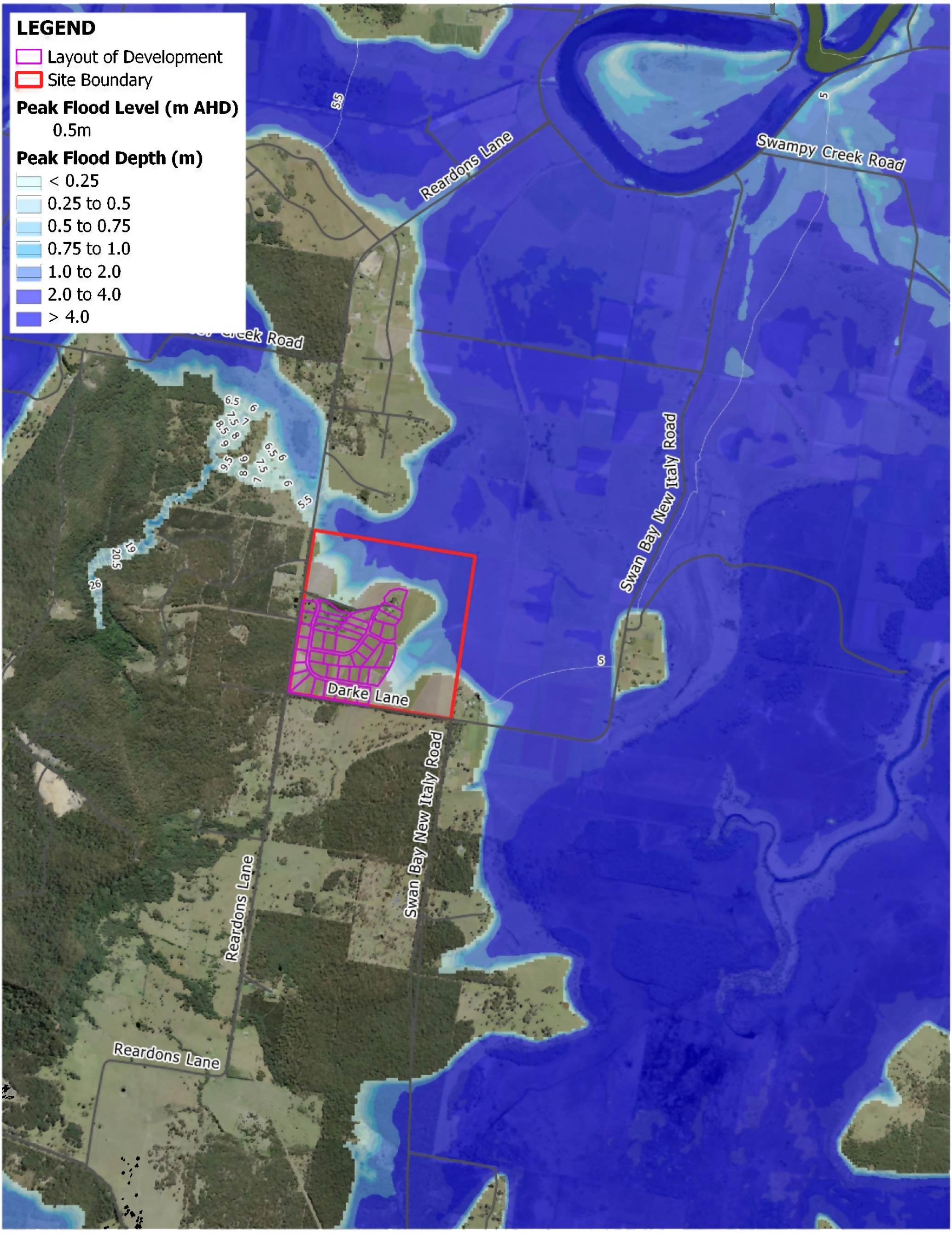

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Peak Flood Depths and Level Contours - 1% AEP Event

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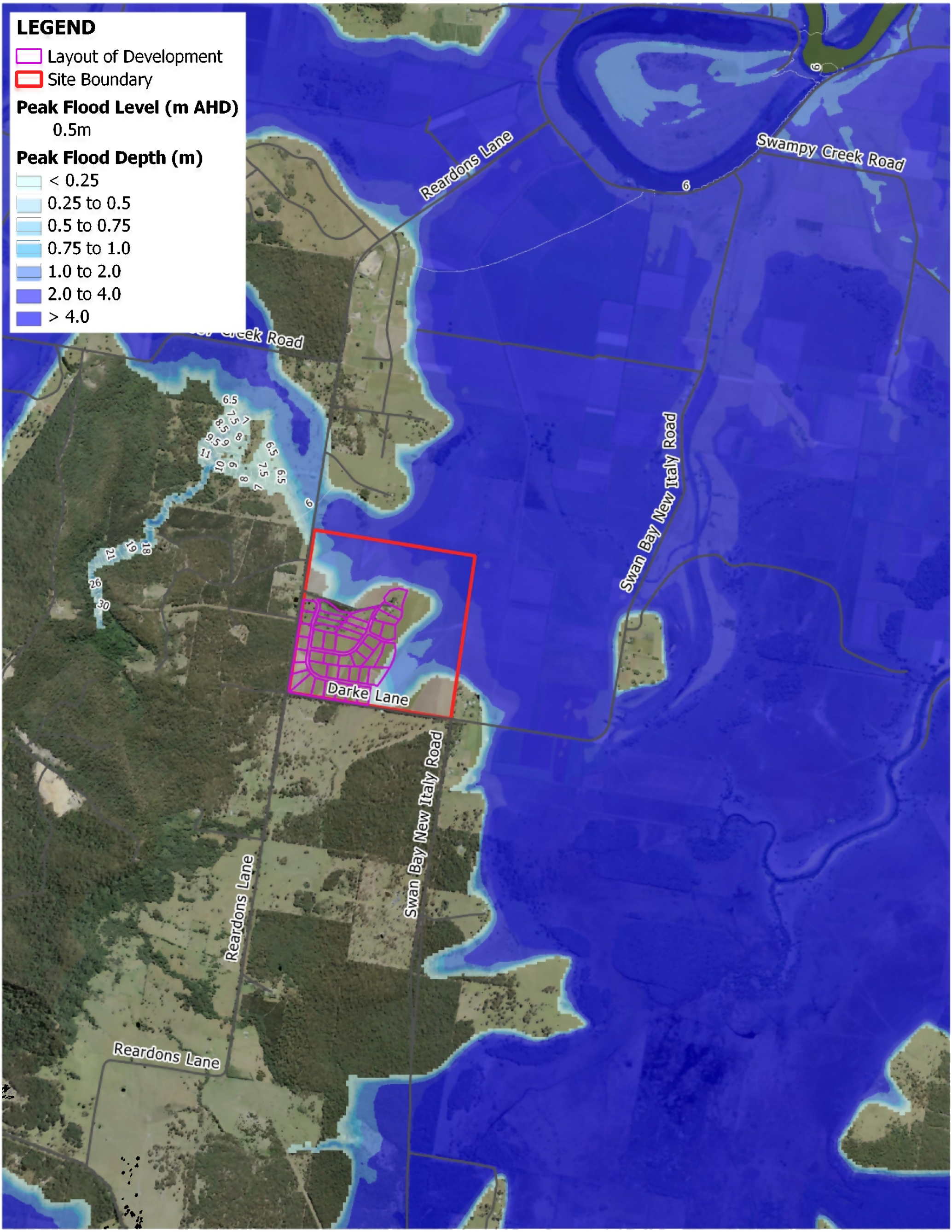

