ATTACHMENTS

ORDINARY MEETING

Thursday 20 August 2020
9:00am
Council Chambers Crookwell

Contents

Laterals

Planning
Engineering & Management
Environmental

PLANNING PROPOSAL

Mr. Ian Miller

LAGGAN LANE ESTATE

297 Peelwood Road, Laggan

Lot 2 DP 1233492, Lot 1 DP 239858 and Lot 1 DP 1253980

July 2020 **Laterals Reference No.: 1820**

Prepared by:
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CONTENTS

EXECUTIVE SUMMARY

This Planning Proposal is submitted to the Upper Lachlan Shire Council to rezone and amend the lot size for certain land being:

- Lot 2 DP 1233492 (part) from RU2 Rural Landscape zone to RU5 Village zone and reduce the minimum lot size from 80ha to 4,000m^2 to enable the development of dwelling houses on lots to be created in accordance with this Planning Proposal and under the *Upper Lachlan Local Environmental Plan 2010* (LEP 2010).

- Lot 2 DP 1233492 (part), Lot 1 DP 239858 and Lot 1 DP 1253980 from RU2 Rural Landscape zone to RU4 Rural Small Holdings zone and reduce the minimum lot size from 80ha to 1ha (part), 2ha (part) and 5ha (part) to enable agricultural small holdings to be created in accordance with this Planning Proposal and under the *Upper Lachlan Local Environmental Plan 2010* (LEP 2010).

See plans prepared by Laterals on pages 5 to 9. Copies of the Deposited Plans are at Annexure A.

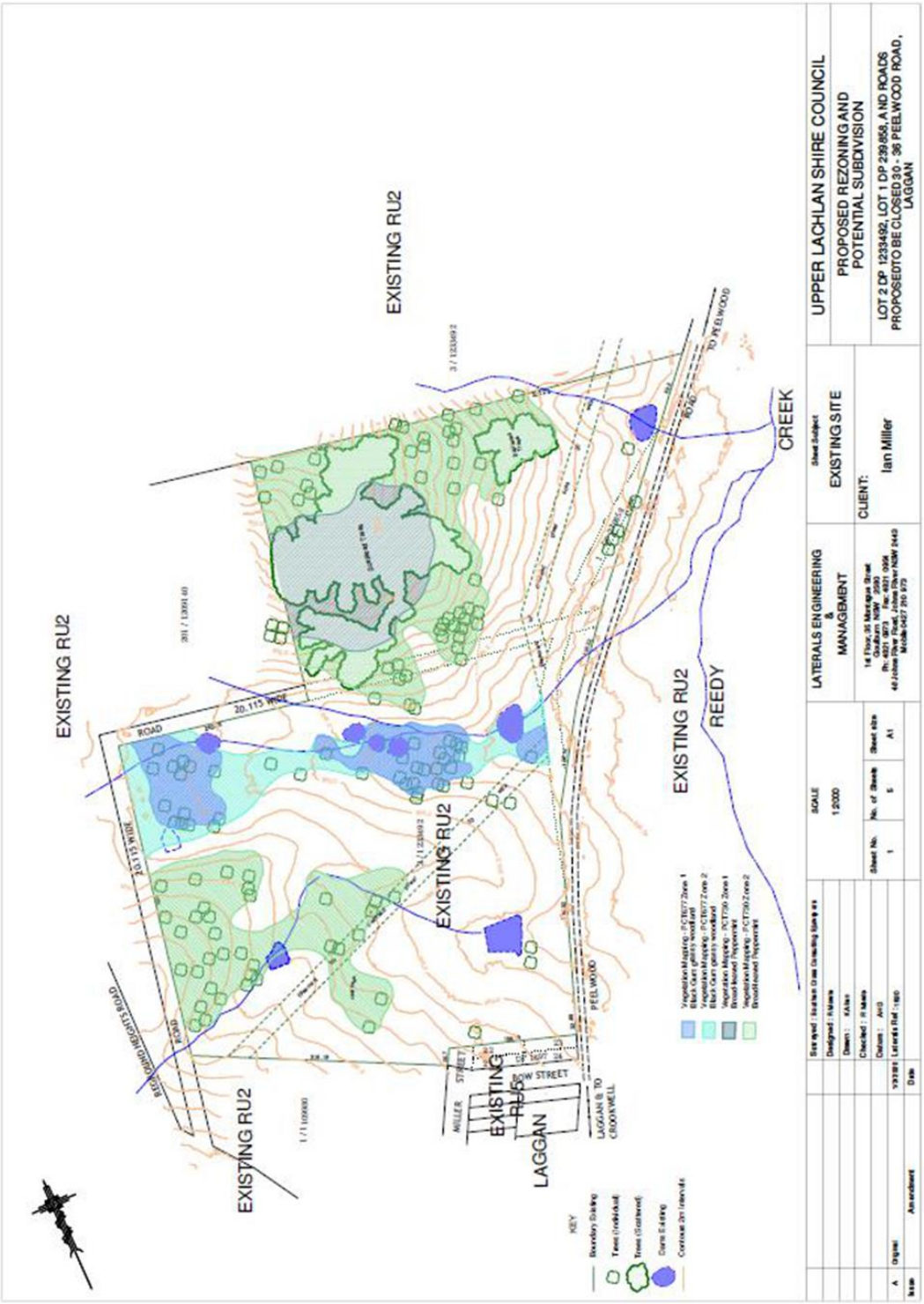
This Planning Proposal has been prepared in accordance with Division 3.4 of the *Environmental Planning and Assessment Act 1979* and the NSW Department of Planning and Environment "A Guide to Preparing Planning Proposals" and addresses the following specific matters in the Guideline and *Environmental Planning and Assessment Act 1979;*

- Part 1 - objectives or intended outcomes;
- Part 2 - explanation of provisions;
- Part 3 - justification;
  - questions to consider when demonstrating the justification;
- Part 4 - Mapping;
- Part 5 - Community consultation;
- Part 6 - Project timeline.

The landowners have had discussions with the Upper Lachlan Shire Council and all the matters raised have been addressed in this Planning Proposal.

The Planning Proposal demonstrates that there is site specific planning merit and justified by addressing the matters required pursuant to s3.33(2) of the *Environmental Planning and Assessment Act 1979* as well as relevant strategic documents, objectives and actions within the relevant regional and sub-regional strategies, relevant State policies, Ministerial Directions and environmental impacts.

It is recommended that this Planning Proposal be endorsed by the Upper Lachlan Shire Council and forwarded to the Minister for Planning for a gateway determination in accordance with Section 3.34 of the *Environmental Planning and Assessment Act 1979*.



Existing Site Plan
(Plan Source: Laterals Planning)

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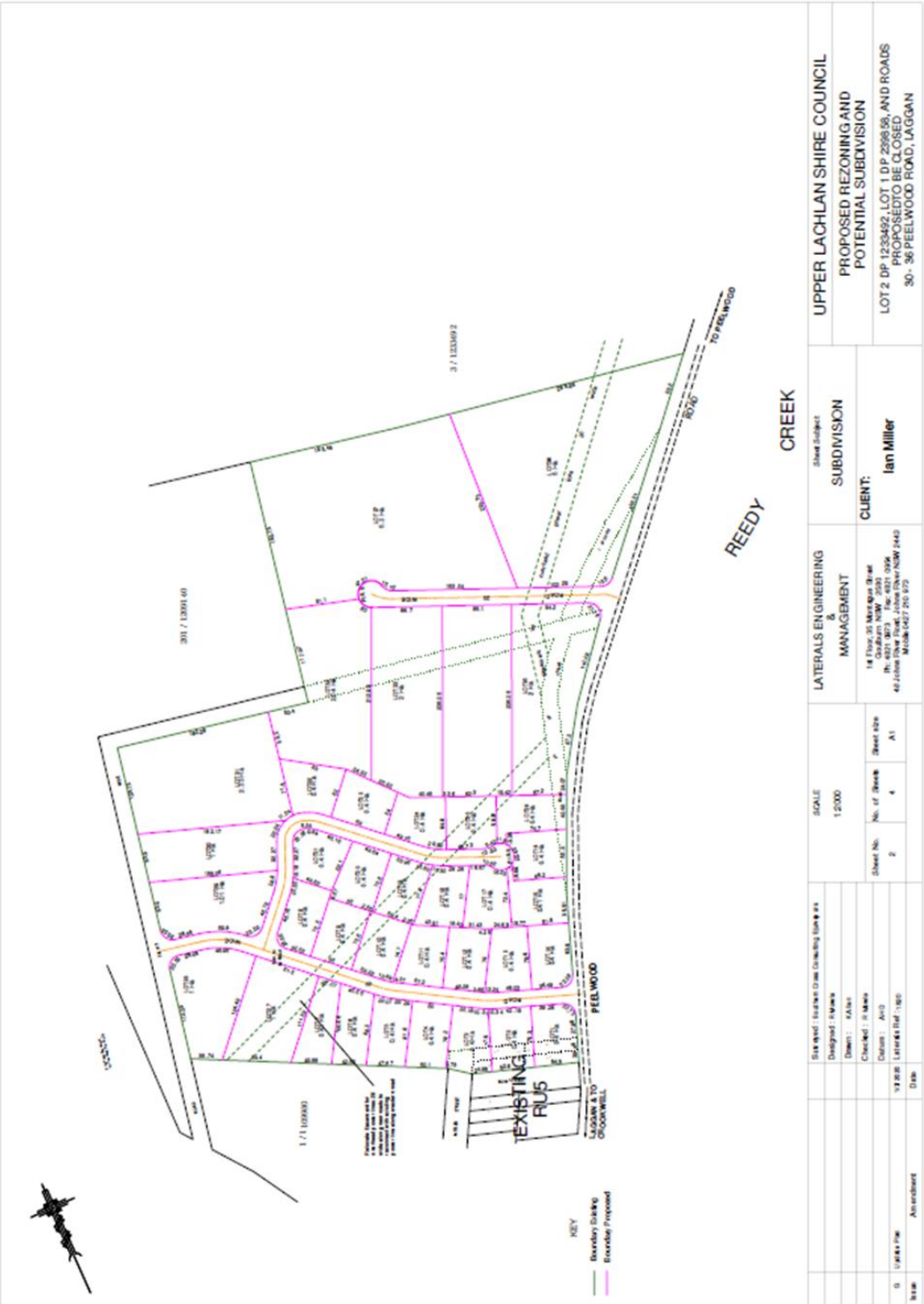

Proposed Subdivision Plan
(Plan Source: Laterals Planning)

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Existing Site and Proposed Development Plan
(Plan Source: Laterals Planning)