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Peak Flood Depths and Level Contours - 0.2% Event

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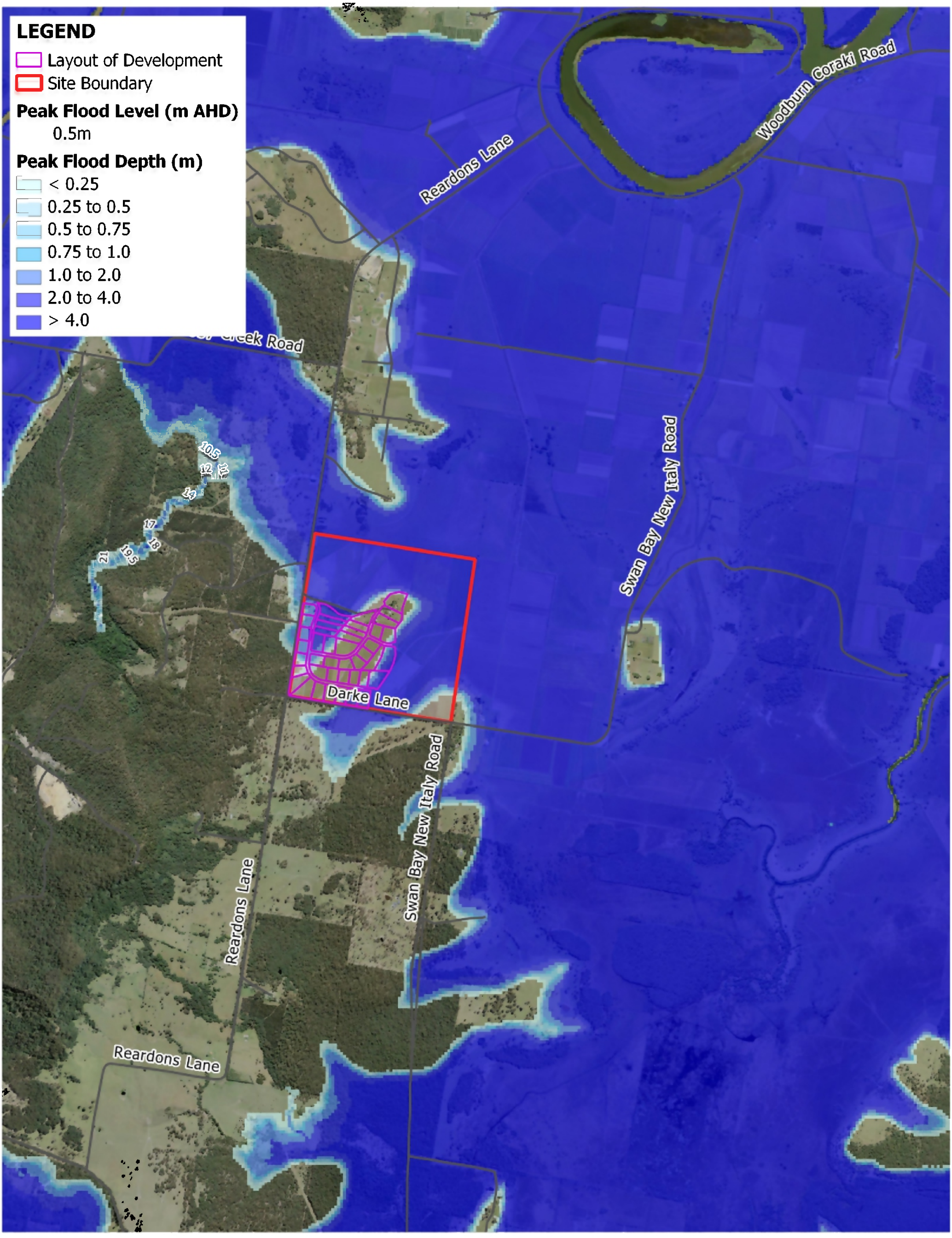

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Peak Flood Depths and Level Contours - PMF Event