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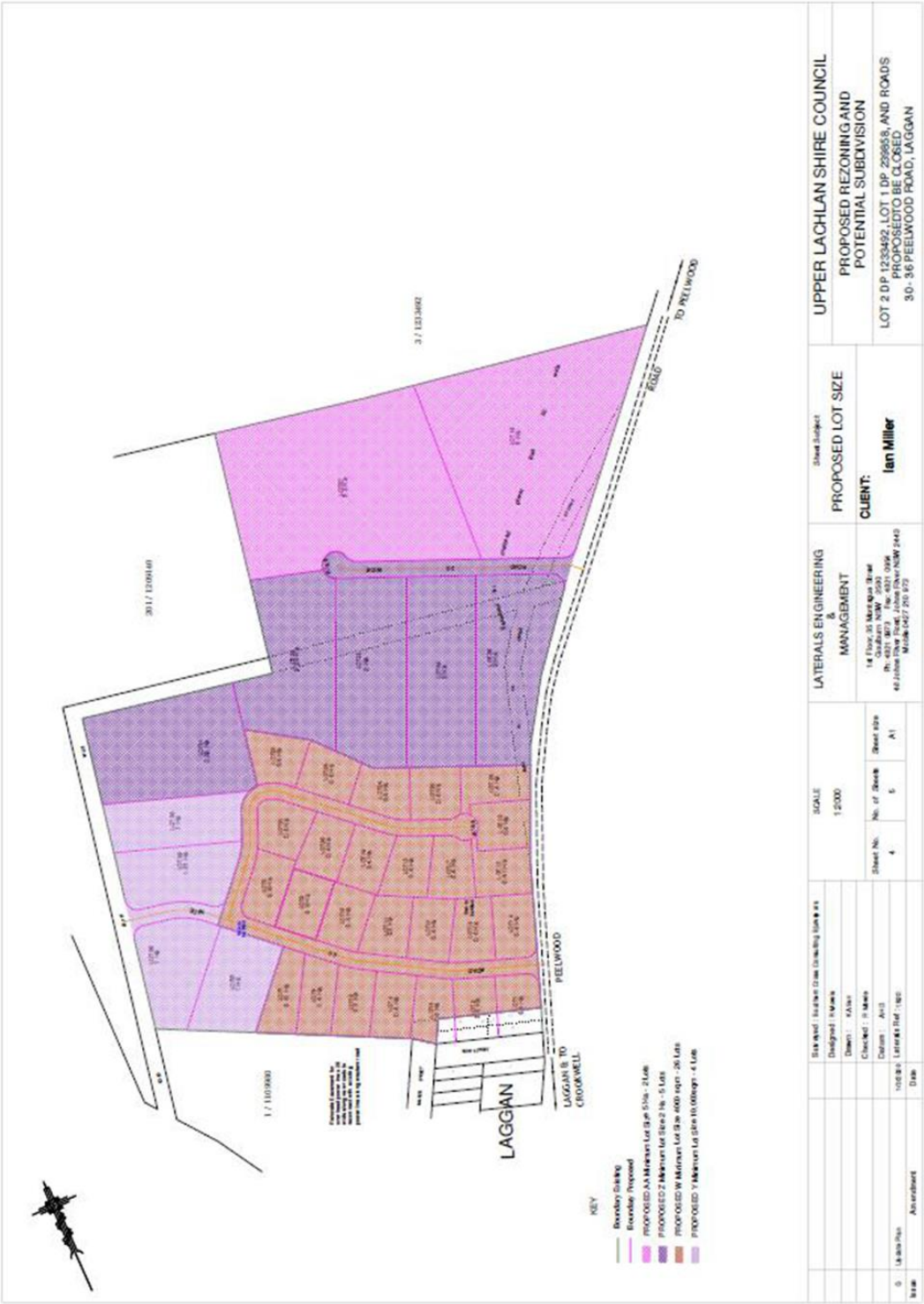

Proposed Lot Size Plan
(Plan Source: Laterals Planning)

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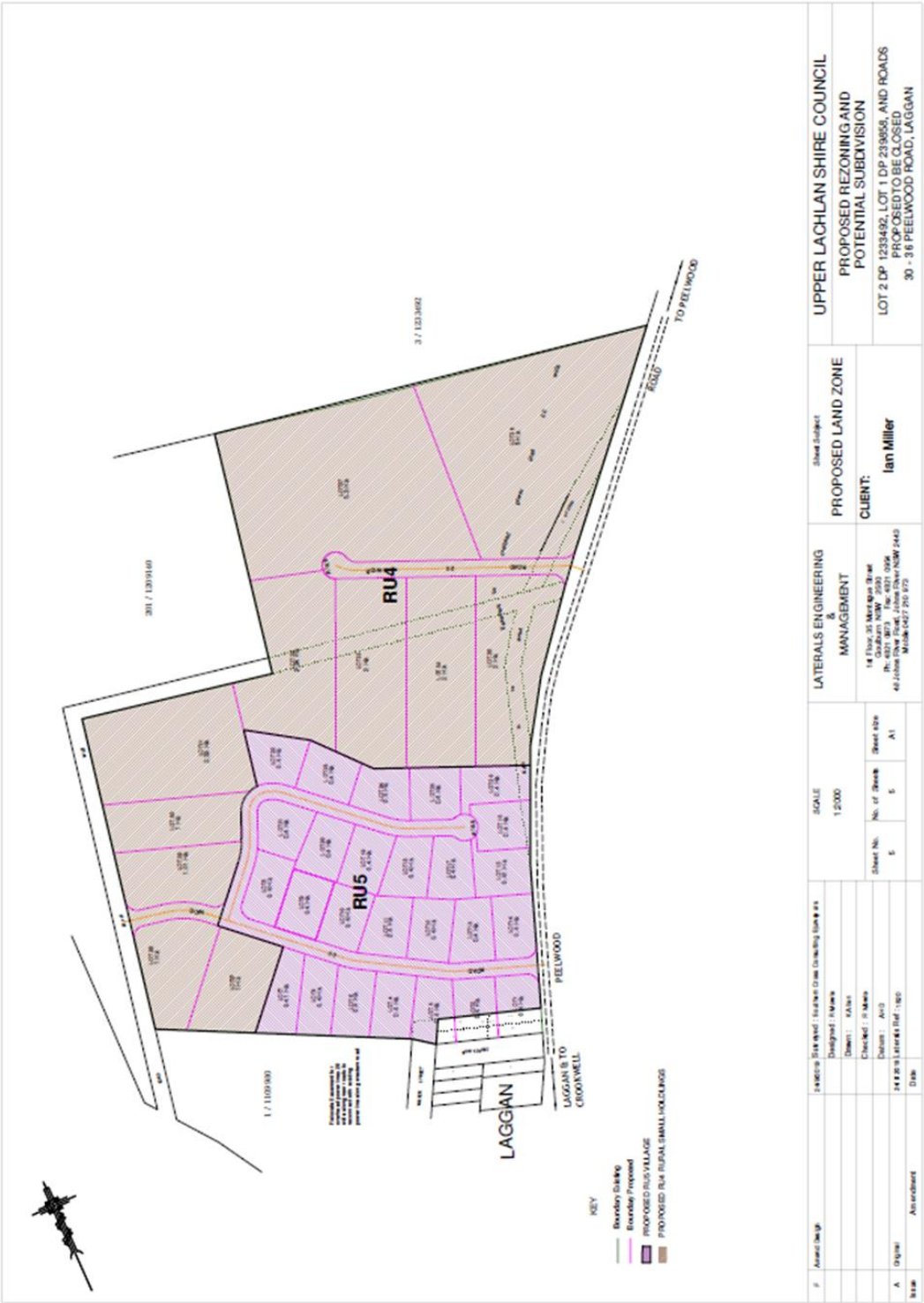

Proposed Land Zone Plan
(Plan Source: Laterals Planning)

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PART 1 – OBJECTIVES

The objective of this Planning Proposal is to rezone and amend the lot size for certain land being:

- Lot 2 DP 1233492 (part) from RU2 Rural Landscape zone to RU5 Village zone and reduce the minimum lot size from 80ha to 4,000m^2 to enable the development of dwelling houses on lots to be created in accordance with this Planning Proposal and under the *Upper Lachlan Local Environmental Plan 2010* (LEP 2010).

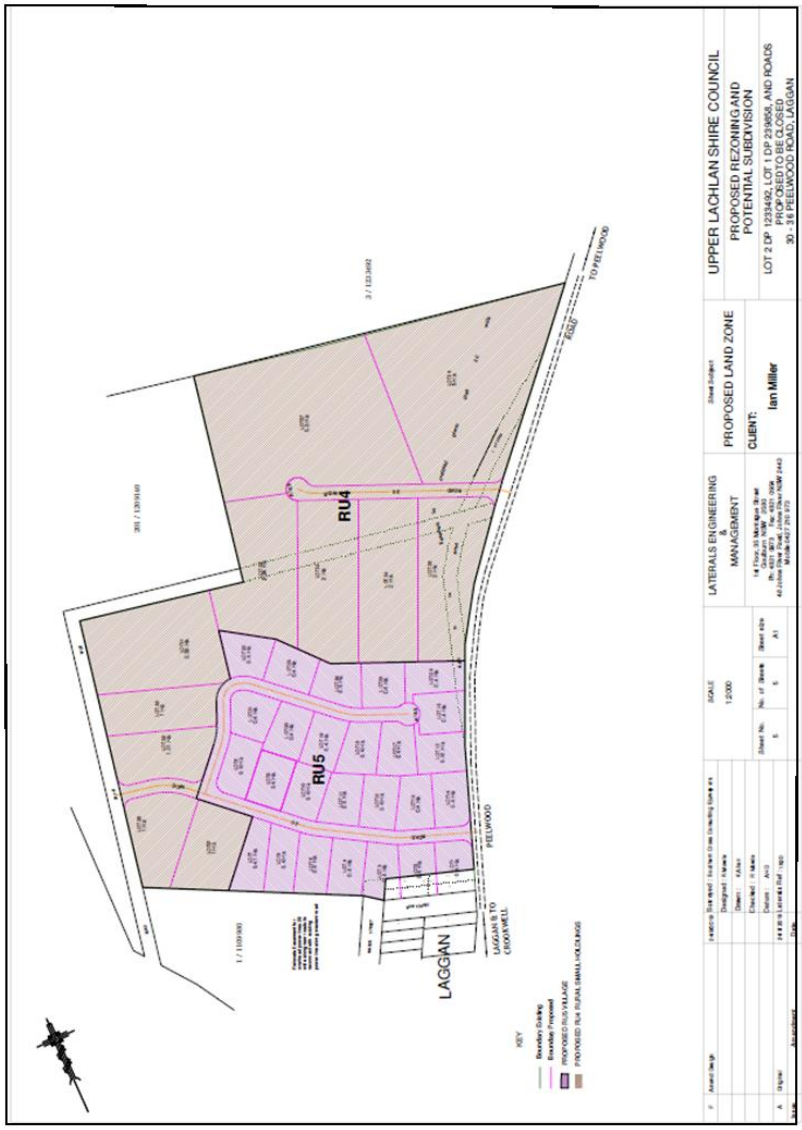
- Lot 2 DP 1233492 (part), Lot 1 DP 239858 and Lot 1 DP 1253980 from RU2 Rural Landscape zone to RU4 Rural Small Holdings zone and reduce the minimum lot size from 80ha to 1ha (part), 2ha (part) and 5ha (part) to enable agricultural small holdings to be created in accordance with this Planning Proposal and under the *Upper Lachlan Local Environmental Plan 2010* (LEP 2010).

PART 2 - EXPLANATION OF THE PROVISIONS

The proposed outcome will be achieved by an amendment to the *Upper Lachlan Local Environmental Plan 2010* as follows:

(1) Amending Upper Lachlan Land Zoning Maps - Sheets LZN_005 and LZN_005E by rezoning:

- Lot 2 DP 1233492 (part) from RU2 Rural Landscape to RU5 Village – see map below.
- Lot 2 DP 1233492 (part), Lot 1 DP 239858 and Lot 1 DP 1253980 from RU2 Rural Landscape to RU4 Rural Small Holdings – see map below.



Amendment to Upper Lachlan Land Zoning Maps – Sheets LZN_005 and LZN_005E
(Plan Source: Laterals Planning)

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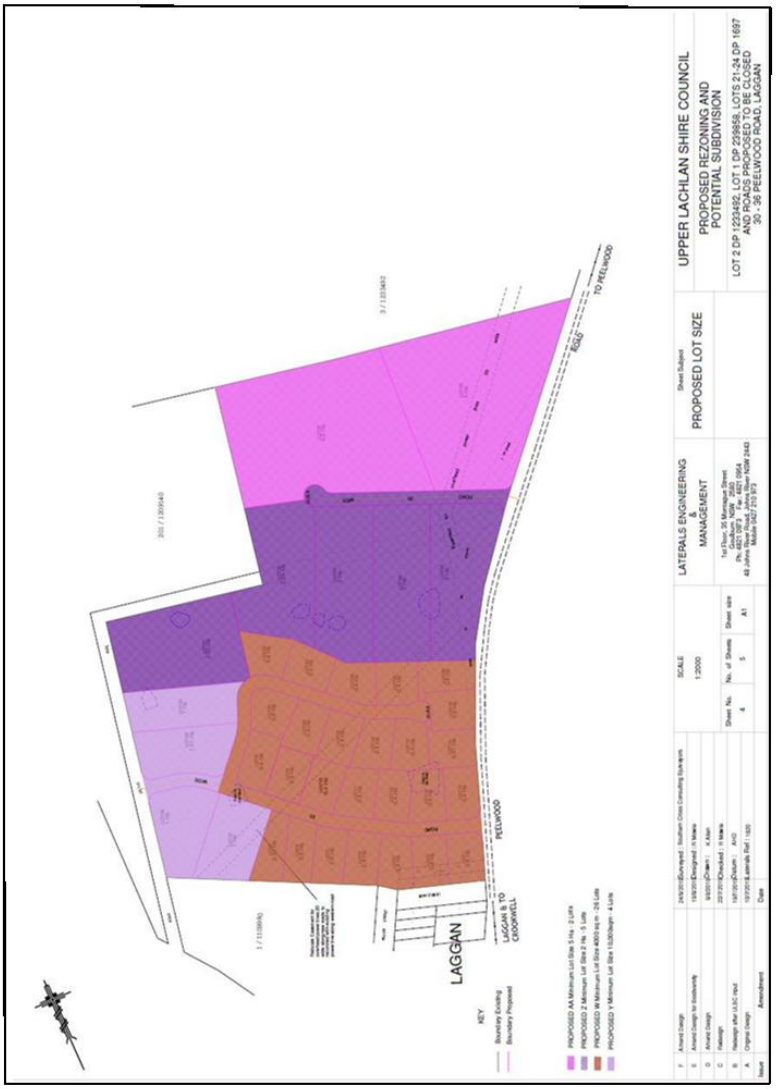
(2) Amending Upper Lachlan LEP 2010 Lot Size Maps – Sheets LSZ_005 and LSZ_005E by including:

- Lot 2 DP 264152 (part) identified as "W" having a Minimum Lot Size of 4000m^2 – see map below.
- Lot 2 DP 264152 (part) identified as "Y" having a Minimum Lot Size of 10000m^2 – see map below.
- Lot 2 DP 264152 (part), Lot 1 DP 1253980 and Lot 1 DP 239858 (part) identified as "Z" having a Minimum Lot Size of 2ha – see map below.
- Lot 2 DP 264152 (part) and Lot 1 DP 239858 (part) identified as "AA" having a Minimum Lot Size of 5ha – see map below.



Amendment to Upper Lachlan Lot Size Maps - Sheets LSZ_005 and LZN_005E
(Plan Source: Laterals Planning)

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PART 3 - JUSTIFICATION

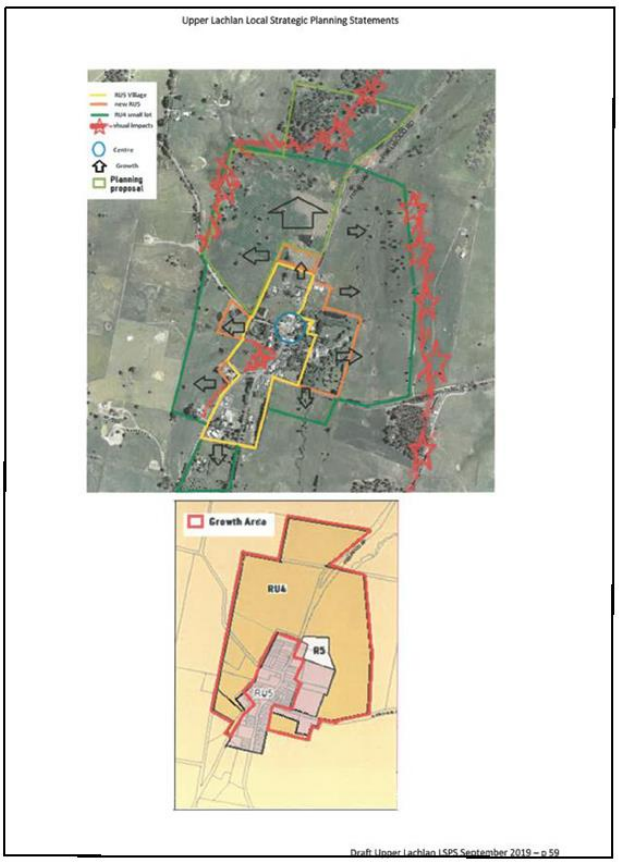
Section A – Need for Planning Proposal

1. ***Is the planning proposal a result of any strategic study or report?***

This planning proposal has been prepared by the property owner in response to the Upper Lachlan Local Strategic Planning Statement. The planning proposal is consistent with the Statement which aims to remedy population decline by providing:

- A diversified economy.
- A diverse agriculture based economy.
- Transition to renewable energy.
- Tourism as a value add development.
- Diversified housing options.
- Well planned rural residential housing and new village and hamlet opportunities.
- Local identity, heritage and environment conservation.
- Infrastructure and services to support growth.

Laggan is identified as a growth area within the Planning Statement – see below:



Upper Lachlan Strategic Planning Statement
(Plan Source: Upper Lachlan Local Strategic Planning Statement)

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The Planning Proposal will not further fragment this rural area and it will provide opportunity for diversification and innovation of agricultural production and custodianship of the environmental and scenic values. The development will manage potential for land use conflicts and provide a buffer and protect prime agricultural areas via the local environmental plan and development control provisions to ensure the objectives of the zone are fulfilled.

2. ***Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?***

It is considered that this planning proposal is the most appropriate means of achieving the proposed minimum lot size and rezoning for the subject land and is seeking this amendment in accordance with Section 3.21 of the *Environmental Planning and Assessment Act 1979* which states:

3.21 Review of environmental planning instruments (cf previous s 73)

(1) The Planning Secretary shall keep State environmental planning policies and councils shall keep their local environmental plans and development control plans under regular and periodic review for the purpose of ensuring that the objects of this Act are, having regard to such changing circumstances as may be relevant, achieved to the maximum extent possible.

(2) Every 5 years following such a review, the Planning Secretary is to determine whether relevant State environmental planning policies should be updated and a council is to determine whether relevant local environmental plans should be updated.

The objective of the planning proposal is able to be achieved by either:

(i) Include an additional permitted use for the particular land through Schedule 1 of the *Upper Lachlan Local Environmental Plan 2010*; or

(ii) Amend the Minimum Lot Size map (sheets LSZ_005 and LSZ_005E) and Land Zoning map (sheets LZN_005 and LZN_005E) for the particular land.

These options are considered below.

(i) Include an additional permitted use for the particular land through Schedule 1 of the *Upper Lachlan Local Environmental Plan 2010*.

The draft Planning Practice Note (Schedule 1 Additional Permitted Uses) includes the following applicable statements:

Introduction

The Standard Instrument adopts a land use zone based format for identifying permitted and prohibited land uses. Any uses permitted within the Land Use Table are applicable to the entire zone it relates to.

Clause 2.5 of the Standard Instrument Order allows councils to permit additional uses for particular land. These uses are permitted in addition to those identified in the LEP Land Use Table or other planning instruments such as the Infrastructure SEPP for that site only.

Additional permitted uses for particular land are to be inserted in Schedule 1 of the LEP.

Schedule 1 should only be used in exceptional circumstances

For reasons of clarity, land use permissibility should preferably be controlled by the zones and the Land Use Table.
Where this is not possible and the intended outcome is adequately justified by council, the use of Schedule 1 may be acceptable.
Additional listings in the LEP Schedule 1 should be minimised and should only proceed where council can demonstrate that there is no other acceptable solution to progress the matter.
For example, council should not use Schedule 1 where a rezoning via a planning proposal or adoption of a Development Control Plan can achieve the same outcome. In most cases a site could be rezoned to facilitate the use or the particular use could be included in the zone land use table to permit it in that zone across the local government area.

The use of Schedule 1 to insert additional land uses would certainly be appropriate but this option does not address the change to zonings or a variation to the minimum lot size. The proposal is not considered to be exceptional circumstances and the use of Schedule 1 is not the best method to achieve the objectives of this Planning Proposal.

(ii) Amend the Minimum Lot Size map (sheets LSZ_005 and LSZ_005E) and Land Zoning map (sheets LZN_005 and LZN_005E) for the particular land.