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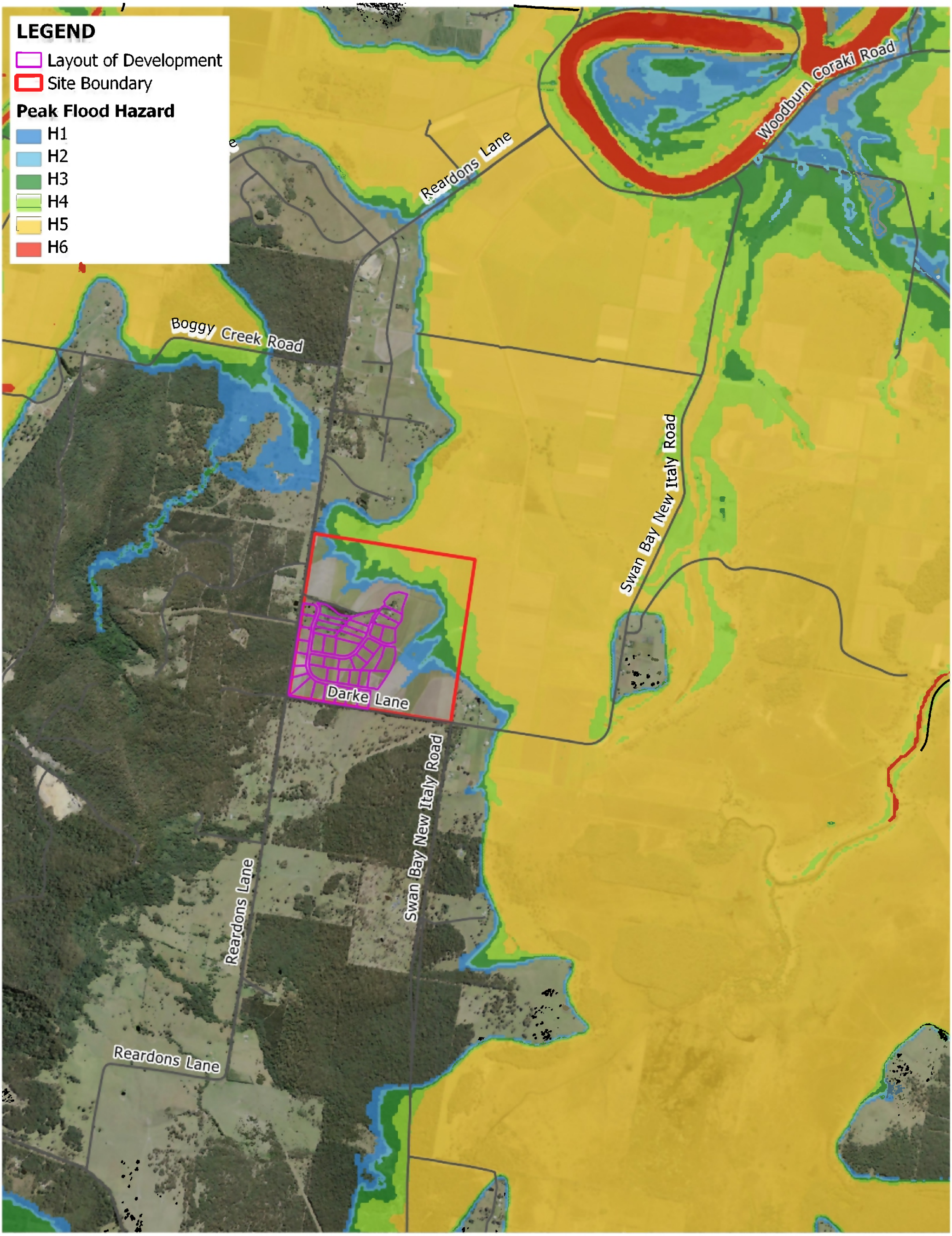

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Peak Flood Hazard - 5% AEP Event

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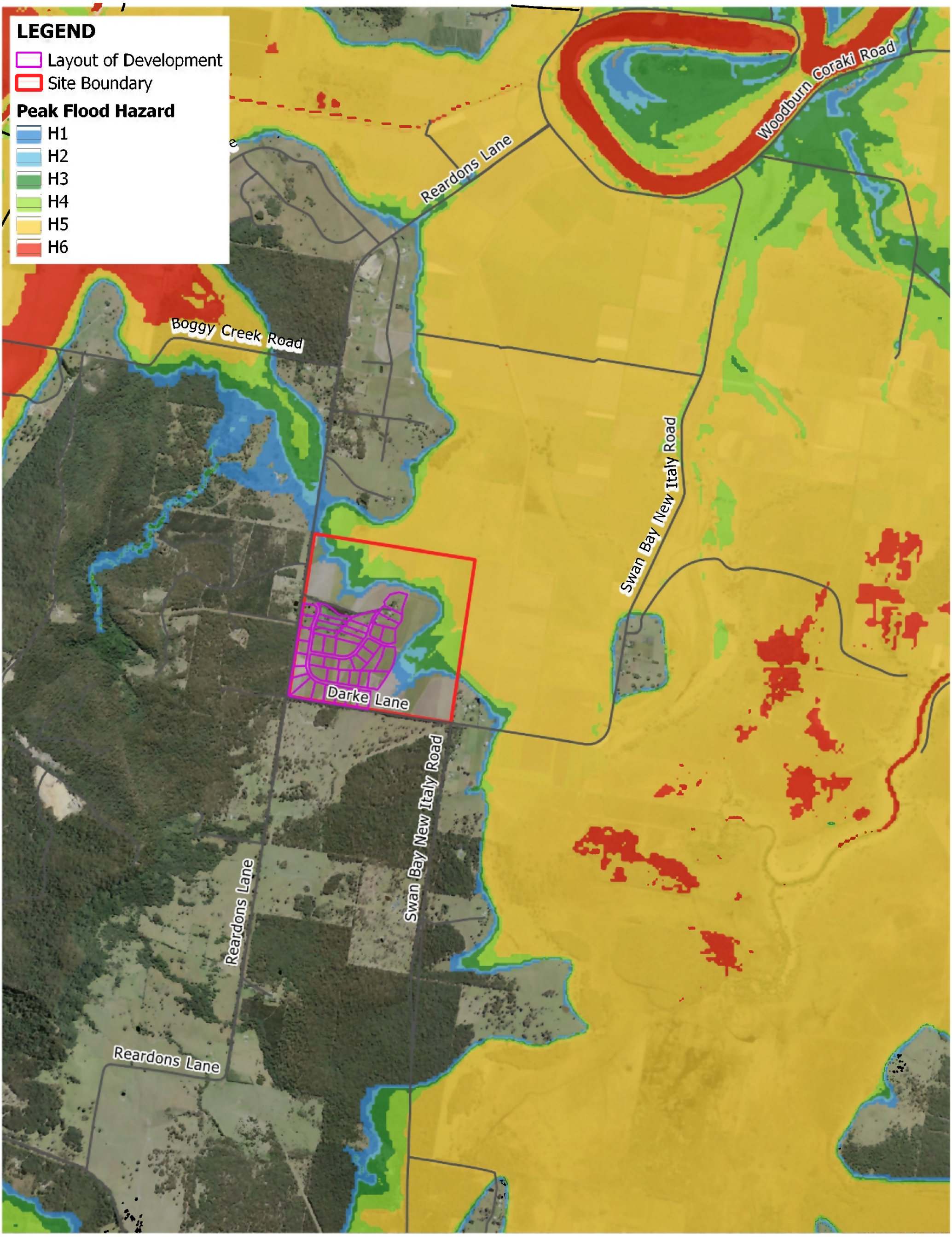