The proposed variation to the development standard can be achieved by amending Upper Lachlan Lot Size Map Sheets LSZ_005 and LSZ_005E and Land Zoning Map Sheets LZN_005 and LZN_005E by identifying the particular land having a minimum lot size as shown on the lot size map on page 12 and rezoning the land as shown on the zoning maps on page 11. Subsequent subdivision of the land is permissible pursuant to Clause 2.6 of the *Upper Lachlan Local Environmental Plan 2010*. The land is identified in the Upper Lachlan Local Strategic Planning Statement and reflects Council's desire for development in this area north of Laggan. The current zone, and land use table and lot size requirements are inflexible and do not permit residential or small lot rural development. Therefore, more suitable alternative zones and lot size requirements have been identified based on location and planning considerations. In order to facilitate zone and lot size changes, a Planning Proposal must be prepared. A zoning and lot size change cannot be facilitated any other way. The proposed zoning and lot size changes are considered to be the best method to achieve the objectives of the Planning Proposal.

Section B - Relationship to strategy planning framework

3. Is the planning proposal consistent with the objectives and actions of the applicable regional or sub-regional strategy?

The planning proposal is consistent with the objectives and actions contained within the *South East and Tablelands Regional Plan 2036* and *The Tablelands Regional Community Strategic Plan 2016-2036*.

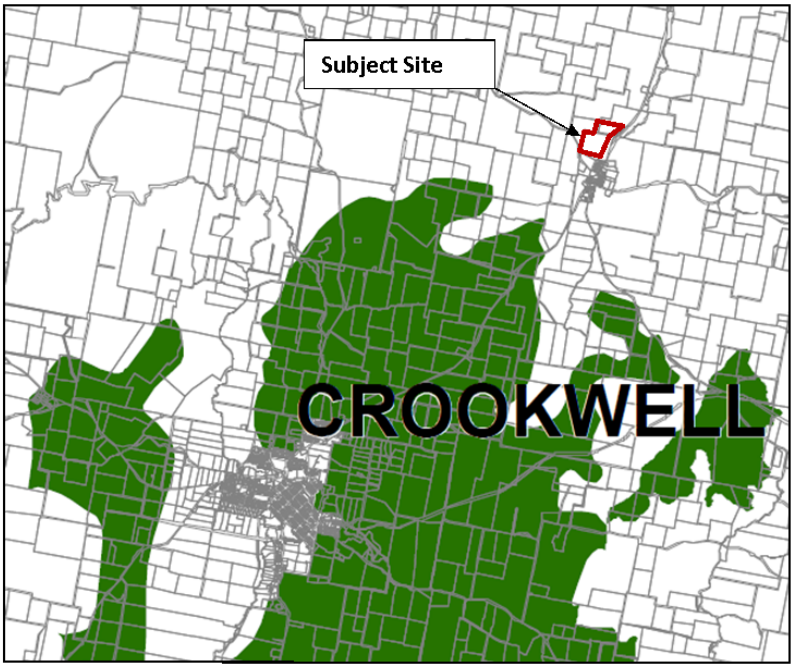
South East and Tablelands Regional Plan 2036

The Planning Proposal is consistent with the relevant goals of the *South East and Tablelands Regional Plan 2036*.

Goal 1: A connected and prosperous economy.

Direction 8 – Protect important agricultural land: The Direction states *"The South East and Tablelands offers stable and favourable growing conditions and easy access to export markets. It is well placed to take advantage of growing demand from Asia and the Sydney Basin, where the capacity to feed residents is forecast to drop from 20 per cent of food demand to less than six per cent over the next 15 years." and "Important agricultural land will be mapped to guide planning decisions, local environmental plans and infrastructure investment, and to provide information on important agricultural industries and resources. They may include biophysical attributes and socio-economic data."* Actions include *"Protect identified important agricultural land from land use conflict and fragmentation and manage the interface between important agricultural land and other land uses through local environmental plans."*

Comment: The important agricultural land is shown on the map below and the land the subject of this Planning Proposal does not impact on important agricultural land. The increased supply of residential land in this location with access to local businesses means more sustainable transport options and reduced travel times to employment opportunities which will result in a connected and prosperous community.



Biophysical Strategic Agricultural Land Map

(Map Source: NSW Dept of Planning, Industry and Environment website)

Goal 2: A diverse environment interconnected by biodiversity corridors.

Direction 15 - Enhance biodiversity connections: The Direction states *"Regional biodiversity corridors are native vegetation links within a region, between regions or between significant biodiversity features. They expand and link different habitats and are*

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critical to long-term ecological connections, particularly in the context of long-term climate change" and *"Land uses within regional biodiversity corridors should maintain and, where possible, enhance ecological connectivity."*
Comment: The land is currently used for sheep / cattle grazing as well as cropping of fodder crops and does not contain any significant tree vegetation and certainly no understory vegetation. The biodiversity is therefore substantially a monoculture. The Planning Proposal will result in the planting of locally sourced native vegetation within the road reserves and on the private property and will be implemented in accordance with a site specific development control plan. The site as a whole will therefore contribute to enhancing biodiversity connections.

Goal 3: Healthy and connected communities
Direction 22 - Build socially inclusive, safe and healthy communities: The Direction states *''Neighbourhoods and centres will be environmentally sustainable, socially inclusive, easy to access, healthy and safe. This is particularly important as the population ages and the climate changes. The design and location of recreation facilities, sporting infrastructure, parks and public buildings should encourage people to be physically active where they work and in their neighbourhoods. Neighbourhood communities will reconnect with the surrounding landscape via walkways, cycleways and public transport. These networks will be considered for extension as part of planning for residential release areas and renewal sites. With an older population, homes should be close to active and interesting public spaces, and should be well designed and adaptable. Adaptable housing has a flexible floor plan that enables simple modifications to suit the changing needs of residents. This allows people to stay in their own homes as they age, or as their level of mobility changes.''* Actions include *''Integrate walking and cycling networks into the design of new communities to encourage physical activity and promote energy efficiency in new development proposals.''*
Comment: These actions will be incorporated into the development.

Direction 23 - Protect the region's heritage: The Direction states *''Heritage is irreplaceable and should be appreciated, valued and protected for the benefit of current and future generations. Harm to Aboriginal objects and places, or areas of significance to Aboriginal people, should be avoided. Where impacts on Aboriginal and historic heritage cannot be avoided, appropriate heritage management mechanisms must be implemented. Areas of high growth can have cumulative impacts on Aboriginal cultural heritage values and historic places. Early investment at the strategic planning stage can protect and preserve heritage and provide greater certainty for stakeholders during the development assessment process.''*
Comment: An Aboriginal Due Diligence Assessment has been undertaken by Apex Archaeology and the assessment recommends:

- *No further Aboriginal archaeological assessment is required prior to the commencement of upgrade works as described in this report.*
- *The results of this assessment fulfil the requirement for Due Diligence in accordance with the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (Code of Practice). Works may proceed with caution.*
- *The proposed works must be contained to the area assessed during this due diligence assessment, as shown on Figure 1. If the proposed location is amended, further archaeological assessment may be necessary to determine if the proposed works will impact any Aboriginal objects or archaeological deposits.*

- *Should unanticipated archaeological material be encountered during site works, all work must cease and an archaeologist contacted to make an assessment of the find. Further archaeological assessment and Aboriginal community consultation may be required prior to the recommencement of works. Any objects confirmed to be Aboriginal in origin must be reported to the OEH under Division 1, Section 89A of the NPW Act*.

  Additionally, the expansion of the residential area of Laggan will result in an increase in population which will improve the viability of the existing Laggan Hotel being a locally listed heritage item (No. 1118– see Heritage map at Annexure D).

Goal 4: Environmentally sustainable housing choices.

Direction 24 - Deliver greater housing supply and choice: The Direction states *"Having a ready supply of well located land for residential development will create downward pressure on house prices, maximise use of existing infrastructure and protect environmentally sensitive areas."*

Comment: The subject land will provide an additional housing supply and choice and will cater to a range of housing types and household compositions. Future residents will have access to services, jobs and transport. This land can also cater to and support a specific demographic being the small area farmer.

Direction 28 - Manage rural lifestyles: The Direction states *''A consistent planning approach will identify suitable locations for new rural residential development that avoids fragmentation of productive agricultural land and lessens the impact on high environmental value assets, cultural and heritage assets, or areas with important rural landscapes. Rural residential development should not increase pressure on infrastructure and services, and should be located on land free from natural hazards.''* Action include *''Locate new rural residential areas:*

- *close to existing urban settlements to maximise the efficient use of existing infrastructure and services, including roads, water, sewer and waste services, and social and community infrastructure;*
- *to avoid and minimise the potential for land use conflicts with productive, zoned agricultural land and natural resources; and*
- *to avoid areas of high environmental, cultural and heritage significance, important agricultural land and areas affected by natural hazards.''*

Comment: This proposal satisfies the Actions of this direction in that the development:

- is close to existing an urban settlement to maximise the efficient use of existing infrastructure and services and social and community infrastructure;
- will avoid and minimise the potential for land use conflicts with productive, zoned agricultural land and natural resources; and
- will avoid areas of high environmental, cultural and heritage significance, important agricultural land and areas affected by natural hazards.

  This development maximises the use of existing infrastructure and services and doesn't require new services that would impose excessive costs on Council. The development is on the edge of an existing urban area and supports the Upper Lachlan Council narrative with regard to housing that is responding to demographic changes and housing affordability pressures by allowing a mix of housing types.

Local Narratives (Upper Lachlan)

The Narrative states "*The Upper Lachlan Local Government Area will see a 36 per cent growth in the number of people aged over 65 by 2036. The area has a population of around 8,000, with Crookwell and Gunning providing a health and medical service, a fire brigade, police services, banking, a post office and retail offerings*" and in respect to housing it states "*Support the rural lifestyle and the unique cultural and historic heritage of the area's villages''* and *''Support a variety of housing options and land developments to cater for an ageing population.''*

Comment: The Planning Proposal reflects the existing RU5 zone in Laggan by providing low density residential development which is very flexible, will offer a wide range of housing options whilst maintain the cultural and historic heritage of Laggan.

<u>The Tablelands Regional Community Strategic Plan 2016-2036</u>

The Tablelands Regional Community Strategic Plan 2016-2036 identifies the community aspirations via the strategic priorities that achieve the future visions for the region. These include:

- Environment
- Economy
- Community
- Infrastructure
- Civic Leadership

Each relevant strategic pillar is identified below:

Environment:

Strategy EN1 requires *''Protect and enhance the existing natural environment, including flora and fauna native to the region.''* The development site as a whole will protect and enhance the existing natural environment including flora and fauna native to the region and will result in the planting of locally sourced native vegetation within the road reserves and on the private property which will be implemented in accordance with a site specific development control plan.

Strategy EN2 requires *''Adopt environmental sustainability practices*.'' This development maximises the use of existing infrastructure and services and doesn't require new services and thereby provides an environmentally sustainable development.

Strategy EN3 requires *''Protect and rehabilitate waterways and catchments*.'' The development will ensure the existing waterway is protected from stock grazing by the erection of riparian fencing which will enable the waterway area to naturally rehabilitate.

Strategy EN4 requires *''Maintain a balance between growth, development and environmental protection through sensible planning.*'' It is considered that the approach taken to achieve this objective, including consideration of environmental constraints, the amendment to the zoning and minimum lot size of the subject land.

Economy:

Strategy EC3 requires *''Support and foster conditions that enable local and small/home-based businesses to grow.*'' The rezoning of land will provide the momentum for the rezoning aimed at achieving this objective. This is anticipated by the ample lot size and the location of the site near existing businesses in the locality to encourage Home occupations (permitted without consent) and Home Industries (permitted with consent) to establish in this location.

Strategy EC4 requires *''Foster and develop a diverse, adaptive and innovative agricultural industry.''* The inclusion of the RU4 Rural Small Holdings zone will encourage a diverse, adaptive and innovative agricultural industry to the locality.

Community:

Strategy C05 requires *''Maintain our rural lifestyle.''* The subject Planning Proposal is aimed at achieving this objective by providing residential lots adjacent to an urban boundary of a large area enabling a rural lifestyle to thrive in the locality.

Infrastructure:

Strategy IN3 requires *''Maintain and improve road infrastructure and connectivity.''* There is considered adequate infrastructure in the area to support the proposed residential development. New access roads linking with existing infrastructure will be constructed at the developers cost.

Leadership

Strategy CL4 requires *''Actively investigate and communicate funding sources and collaboration opportunities that can strengthen the region.''* The development will contribute funding towards the provision of services throughout the Upper Lachlan Council area in accordance with the Upper Lachlan Development Contributions Plan 2007.

4. Is the planning proposal consistent with a Council's local strategy or other local strategic plan?

(i) Upper Lachlan Shire Local Strategic Planning Statement 2040 (Draft):

The Planning Proposal is consistent with the *Upper Lachlan Shire Local Strategic Planning Statement 2040* (Draft) and in particular will provide an opportunity for new settlements close to existing urban service centres and provide value-adding to agriculture by small-scale intensive agriculture opportunities. Table 1 of the Statement (Upper Lachlan Shire Council Priorities, Principles and Actions) details the future directions for the Council area – see below.

Themes/ Planning Principles	**Priority 1 Non- Urban Land**	**Priority 2 Urban Land**	**Priority 3 Tourism**	**Priority 4 Business Development**
Drivers of Growth and Sustainability	1.1 Promote a diverse agriculture-based economy. Develop an agricultural strategy to provide for value-adding opportunities and succession.	2.1 Develop village residential opportunities in safe locations.	3.1 Identify and locate new tourism opportunities.	4.1 Promote a diversified transitioning economy and provide for small business development.
Productivity and collaborative diversity	1.2 Plan for diverse agro-businesses and agricultural land reform. Encourage vertical integration of the rural economy.	2.2 Zone land for mixed-use, aged care and tourism developments and provide for urban diversity.	3.2 Plan for new tourism and destination opportunities as an economic benefit.	4.2 Encourage a transition to renewable energy as a strength of the Upper Lachlan Shire Council.
Connectivity, transport and	1.3 Lobby for improved internet	2.3 Design towns for walking,	3.3 Continue to improve road	4.3 Promote smart hubs through

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movement	access and capacity. Continue to improve road access for commercial opportunities.	promote density and facilitate a mix of collaborative uses.	access and reuse of alternative transport facilities for destination activity.	broadband connections and decisive planning.
Character, Identity, and heritage,	1.4 Protect the rural landscape by focusing on new development in urban locations and providing for transitions to technologically aware agricultural economies	2.4 Manage and enhance the distinctive character of each village through a master plan. Develop Character Statements for urban development.	3.4 Leverage and celebrate our natural and cultural heritage, climate and natural beauty.	4.4 Reinforce the village town centre small business character and facilitate innovation
Lifestyle and livability	1.5 Provide opportunities for housing diversity and off-farm income to suit changing circumstances.	2.5 Provide new space to grow around existing villages and towns and provide for infill opportunities.	3.5 Conserve and adaptively reuse heritage assets. Enhance areas of high environmental value and significance.	4.5 Identify the commercial locations and focus points of the villages and structure business growth into them.
Population	1.6 Identify business opportunities that can value add to local business and attract investment and employment in the agriculture sector.	2.6 Lobby and promote the development of rural livability facilities in villages and towns.	3.6 Plan for increased human and infrastructure capacity in the tourism phenomena and new destination activities.	4.6 Plan for increased capacity in the alternative energy sector and seek value-adding options.
Landscape	1.7 Recognise the rural landscape as a productive element and identify environmentally sensitive aspects that need protecting.	2.7 Facilitate villages that are empathetic to the existing agri- scape: Small protectable bounded spaces.	3.7 Utilise the temperate climate landscape as a place for active recreation opportunities.	4.7 Create focal points by siting commercial activities within a mixed-use commercially driven precincts.
Structural Elements	1.8 Identify and protect high-value agricultural land: Review minimum lot size opportunities to facilitate agrarian investment.	2.8 Zone infill in existing villages.	3.8 Identify tourist- focused locations and provide for their development.	4.8 Identify growth localities close to Canberra, Yass and Goulburn.

The Planning Proposal is consistent with the directions highlighted in the above table insofar that the development will:

- Improve opportunities to develop village residential opportunities in safe locations.

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- Plan for diverse agro-businesses and agricultural land reform and encourage vertical integration of the rural economy.
- Enable a design for walking, promote density and facilitate a mix of collaborative uses.
- Provide new space to grow around existing villages and towns and will encourage infill opportunities.
- Provide opportunities that can value add to local business and attract investment and employment in the agriculture sector.
- Enable increased human and infrastructure capacity in the tourism phenomena and new destination activities.
- Recognise the rural landscape as a productive element and identify the waterway as an environmentally sensitive aspect that need protecting.
- Facilitate villages that are empathetic to the existing agri- scape.
- Identify this growth locality being close to Goulburn.

(ii) Upper Lachlan Shire Draft Housing Strategy:

The Upper Lachlan Shire Draft Housing Strategy includes the following vision in respect to population and housing:

> *"To manage the demand for housing and associated population growth in a sustainable way to support a prosperous future for the community of Upper Lachlan while recognising and preserving the particular values, characters and liveability of the existing villages and rural areas within the Shire."*

The strategy includes the following details regarding the growth of Laggan in the short to medium term:

> *''A key feature of the village is its predominantly linear growth along Laggan, Woodhouselee and Peelwood Roads with limited depth of development away from the road or along the bisect of Redground Heights Road or the Laggan-Taralga Road. Woodhouselee Road had also developed as a secondary spine for growth south of the village. Laggan is situated within a bowl and framed by prominent ridgelines to the east and north west that provide a clear delineation between the rural lands beyond and those observable from the village or key roads.*
>
> *There are opportunities to continue the northern village expansion towards the cemetery and west along Redground Heights Road. Some opportunity exists to preposition the large lot rural productive lands around the village to smaller lot productive uses to diversify the areas economic and aesthetic mix and ensure the village surrounds are focused as rural rather than large lot residential. The small number of residents ensure commercial uses are limited and mostly focused on weekend trade. This is unlikely to alter without a significant growth in the population. Accordingly, the village should retain its local small scale while providing additional tourism hospitality in the form of rural events that benefit from the existing uses and rural appeal such as weddings, special events, day spar resorts and rural winter retreats. Other than special events the overall nature of any experiences of Laggan benefit from its intimate and small scale.*
>
> *There is some opportunity to grow the village along Redground heights and*

further along the linear road. Spine however the primary growth areas are those beyond the village that cater for intensified rural production on small lots. The valley sides and along Reedy Creek are suitable to rural uses requiring intensive labor and capital that is contingent with specialization and diversification in rural production. The sector diversification in horticulture and animal husbandry can augment the traditional farming practices of the area and bring workers and tourists to the village.

A clear opportunity exists for a specialty café, with pop up option sites, located close to the village centre. The hotel car park and playground are two such areas a temporary use could be created. While the former Catholic Church on the corner of Laggan and Redground heights roads is similarly ideal location for business uses catering to tourism and farm gate opportunities."

The strategy includes the following recommended housing growth areas:

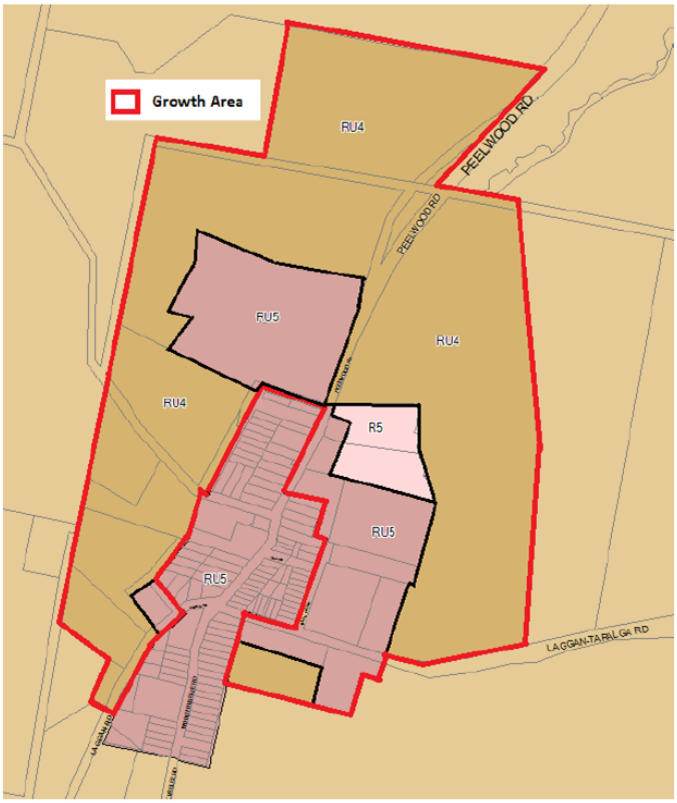

Figure 41. Laggan – recommended housing growth areas map

Recommended Housing Growth Area – Laggan
(Map Source: Upper Lachlan Shire Draft Housing Strategy October 2019)

The Planning Proposal complies with this identified growth area for Laggan.