Title:

Peak Flood Hazard - 2% AEP Event

Figure: A-07

Rev. -

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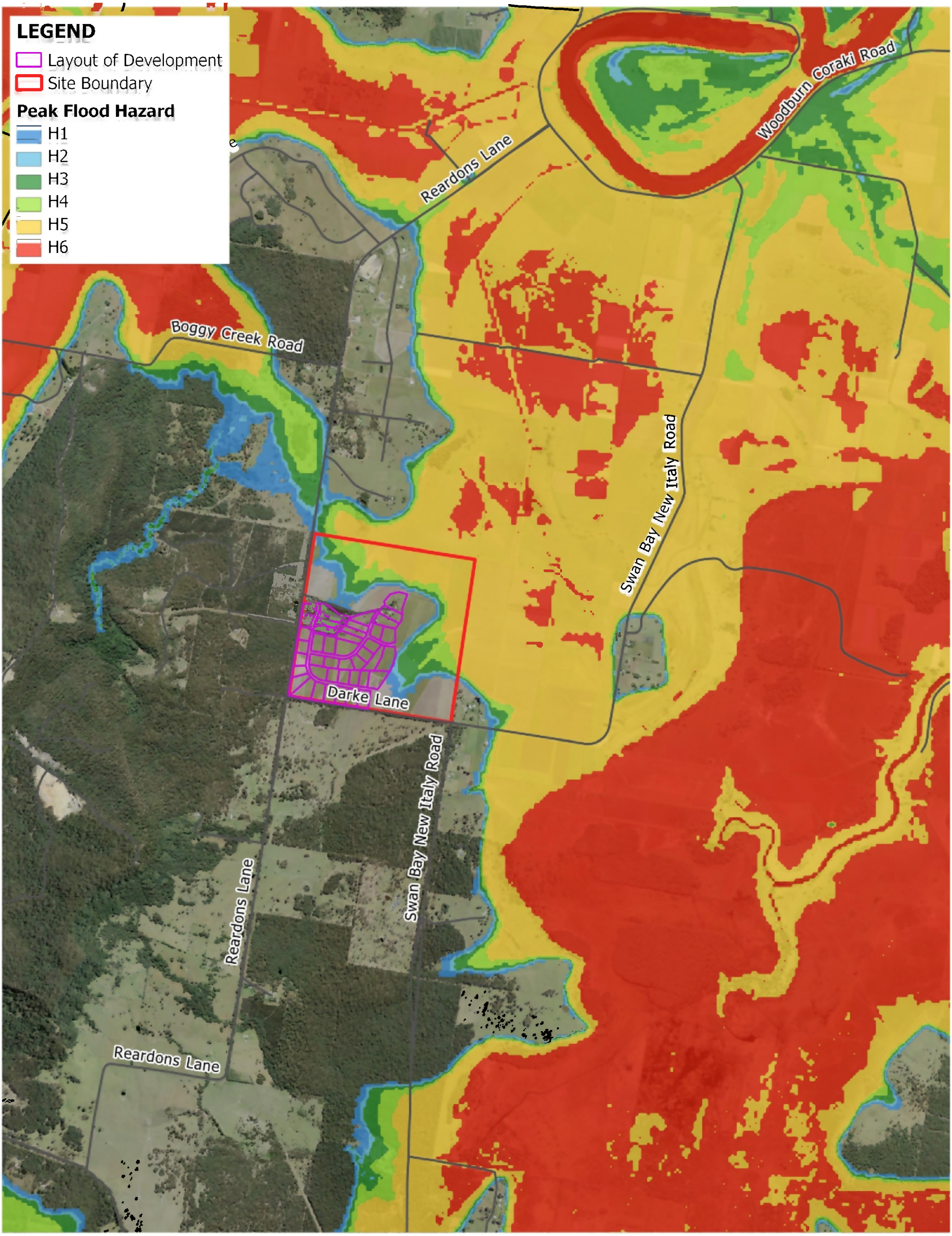

Title:

Peak Flood Hazard - 1% AEP Event

Figure: A-08

Rev: -

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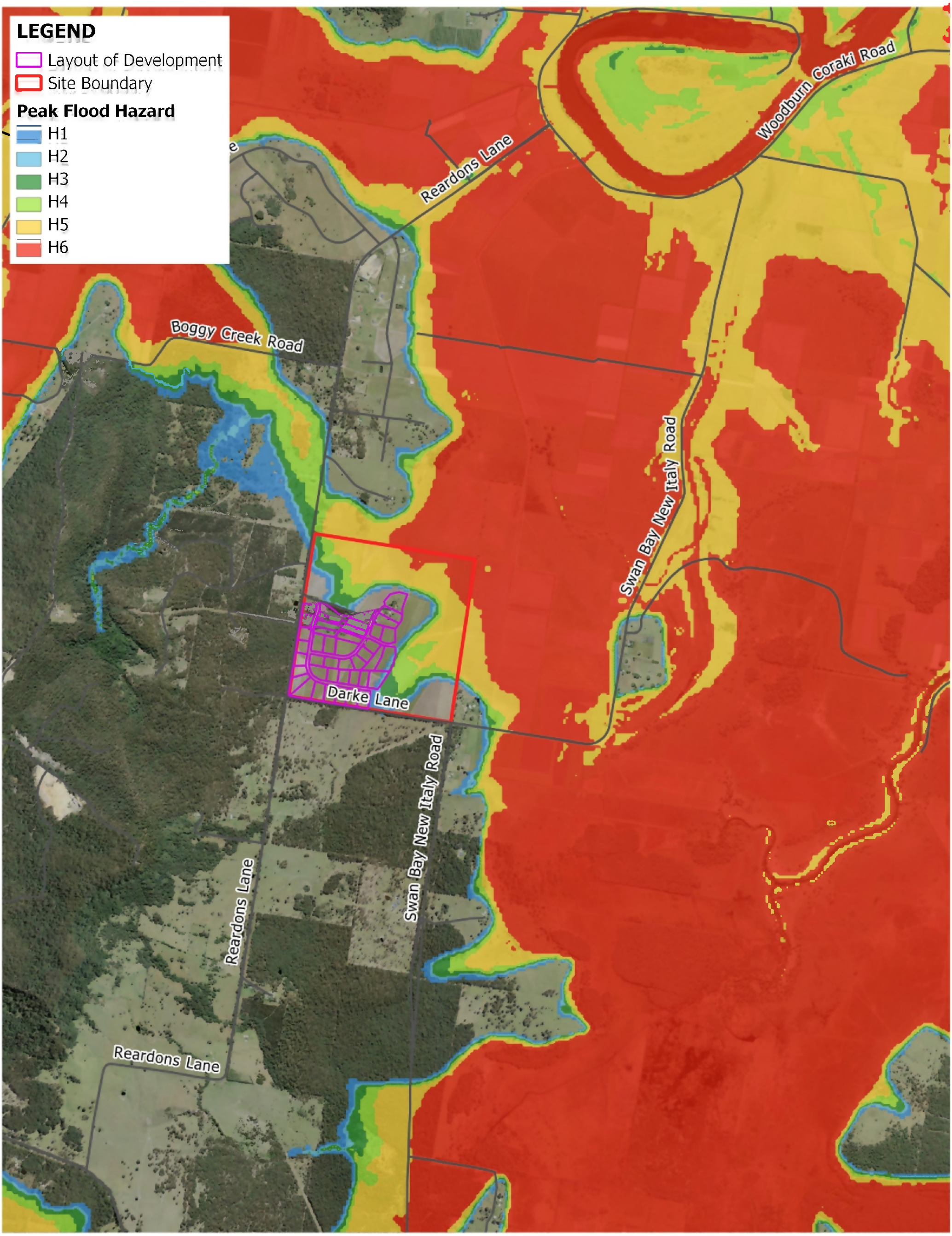

Title:

Peak Flood Hazard - 0.2% AEP Event

Figure: A-10

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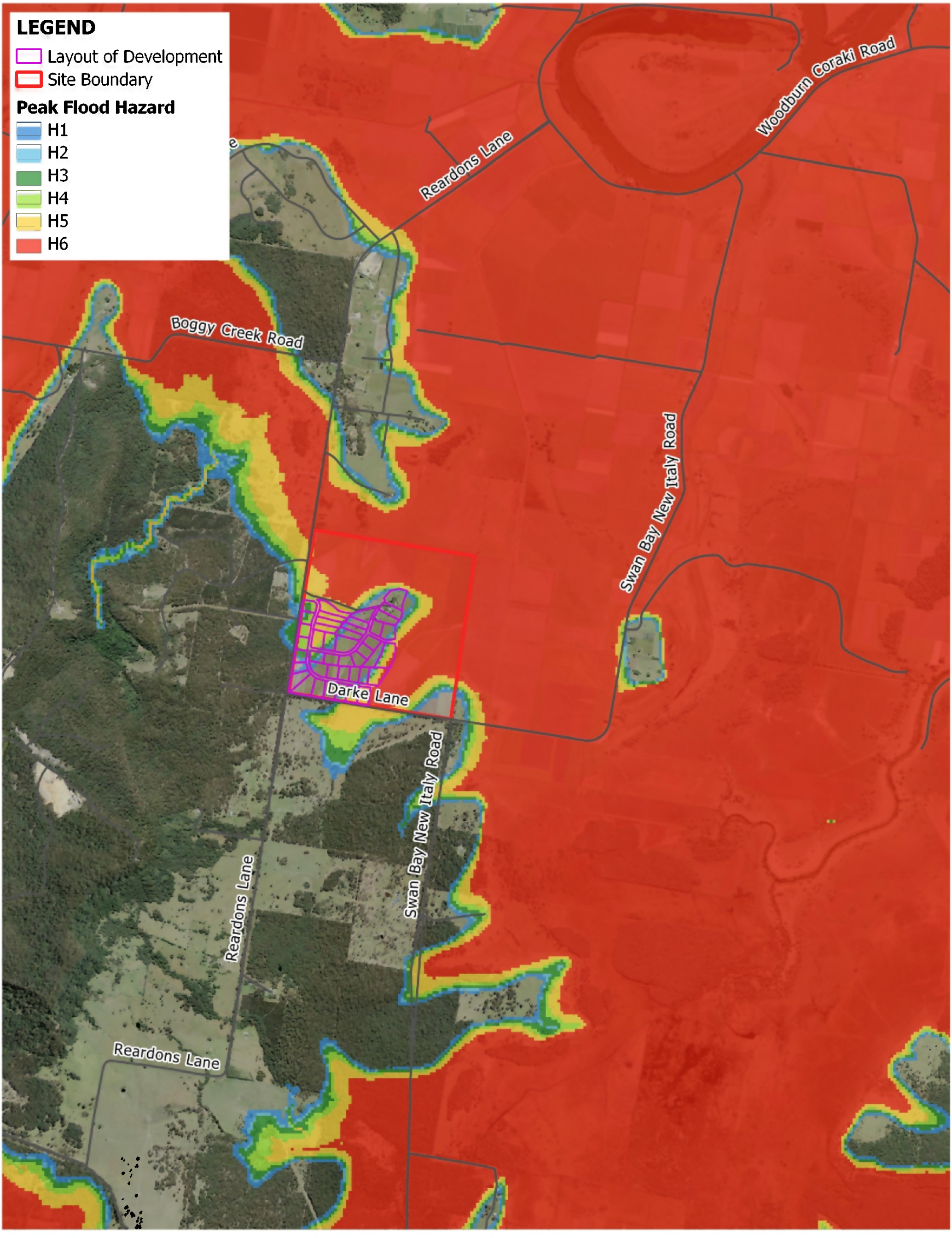