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(iii) Upper Lachlan Community Strategic Plan Vision 2023:

The Upper Lachlan Community Strategic Plan Vision 2023 includes the following Vision and Mission Statement:

> ***The Vision for our future is:***
> *To be a diverse local government area that provides various lifestyle, business enterprise, leisure and recreation alternatives, whilst ensuring environmental sustainability, preservation of our history and a sense of belonging in our community.*
> ***Mission Statement:***
> *To provide services and facilities to enhance the quality of life and economic viability within the Council area.*

This planning proposal is consistent with the Upper Lachlan Community Strategic Plan Vision 2023 insofar that the development will provide for various lifestyle living opportunities whilst ensuring environmental sustainability, preservation of history and a sense of belonging in a community as well as providing services and facilities to enhance the quality of life and economic viability within the Council area. The large lot residential development will provide an opportunity for lifestyle, business enterprise, leisure and recreation alternatives for new residents to the area who will participate in the local community functions and organisations. The identified land does not impact on any historical items and there will be satisfactory environmental safeguards on future residential development with no likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal.

(iv) Upper Lachlan Local Environmental Plan 2010:

The land is currently zoned RU2 Rural Landscape Zone with the following objectives and land uses:

1 Objectives of zone

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To maintain the rural landscape character of the land.*
- *To provide for a range of compatible land uses, including extensive agriculture.*
- *To preserve environmentally sensitive areas including waterways and prevent inappropriate development likely to result in environmental harm.*
- *To protect the Pejar catchment area from inappropriate land uses and activities and minimise risk to water quality.*
- *To minimise the visual impact of development on the rural landscape.*
- *To minimise the impact of development on the existing agricultural landscape character.*
- *To protect and enhance the water quality of watercourses and groundwater systems and to reduce land degradation.*
- *To maintain areas of high conservation value vegetation.*

2 Permitted without consent

Building identification signs; Business identification signs; Environmental protection works; Extensive agriculture; Farm buildings; Home-based child care; Home occupations

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3 Permitted with consent

Aquaculture; Bed and breakfast accommodation; Cellar door premises; Dwelling houses; Farm stay accommodation; Garden centres; Hardware and building supplies; Landscaping material supplies; Light industries; Plant nurseries; Restaurants or cafes; Roads; Roadside stalls; Rural supplies; Secondary dwellings; Timber yards; Any other development not specified in item 2 or 4

4 Prohibited

Amusement centres; Boat building and repair facilities; Boat launching ramps; Boat sheds; Camping grounds; Car parks; Caravan parks; Charter and tourism boating facilities; Centre-based child care facilities; Commercial premises; Crematoria; Eco-tourist facilities; Entertainment facilities; Exhibition homes; Exhibition villages; Freight transport facilities; Function centres; Health services facilities; Heavy industrial storage establishments; Home occupations (sex services); Industrial retail outlets; Industrial training facilities; Industries; Jetties; Marinas; Mooring pens; Moorings; Mortuaries; Passenger transport facilities; Public administration buildings; Recreation facilities (indoor); Registered clubs; Residential accommodation; Respite day care centres; Restricted premises; Service stations; Sex services premises; Storage premises; Tourist and visitor accommodation; Truck depots; Vehicle body repair workshops; Vehicle repair stations; Warehouse or distribution centres; Water recreation structures; Wharf or boating facilities; Wholesale supplies

The land uses identified within the RU2 zone are not considered appropriate in this location being directly adjacent to a RU5 Village zone which has the likelihood of land use conflicts. The proposed RU4 zone with progressively increasing lot sizes away from the RU5 land will provide a much better development proposal and will minimise land use conflicts with the adjacent RU2 zone land uses. The Planning Proposal estimates that the identified land will permit 37 lots to be created with dwelling entitlements. The applicant estimates that the whole development is expected to be fully developed over a period of 10 years being approx. 4 lots / residences per year. It is reasonable to assume in this instance that each additional dwelling will domicile 4 persons on average and increase the population of Laggan up to 16 persons per year which will stimulate and support the vitality of Laggan. The subject land is proposed to be rezoned RU5 Village and RU4 Primary Production Small Lots under the Upper Lachlan LEP 2010 and the following zone objectives and land use table apply:

(i) RU5 Village Zone

1 Objectives of zone

- *To provide for a range of land uses, services and facilities that are associated with a rural village.*
- *To ensure the orderly and efficient use of land and infrastructure within each village.*
- *To improve the amenity of residential, commercial, civic and community uses within village areas.*
- *To conserve buildings, landscape features and streetscape features that contribute to the character and identity of village areas.*
- *To protect creeks and waterways that are associated with the village and surrounding area.*

- *To protect and enhance the water quality of watercourses and groundwater systems and to reduce land degradation.*
- *To maintain areas of high conservation value vegetation.*

2 ***Permitted without consent***
Building identification signs; Business identification signs; Environmental protection works; Home-based child care; Home occupations

3 ***Permitted with consent***
Bed and breakfast accommodation; Centre-based child care facilities; Community facilities; Dual occupancies; Dwelling houses; Home industries; Hotel or motel accommodation; Multi dwelling housing; Neighbourhood shops; Oyster aquaculture; Places of public worship; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Respite day care centres; Roads; Schools; Self-storage units; Seniors housing; Shop top housing; Tank-based aquaculture; Any other development not specified in item 2 or 4

4 ***Prohibited***
Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Boat building and repair facilities; Boat launching ramps; Boat sheds; Cellar door premises; Charter and tourism boating facilities; Correctional centres; Crematoria; Eco-tourist facilities; Electricity generating works; Extractive industries; Farm buildings; Forestry; Freight transport facilities; Funeral homes; Heavy industrial storage establishments; Helipads; Highway service centres; Home occupations (sex services); Industrial training facilities; Industries; Jetties; Marinas; Mooring; Mooring pens; Mortuaries; Open cut mining; Passenger transport facilities; Pond-based aquaculture; Recreation facilities (major); Research stations; Residential accommodation; Restricted premises; Roadside stalls; Rural industries; Sex services premises; Sewerage systems; Storage premises; Tourist and visitor accommodation; Transport depots; Truck depots; Warehouse or distribution centres; Waste or resource management facilities; Water recreation structures; Water supply systems; Wharf or boating facilities

The objectives of the RU5 Village Zone are examined below:

To provide for a range of land uses, services and facilities that are associated with a rural village.

The proposed development will provide for residential development that is associated with a rural village.

To ensure the orderly and efficient use of land and infrastructure within each village.

The proposed development will ensure the orderly and efficient use of the land and infrastructure within Laggan.

To improve the amenity of residential, commercial, civic and community uses within village areas.

The proposed development will improve the amenity of the area being directly adjacent to an existing residential area.

To conserve buildings, landscape features and streetscape features that contribute to the character and identity of village areas.

The proposed development will contribute to the character and identity of Laggan.

To protect creeks and waterways that are associated with the village and surrounding area.

The proposed development will have no impact on creeks and waterways that are associated with Laggan and surrounding area.

To protect and enhance the water quality of watercourses and groundwater systems and to reduce land degradation.
The assessment of the land for water management and waste water management in association with any proposed development requiring consent will ensure the protection and enhancement of the water quality of watercourses and groundwater systems to reduce land degradation. The proposed development will have no impact on the water quality of watercourses and groundwater systems in Laggan.

To maintain areas of high conservation value vegetation.
Part of the subject land is identified on the Upper Lachlan LEP 2010 Natural Resources Sensitivity—Biodiversity Map (Annexure E) and the Natural Resources Sensitivity—Land Map (Annexure F). The land is not identified on the Natural Resources Sensitivity—Water Map (Annexure G). Capital Ecology have undertaken an Ecological Values and Constraints Assessment of the site in a report dated 17 September 2019 – see Appendix Y) and the report states:

> *Overall, with consideration of the study area's land use history and current ecological values, it is our view that the proposed rezoning and subsequent subdivision and development of the study area is a reasonable proposition. Provided that the above recommendations are appropriately incorporated, development in the study area could be designed to avoid significant impacts upon the ecological values of the study area and locality.*

The proposed development will have no impact on high conservation value vegetation as it is not present on the subject land.

(ii) RU4 Primary Production Small Lots

1 ***Objectives of zone***
- *To enable sustainable primary industry and other compatible land uses.*
- *To encourage and promote diversity and employment opportunities in relation to primary industry enterprises, particularly those that require smaller lots or that are more intensive in nature.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To maintain the soil and water quality in good condition in association with the more intensive residential development of land within this zone.*
- *To protect and enhance the water quality of watercourses and groundwater systems and to reduce land degradation.*
- *To maintain areas of high conservation value vegetation.*

2 ***Permitted without consent***
Building identification signs; Business identification signs; Home-based child care; Home occupations

3 ***Permitted with consent***
Aquaculture; Bed and breakfast accommodation; Cellar door premises; Dwelling houses; Extensive agriculture; Farm buildings; Farm stay accommodation; Garden centres; Home industries; Intensive plant agriculture; Landscaping material supplies; Plant nurseries;

Roads; Roadside stalls; Rural supplies; Any other development not specified in item 2 or 4

4 ***Prohibited***

Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Aquaculture; Boat building and repair facilities; Boat launching ramps; Boat sheds; Camping grounds; Car parks; Caravan parks; Cemeteries; Charter and tourism boating facilities; Centre-based child care facilities; Commercial premises; Crematoria; Depots; Eco-tourist facilities; Entertainment facilities; Exhibition homes; Exhibition villages; Forestry; Freight transport facilities; Function centres; Heavy industrial storage establishments; Helipads; Highway service centres; Home occupations (sex services); Industrial retail outlets; Industrial training facilities; Industries; Information and education facilities; Intensive livestock agriculture; Jetties; Marinas; Mooring pens; Moorings; Mortuaries; Passenger transport facilities; Places of public worship; Public administration buildings; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Registered clubs; Research stations; Residential accommodation; Respite day care centres; Restricted premises; Rural industries; Service stations; Sex services premises; Storage premises; Tourist and visitor accommodation; Transport depots; Truck depots; Vehicle body repair workshops; Vehicle repair stations; Veterinary hospitals; Warehouse or distribution centres; Waste or resource management facilities; Water recreation structures; Wharf or boating facilities; Wholesale supplies

The objectives of the RU4 Primary Production Small Lots Zone are examined below:

To enable sustainable primary industry and other compatible land uses.

The proposed 2ha lots will permit a range of small scale and diverse primary industries in the area.

To encourage and promote diversity and employment opportunities in relation to primary industry enterprises, particularly those that require smaller lots or that are more intensive in nature.

The opportunity to undertake sustainable intensive primary industry activities on the small lots will result in employment opportunities to assist in this work being provided in the Laggan / Crookwell area.

To minimise conflict between land uses within this zone and land uses within adjoining zones.

The subject land is not located adjacent to broadscale agricultural activities but in an area dominated by low density sheep and cattle grazing. Residential development will be restricted between a 10m road boundary building setback and an 80m rear building exclusion zone – see proposed plan of subdivision at Annexure L. The RU4 Primary Production Small Lot zone is consistent with the adjoining RU2 Rural Landscape zone and land use conflicts will not arise.

To maintain the soil and water quality in good condition in association with the more intensive residential development of land within this zone.

The assessment of the land for water management and waste water management in association with proposed residential development will maintain the soil and water quality in good condition in association with the more intensive primary production / residential development of land within this zone. The subject land is not serviced by a reticulated water supply or sewerage system. It should be noted that Collector is not serviced by reticulated

water or sewerage. Rainwater tanks will therefore provide the source for potable water. Within the Upper Lachlan Council area having a population of 7,695 persons (2016 Census) only 2,984 persons (2016 Census) in the villages of Crookwell, Taralga and Gunning have access to reticulated water and sewerage services. The *Upper Lachlan DCP 2010* states that "*every dwelling erected on land to which this Plan applies will be required to have not less than 45,000 litres of roof water storage for domestic purposes*". It is also noted that the Upper Lachlan Council also provides free access to potable water for all residents from reticulated supplies in Gunning, Crookwell and Taralga.

To protect and enhance the water quality of watercourses and groundwater systems and to reduce land degradation.

The assessment of the land for water management and waste water management in association with any proposed development requiring consent will ensure the protection and enhancement of the water quality of watercourses and groundwater systems to reduce land degradation. A Feasibility Assessment for Wastewater Management has been undertaken by SEEC with a copy of the report at Annexure M.

To maintain areas of high conservation value vegetation.

Part of the subject land is identified on the Upper Lachlan LEP 2010 Natural Resources Sensitivity—Biodiversity Map (Annexure E) and the Natural Resources Sensitivity—Land Map (Annexure F). The land is not identified on the Natural Resources Sensitivity—Water Map (Annexure G). Capital Ecology have undertaken an Ecological Values and Constraints Assessment of the site in a report dated 17 September 2019 – see Appendix N) and the report states:

> *"Overall, with consideration of the study area's land use history and current ecological values, it is our view that the proposed rezoning and subsequent subdivision and development of the study area is a reasonable proposition. Provided that the above recommendations are appropriately incorporated, development in the study area could be designed to avoid significant impacts upon the ecological values of the study area and locality."*

The proposed development will have no impact on high conservation value vegetation as it is not present on the subject land.

5. Is the planning proposal consistent with applicable State Environmental Planning Policies?

The current State Environmental Planning Policies applying to the land are detailed below (Source: NSW Planning Portal - 5 June 2019):

SEPP (Affordable Rental Housing) 2009
SEPP (Building Sustainability Index: BASIX) 2004
SEPP (Concurrences) 2018
SEPP (Educational Establishments and Child Care Facilities) 2017
SEPP (Exempt and Complying Development Codes) 2008
SEPP (Housing for Seniors or People with a Disability) 2004
SEPP (Infrastructure) 2007
SEPP (Koala Habitat Protection) 2019
SEPP (Mining, Petroleum Production and Extractive Industries) 2007
SEPP (Miscellaneous Consent Provisions) 2007
SEPP (Primary Production and Rural Development) 2019
SEPP No 1—Development Standards

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SEPP No 21—Caravan Parks
SEPP No 33—Hazardous and Offensive Development
SEPP No 36—Manufactured Home Estates
SEPP No 44—Koala Habitat Protection
SEPP No 50—Canal Estate Development
SEPP No 55—Remediation of Land
SEPP No 64—Advertising and Signage
SEPP No 65—Design Quality of Residential Apartment Development

The applicable State Environmental Planning Policies are highlighted above and are discussed below:

(i) SEPP (Infrastructure) 2007:

State Environmental Planning Policy (Infrastructure) was gazetted on 1 January 2008 and aims:

(a) improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services, and
(b) providing greater flexibility in the location of infrastructure and service facilities, and
(c) allowing for the efficient development, redevelopment or disposal of surplus government owned land, and
(d) identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development), and
(e) identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and
(f) providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing, and
(g) providing opportunities for infrastructure to demonstrate good design outcomes.

The policy applies to all local government areas within the state, including Upper Lachlan Shire, and the SEPP requires consent to be sought for road, sewerage and stormwater infrastructure.

(ii) SEPP (Koala Habitat Protection) 2019:

State Environmental Planning Policy (Koala Protection) 2019 was gazetted on 1 March 2020 and aims:

This Policy aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

Clause 9 (*Development assessment process - no approved koala plan of management for Land*) states:

(1) This clause applies to land to which this Policy applies if the land—

(a) is identified on the Koala Development Application Map, and

(b) has an area of at least 1 hectare (including adjoining land within the same ownership), and

(c) does not have an approved koala plan of management applying to the land.

(2) Before a council may grant consent to a development application for consent to carry out development on the land, the council must take into account—

(a) the requirements of the Guideline, or

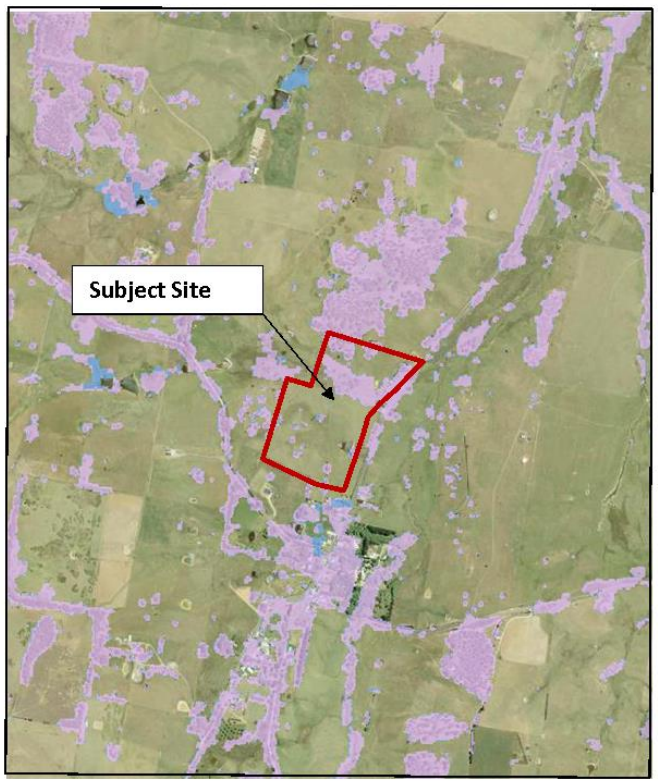
(b) information, prepared by a suitably qualified and experienced person in accordance with the Guideline, provided by the applicant to the council demonstrating that—

(i) the land does not include any trees belonging to the feed tree species listed in Schedule 2 for the relevant koala management area, or

(ii) the land is not core koala habitat.

In respect to the above items:

- The land is identified on the Koala Development Application Map – see below.



Koala Development Application Map

(Source: NSW Department of Planning, Industry and Environment web site)

In respect to the SEPP:

- The land has an area greater than 1ha.
- The land does not have an approved koala plan of management.
- The land does include the tree species *Eucalyptus dives* Broad Leaf Peppermint being a feed species identified in Schedule 2 Feed Tree Species for the Central and Southern Tablelands koala management area.

The ecological assessment of the subject land undertaken by Capital Ecology (see Annexure N) includes the following statements:

- *Patches of remnant native vegetation have been retained in the riparian zone along the larger tributary of Reedy Creek, and other patches have been retained on the higher elevated land in the north and southwest of the study area. The trees in the riparian zone are predominantly remnant Black Gum Eucalyptus aggregata and those on the higher land are a monoculture of Broad-leaved Peppermint Eucalyptus dives.* (Page 4)
- *Appendix B lists the fauna species recorded during the field survey. All of these are common species in NSW and the region.* (Page 13)

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Appendix B. Fauna Species Recorded

Class	Common name	Scientific name	BC Act status
Amphibia	Common Eastern Froglet	*Crinia signifera*	Protected
Amphibia	Whistling Tree Frog	*Litoria verreauxii*	Protected
Aves	Pacific Black Duck	*Anas superciliosa*	Protected
Aves	Grey Butcherbird	*Cracticus torquatus*	Protected
Aves	Australian Magpie	*Gymnorhina tibican*	Protected
Aves	Noisy Miner	*Manorina melanocephala*	Protected
Aves	Crimson Rosella	*Platycercus elegans*	Protected
Aves	Eastern Rosella	*Platycercus eximius*	Protected
Mammalia	European Rabbit	*Oryctolagus cuniculus*	-

- *As detailed in the Likelihood of Occurrence Assessment (refer to Appendix C), whilst there is some potential for several threatened or rare flora species to occur in the study area, the land use history and associated disturbance of the study area is likely to preclude the persistence of these species.*

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Appendix C. Likelihood of Occurrence Assessment

Key for below table

EPBC Act:	BC Act:
CE - critically endangered	CE1 - critically endangered species (Schedule 1, Part 1)
E - endangered	E1 - endangered species (Schedule 1, Part 2)
V - vulnerable	E2 - endangered population (Schedule 1, Part 2, Division 4)
CD - conservation dependent	E4 - presumed extinct (Schedule 3, Part 1)
	V1 - vulnerable species (Schedule 2, Part 3)

Note: The brief species distribution and habitat descriptions provided in the below table are sourced / appropriated from the threatened species online profiles, listing determinations and/or recovery plans prepared for the species by the Commonwealth Government and NSW Government. These resources and associated references are provided on the relevant government websites.

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Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Miniopterus schreibersii oceanensis Eastern Bent-wing Bat	-	V1	The Eastern Bent-wing Bat is a subspecies of the Common Bent-wing Bat, with a range thought to be from central Victoria to Cape York Peninsula, Queensland. It is a fast flyer, able to travel many kilometres in a night. Caves are the primary roosting habitat for this species however similar man-made structures are also used (culverts, eaves etc.). The species forages above the forest canopy.	Low This species has been recorded in the broader locality. It is possible that the species may visit the study area to forage, however the study area does not contain potential nesting resources or foraging resources of potential significance to the species.
Petauroides Volans Greater Glider	V	-	The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, with an elevational range from sea level to 1200 m above sea level. The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is primarily folivorous, and is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species	Low The species is not known to occur near the study area and was not recorded during the field survey.
Petrogale penicillata Brush-tailed Rock-wallaby	V	E1	In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. They occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. They browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	Negligible There is no potential habitat in the study area for the species.
Phascolarctos cinereus Koala (combined populations of Qld, NSW and the ACT)	V	V1	In NSW, the Koala mainly occurs on the central and north coasts with some populations in the western region. Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. They are solitary with varying home ranges. In high quality habitat home ranges may be 1-2 hectare and overlap, while in semi-arid country they are usually discrete and around 100 ha.	Low Old records exist of the species in the locality to the southwest. It is possible that the species may pass through the study area during movements through the broader locality, however the study area does not contain habitat of potential significance to the species.