Title:

Peak Flood Hazard - PMF Event

Figure: A-11

Rev: -

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Annex B Responses to Table 5 of Appendix A of LU01 Guideline

Response to Flood Risk Management Guideline LU01 – Appendix A Analysis, reporting and handover requirements			
Table 5 – Typical simple and details assessment scopes of works and information requirements for FIRAs			
Section	**Sub-Section**	**Simple Assessment**	**BMT Response**
Introduction	1.1 Background	Background: • purpose of the FIRA • client details • property address, size and description of location and details of proposed development	• A desktop qualitative Flood Impact Risk Assessment (FIRA) has been prepared as documented in the "PP-2022-502 Reardons/Darkes Lane, Swan Bay – Qualitative Flood Impact And Risk Assessment (BMT, November 2023). .The Purpose of the FIRA was to define the existing on-site flood risk and outline a high-level flood emergency response strategy the proposed development (hereafter referred as the "Site"). •The client is Newton Denny Chapelle (NDC) Pty Ltd on behalf of Mr Noel Newman •The Site is located at the corner of Reardons Lane & Darke Lane, Swan Bay •The total area of the Site is approximately 128.8 hecatres, of this total area approximately 44 hectares is proposed to developed, with the remainder of the Site retained as existing. •The proposed development consists of the 43 large resiential lots. Access will be via Reardons Lane.
	1.2 Project context	Description of project context: • any FIRAs or FRM studies or plans previously conducted and relevant to the site • history of the application	•The Richmond Valley Flood Emergency Sub Plan (NSW SES, 2023) contains information related flood emergency response for the broader floodplain (including Swan Bay) based on the Richmond River flood behaviour and Bureau of Meteorlogy flood forecasting.

Response to Flood Risk Management Guideline LU01 – Appendix A Analysis, reporting and handover requirements			
Table 5 – Typical simple and details assessment scopes of works and information requirements for FIRAs			
	1.3 FIRA requirements	Description of discussion with consent authority and requirements: • any correspondence with the consent authority and referral agencies on FIRA requirements • general relevant assessment requirements (see Sections 2 and 3 of this guideline)	
Background	2.1 Study area	Description of the study area: • catchments, topography, waterways, flood-dependent ecosystems, oceanic influences • land use and existing development • hydrologic/hydraulic controls	•The Site is located approximately 3 km south of Richmond River and east of Bungawalbin Creek. It is bounded by large rural lots to the north and east, Darke Lane to the south and Reardons Lane to the west. •The Site slopes to the east, with ground elavations ranging from 11.8 to 12m AHD along the western boundary to 11.3 to 11.6m AHD along the western boundary. •Ground elevations across the Site. The minimum ground elevation is 1.4 m AHD, at the northwest corner. There is an existing ridge in the middle of the Site (with elevations ranging from 14.0 m AHD to 16.2m AHD) that falls east or west. •The existing site includes a rural property. •The Richmond Valley Development Control Plan 2021 (DCP), complementing the Richmond Valley Local Environmental Plan 2012, is the main planning instrument. This DCP contains detailed flood-related objectives and controls that will be used by Council when determining development applications.

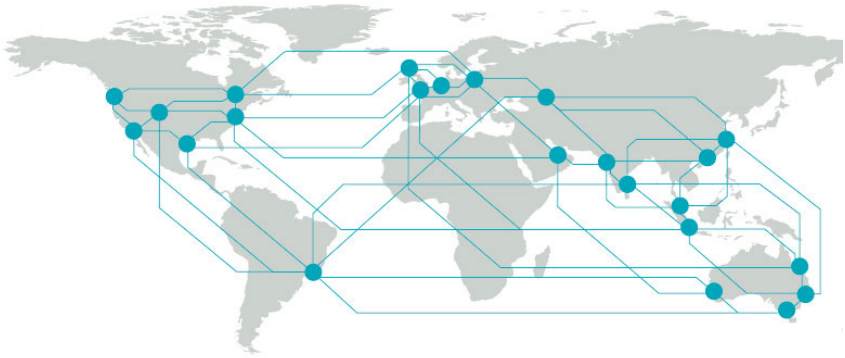
Response to Flood Risk Management Guideline LU01 – Appendix A Analysis, reporting and handover requirements			
Table 5 – Typical simple and details assessment scopes of works and information requirements for FIRAs			
	2.2 Known flood behaviour	Description of the flood behaviour: · type · duration and how often inundated · existing flood problems · hydrologic/hydraulic controls' effect on flooding · coincident tributary flooding · other factors (e.g. blockage, high tides, antecedent conditions)	·Mainstream Richmond River flood inundation durations are discussed in Section 2.2.3 of the FIRA (BMT, November, 2023). ·Existing mainstream flooding conditions (peak flood levels, depth and hazard) are summarised in Section 2.2 to Section 2.5 of the FIRA (BMT, November 2023). ·consideration of hydraulic controls such as coincident tributary flooding, will be made as part of the detailed FIRA.
	2.3 Flood history	Description of the flood history: · recent and largest recorded events · area of inundation and impacts on the community · catchment description at historical event relative to present day for key events	·Based on Richmond Valley Flood Study (RVFS) (BMT, September, 2023), four historic events were used for model calibration/validation purposes. The events of February/March 2022, January 2008 and May 2009 were used to calibrate the hydrologic and hydraulic models and the March/April 2017 event was used to validate the models. These events were selected as they are some of the largest events to occur within recent years.
	2.4 Emergency management	Outline existing EM strategy for the area Description of the existing EM: · response/preparation time · warning systems and time · local/regional EM strategies or plans	·There is no site-specific flood emergency management plan for the existing Site. ·The Richmond Valley Flood Emergency Sub Plan (NSW SES, 2023) contains information related flood emergency response for the broader floodplain (including Swan Bay) based on the Richmond River flood behaviour and Bureau of Meteorlogy flood forecasting. ·There is a BOM flood gauge on gauge at Richmond River at Woodburn that is used by SES to issue flood warnings for the broader area including Swan Bay.

Response to Flood Risk Management Guideline LU01 – Appendix A Analysis, reporting and handover requirements			
Table 5 – Typical simple and details assessment scopes of works and information requirements for FIRAs			
			Section 2.7 of the FIRA (BMT, November 2023) provides further information with regards to the gauge.
3. Available information		List and describe: • previous studies and model files, including whether the information is fit for purpose for the assessment; if yes then it will need to be reproduced in the report including figures and detailed descriptions • relevant legislation, policy and guidance • flood EM plans (e.g. local flood plans) • historic data, including summary of key events and available data • hydrologic and hydraulic data, including stream flow records, rating curves, rainfall records, ocean and water level data and rainfall gauges • site visit, including any observations that may impact or be impacted by flood; photos and figures should be included where relevant • survey data, including existing or new survey data, for example, DEMs, LiDAR data, creek/river cross-sections or hydro surveys, location of drainage assets, floor levels and existing structures • geographic information system (GIS) data, including cadastral layers, waterways, natural environment areas, street names, roads and land-use zoning	Previous studies relevant for the Site include the following: •BMT (September 2023). Richmond Valley Flood Study (RVFS), Volume 1. •Richmond Valley Flood Emergency Sub Plan (NSW SES, 2023).

Response to Flood Risk Management Guideline LU01 – Appendix A Analysis, reporting and handover requirements			
Table 5 – Typical simple and details assessment scopes of works and information requirements for FIRAs			
			·The details of historical flood events, rating curves, rainfall records, DEM are LiDAR data are detailed in RFVS (BMT, September 2023)
4. Flood related requirements		Describe flood related requirements: · requirements of the consent authority and referral agencies · relevant legislation, policies and guidelines · scale of assessment · identify compatibility or deviation from existing FRM plans	·The following policies and guidelines may be relevant for flood impact and risk assessment of devevelopment on the Site: -The Richmond Valley Development Control Plan 2021 (DCP) -Department of Planning and Environment(DPE, 2023a). Flood Risk Management Manual - The policy and manual for the management of flood liable land. -DPE, 2023b. Flood impact and risk assessment - Flood risk management guideline LU01.
5. Pre-developed modelling and analysis	5.1 Existing flood modelling	Description of methodology and modelling as applicable including: · design events assessed · hydrologic and hydraulic controls and any changes over time, particularly since calibration, validation events or completion of existing studies · flood modelling techniques and results · model checks as required	·No hydrologic or hydraulic modelling was undertaken as part of the FIRA (BMT, November 2023). .The FRA was based on a qualitivate flood invesgation based on knowledge of existing flood modelling results/outputs from the RVFS (BMT, September 2023). ·Detiled flood modelling will be undertaken as part of DA application stage to model and assess the existing site conditions in detail.
	5.2 Existing flood impacts	Describe and document existing: · flood behaviour for the full range of flooding at and surrounding the site · flood impacts on surrounding properties · any additional data	·The FIRA (BMT, November 2023) presents the existing flood conditions as follows: -Existing mainstream flooding conditions (peak flood levels, depth and hazard) are summarised in Section 2.2 to Section 2.5.

Response to Flood Risk Management Guideline LU01 – Appendix A Analysis, reporting and handover requirements			
Table 5 – Typical simple and details assessment scopes of works and information requirements for FIRAs			
6. post-developed modelling and analysis	6.1 proposed development flood modelling/assessment	Describe and document - Analysis undertaken including modelling and modelling assumptions as required - Changes due to proposed development – difference between existing and post-development outputs at key locations	·No post-development hydrologic or hydraulic modelling was undertaken as part of the FIRA (BMT, November 2023). The FIRA was based on a qualitative flood investigation based on existing flood modelling results/outputs from the RVFS (BMT, September 2023). ·Detiled flood modelling will be undertaken as part of DA application stage to model and assess the proposed site conditions, including necessary flood mitigation works.
	6.2 flood impacts of proposed development	Describe and document changes due to proposed development in: - Impacts to flood behaviour - Changes to frequency/scale of inundation of existing properties, where know - The impacts on the proposed devellopemnt and users	·No post-development hydrologic or hydraulic modelling was undertaken.
7. key risks to be managed		Describe and document - Proposed management measures or alterations t the development required to address impacts to the development and its users and any offsite impacts - Comparison of pre- and post-manageent measure impacts considering management measures with development requirements from consent authotiy and how they meet any flood related objectives - Effectiveness, limitations and any necessary additional requirements to address risk to the development and its users or offsite impacts - Residual risks to users of the development	·No post-development hydrologic or hydraulic modelling was undertaken as part of theFIRA (BMT, November 2023. ·The FRA was based on a qualitative flood investigation. ·Approriate flood mitigation/management measures will be investigated and modelled using the RVFS (BMT, September 2023) model at a DA application stage. ·A detailed flood risk assessment will be undertaken as at a DA application stage.

Response to Flood Risk Management Guideline LU01 – Appendix A Analysis, reporting and handover requirements			
Table 5 – Typical simple and details assessment scopes of works and information requirements for FIRAs			
8. conclusions and recommendations		Describe and documents - Conclujsions - Management measures to reduce flood impacts and any residual impacts and recommendations including mapping and GIS outputs - Compatibility or deviation from consent authority requirements	·The FIRA (BMT, November 2023) has recommended off-site evacuation as the primary flood emergency response strategy, as discussed in Section 3.3.2 and Section 4. ·A detiled flood modelling will be undertaken as part of DA application phase that will include appropriate flood mitigation measures to ensure that the proposed development shall not cause an adverse flood impact to adjoining properties.
9. References		List key references used in the report	• AIDR (2017). Guideline 7-3 Flood Hazard • AIDR (2020). National Emergency Risk Assessment Guidelines • BMT (September 2023). Richmond Valley Flood Study (RVFS), Volume 1. • Richmond Valley Flood Emergency Sub Plan (NSW SES, 2023). • Department of Planning and Environment (DPE, 2023a). Support for emergency management planning - Flood risk management guideline EM01. • DPE, 2023b. Flood impact and risk assessment - Flood risk management guideline LU01. • The Richmond Valley Development Control Plan 2021 (DCP)



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Level 4
4-14 Foster Street
Surry Hills
NSW 2010
Australia
+61 2 8960 7755

Registered in Australia
Registered no. 010 830 421
Registered office
Level 5, 348 Edward Street,
Brisbane QLD 4000 Australia

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Department of Planning and Environment

Your ref: PP-2022-502
Our ref: DOC23/1075046-4

Local and Regional Planning
Department of Planning and Environment
PO Box 949
TAMWORTH NSW 2340

Attention: Ms Gina Davis

Dear Ms Davis

RE: Planning Proposal Lots 831, 832, 833 DP 847683 Darke Lane, Swan Bay (PP-2022-502)

Thank you for your e-mail dated 15 December 2023 about the planning proposed to rezone land to allow large lot residential development at Darke Lane, Swan Bay, seeking flooding advice from the Biodiversity and Conservation Division (BCD) of the Department of Planning and Environment. I appreciate the opportunity to provide input.

BCD has reviewed the planning proposal and associated documents and we provide the following advice.

The planning proposal seeks to rezone part of the RU1 – Primary Production land on lots 831, 832, 833 DP 847683 Darke Lane, Swan Bay, to R5 – Large Lot residential, with a minimum lot size of 7,500m^2.

With respect to the assessment of biodiversity, the planning proposal relies on the NSW Biodiversity Values (BV) map, the High Environmental Value (HEV) map in the North Coast Regional Plan and a flora and fauna assessment undertaken in 2008. BCD advises that:

- The BV map was developed by BCD as part of the biodiversity offset scheme threshold and does not map the only parts of NSW with biodiversity values. Hence, unmapped areas are likely to also contain biodiversity values.

- The HEV map was developed by BCD using regional scale datasets for use in the regional plan. Hence, it is unsuitable for interrogation at the site scale.

- The flora and fauna assessment from 2008 is out of date.

Nevertheless, recent aerial imagery and photographs provided by NSW Planning from their site inspection indicate the entire property has been modified and used for cane farming purposes, so we have no further comments on biodiversity for the planning proposal.

With respect to flood related matters, a significant portion of the adjoining land lies above the Probable Maximum Flood (PMF) level. Richmond Valley Council's floor level requirement for residential properties is a minimum of 0.5m above the 1% AEP flood level, which is achievable given all the proposed lots within the proposed R5 zone are above the 1% AEP flood level, noting some of the proposed lots may be subject to high flood hazards in the event of a PMF. Knowledge of such flood conditions will need to be considered for future dwelling design on each lot at the development application stage.

In addition, whilst the land proposed to be zoned R5 is above the 1% AEP riverine flooding level, overland flooding may impact on slab-on-ground type construction on some lots. Overland flooding risk and impact is an important consideration at the development application stage.

Flood isolation in an extreme event may occur over several days in the Swan Bay area. For this reason, planning for a flood evacuation may be necessary with input from the State Emergency Services.

In view of the above comments, BCD has no objection to the planning proposal from a flooding perspective, and we provide the following recommendation:

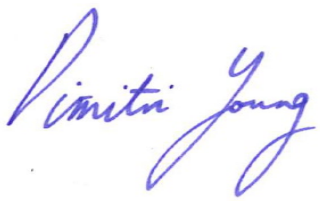
1. Prior to issuing subdivision development consent:

    a. Advice be sought from State Emergency Services on planning for flood evacuation.

    b. Appropriate measures and building design restrictions be applied to lots that may be subject to Probable Maximum Flood and overland flood impacts.

If you have any questions about this advice, please do not hesitate to contact Mr Bill Larkin, Senior Conservation Planning Officer, at bill.larkin@environment.nsw.gov.au or 6659 8216.

Yours sincerely



DIMITRI YOUNG
Senior Team Leader Planning, North East Branch
Biodiversity and Conservation

22/12/2023