The Appendix C extract above indicates that the likelihood of occurrence of koalas is low, however, an Ecological Impact Assessment prepared by a suitably qualified and experienced person will be required to inform any future development application.

(iii) SEPP (Primary Production and Rural Development) 2019:

State Environmental Planning Policy (Primary Production and Rural Development) 2019 was gazetted on 11 October 2019 and aims:

(a) to facilitate the orderly economic use and development of lands for primary production,

(b) to reduce land use conflict and sterilisation of rural land by balancing primary production, residential development and the protection of native vegetation, biodiversity and water resources,

(c) to identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations,

(d) to simplify the regulatory process for smaller-scale low risk artificial waterbodies, and routine maintenance of artificial water supply or drainage, in irrigation areas and districts, and for routine and emergency work in irrigation areas and districts,

(e) to encourage sustainable agriculture, including sustainable aquaculture,

(f) to require consideration of the effects of all proposed development in the State on oyster aquaculture,

(g) to identify aquaculture that is to be treated as designated development using a well-defined and concise development assessment regime based on environment risks associated with site and operational factors.

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The policy applies to all local government areas within the state, including Upper Lachlan Shire, and the following comments are in respect to the above aims:

- The Planning Proposal will not impact on the economic use and development of adjoining lands for primary production.
- The Planning Proposal is located directly adjacent to an existing RU5 Village zone and the proposed RU4 zone with progressively increasing lot sizes away from the RU5 land will minimise land use conflicts with the adjacent RU2 zone land uses. The Proposal is also consistent with the Upper Lachlan Draft Local Strategic Planning Statement 2010 and Draft Housing Strategy which balances primary production and residential development. Native vegetation, biodiversity and water resources will not be adversely impacted.

6. Is the planning proposal consistent with applicable Ministerial Directions (s.9.1 Directions)?

The following table is a list of Directions issued by the Minister for Planning to relevant planning authorities under Section 9.1 Directions by the Minister (previous s117) of the *Environmental Planning and Assessment Act 1979*. These directions apply to planning proposals lodged with the Department of Planning on or after the date the particular direction was issued:

Section 9.1 Directions	Issue Date/Date effective	Relevant	Inconsistent
1. Employment and Resources	1 July 2009 (Except for New Direction 1.2 effective 14 April 2016; Direction 1.1 effective 1 May 2017; New Direction 1.5 effective 28 February 2019)		
1.1 Business and Industrial Zones		No	-
1.2 Rural Zones		Yes	No
1.3 Mining, Petroleum Production and Extractive Industries		No	-
1.4 Oyster Aquaculture		No	-
1.5 Rural Lands		Yes	No
2. Environment and Heritage	1 July 2009 (Except for New Direction 2.5 effective 2 March 2016; Direction 2.1 and 2.4 effective 14 April 2016; Direction 2.2 effective 3 April 2018)		
2.1 Environment Protection Zones		No	-
2.2 Coastal Protection		No	-
2.3 Heritage Conservation		No	-
2.4 Recreation Vehicle Areas		No	-
2.5 Application of E2 and E3 Zones and Environmental Overlays in Far North Coast LEP's		No	-
3. Housing, Infrastructure and Urban Development	1 July 2009 (Except for New Direction 3.6 effective 16 February 2011; Direction 3.1, 3.2, 3.4 and 3.5 effective 14 April 2016; Direction 3.7 effective 15 February 2019)		
3.1 Residential Zones		Yes	No
3.2 Caravan Parks and Manufactured Home Estates		No	-
3.3 Home Occupations		No	-
3.4 Integrating Land Use and Transport		No	-
3.5 Development Near Licensed Aerodromes		No	-
3.6 Shooting Ranges		No	-
3.7 Reduction in non-hosted short term rental accommodation period		No	-
4. Hazard and Risk	1 July 2009 (Except for new Direction 4.2 effective 12 April 2016)		
4.1 Acid Sulphate Soils		No	-
4.2 Mine Subsidence and Unstable Land		No	-

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4.3 Flood Prone Land		Yes	No
4.4 Planning for Bushfire Protection		Yes	No
5. Regional Planning	1 July 2009 (Except for New Direction 5.2 effective 3 March 2011; Direction 5.4 effective 21 August 2015; Direction 5.9 effective 30 September 2013; Direction 5.8 and 5.10 effective 14 April 2016; Direction 5.1 and 5.3 effective 1 May 2017) Direction 5.11 effective 6 February 2019)		
5.1 Implementation of Regional Strategies		Yes	No
5.2 Sydney Drinking Water Catchments		No	-
5.3 Farmland of State and Regional Significance on the NSW Far North Coast		No	-
5.4 Commercial and Retail Development along the Pacific Highway North		No	-
5.5 Development in the vicinity of Ellalong, Paxton and Millfield (Cessnock LGA) (Revoked 18 June 2010)		No	-
5.6 Sydney to Canberra Corridor (Revoked 10 July 2008. See amended Direction 5.1)		-	-
5.7 Central Coast (Revoked 10 July 2008.		No	-
5.8 Second Sydney Airport: Badgerys Creek		No	-
5.9 North West Rail Link Corridor Strategy		No	-
5.10 Implementation of Regional Plans		Yes	No
5.11 Development of Aboriginal Land Council land		No	-
6. Local Plan Making	1 July 2009		
6.1 Approval and Referral Requirements		Yes	No
6.2 Reserving Land for Public Purposes		No	-
6.3 Site Specific Provisions		No	-
7. Metropolitan Planning	14 January 2015 Except for Direction 7.2 effective 22 September 2015; Direction 7.3: effective 9 December 2016; Direction 7.4: effective 15 May 2017; Direction 7.5: effective 25 July 2017; Direction 7.6: effective 5 August 2017; Direction 7.7: effective 22 December 2017; Direction 7.8: effective 20 August 2018; Direction 7.9: effective: 25 September 2018; Direction 7.10: effective 25 September 2018		
7.1 Implementation of A Plan for Growing Sydney		No	-
7.2 Implementation of Greater Macarthur Land Release Investigation		No	-
7.3 Parramatta Road Corridor Urban Transformation Strategy		No	-
7.4 Implementation of North West Priority Growth Area Land Use and Infrastructure Implementation Plan		No	-
7.5 Implementation of Greater Parramatta Priority Growth Area Land Use and Infrastructure Implementation Plan		No	-
7.6 Implementation of Wilton Priority Growth Area Interim Land Use and Infrastructure Implementation Plan		No	-
7.7 Implementation of Glenfield to Macarthur Urban Renewal Corridor		No	-
7.8 Implementation of Western Sydney Aerotropolis Interim Land Use and Infrastructure Implementation Plan		No	-
7.9 Implementation of Bayside West Precincts 2036 Plan		No	-
7.10 Implementation of Planning Principles for the Cooks Cove Precinct		No	-

The applicable s9.1 Directions (highlighted above) are discussed below:

DIRECTION 1.2: RURAL ZONES

Objective

(1) The objective of this direction is to protect the agricultural production value of rural land.

What a relevant planning authority must do if this direction applies

(4) A planning proposal must:

(a) not rezone land from a rural zone to a residential, business, industrial, village or tourist zone.

Consistency

(5) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the provisions of the planning proposal that are inconsistent are:

(a) justified by a strategy which:

(i) gives consideration to the objectives of this direction,

(ii) identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites), and

(iii) is approved by the Director-General of the Department of Planning, or

(b) justified by a study prepared in support of the planning proposal which gives consideration to the objectives of this direction, or

(c) in accordance with the relevant Regional Strategy or Sub-Regional Strategy prepared by the Department of Planning which gives consideration to the objective of this direction, or

(d) is of minor significance.

Comment:

The Planning Proposal seeks to rezone some land from a rural zone (RU2) to a residential zone (RU5) and is justified in terms of the minor significance of the proposal and consistency with the Rural Zones SEPP and being consistent with the Upper Lachlan Draft Local Strategic Planning Statement 2010 and Draft Housing Strategy and the South East and Tablelands Regional Plan 2036 and the Sydney - Canberra Regional Strategy 2006 - 2031.

DIRECTION 1.5: RURAL LANDS

Objectives

(1) The objectives of this direction are to:

(a) protect the agricultural production value of rural land,

(b) facilitate the orderly and economic development of rural lands for rural and related purposes.

What a relevant planning authority must do if this direction applies

(4) A planning proposal to which clauses 3(a) or 3(b) apply must be consistent with the Rural Planning Principles listed in State Environmental Planning Policy (Rural Lands) 2008.

(5) A planning proposal to which clause 3(b) applies must be consistent with the Rural Subdivision Principles listed in State Environmental Planning Policy (Rural Lands) 2008.

Note: State Environmental Planning Policy (Rural Lands) 2008 does not require a relevant planning authority to review or change its minimum lot size(s) in an existing LEP. A relevant planning authority can transfer the existing minimum lot size(s) into a new LEP. However,

where a relevant planning authority seeks to vary an existing minimum lot size in an LEP, it must do so in accordance with the Rural Subdivision Principles listed in State Environmental Planning Policy (Rural Lands) 2008.

Consistency

(6) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the provisions of the planning proposal that are inconsistent are:

(a) justified by a strategy which:

i. gives consideration to the objectives of this direction,

ii. identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites, and

iii. is approved by the Director-General of the Department of Planning and is in force, or

(a) is of minor significance.

Comment:

An increase in the permissible density of land is justified in terms of the minor significance of the proposal and consistency with the Rural Lands SEPP as detailed below:

- The planning proposal is adjacent to an existing village;
- The proposal is consistent with the Upper Lachlan Draft Local Strategic Planning Statement 2010 and Draft Housing Strategy;
- The proximity of the subject land to Laggan and adjoining land with a minimum lot size of 4,000m^2 will ensure that the proposal will not result in fragmentation of farm land;
- The proximity of the site to Laggan and adjoining land with minimum lot size of 4,000m^2 ensures the proposal will increase compatibility and minimise any potential for land use conflicts caused by intensive agricultural uses;
- The proximity of the subject land to the Peelwood Road and network of local roads will minimise the potential for land use conflicts;
- The planning proposal will have minimal environmental impact on the local biodiversity and water resources;
- The subject land is adequately serviced in terms of electricity, telecommunications, road network and associated services (e.g. school bus and postal services). The proximity to Goulburn and Canberra will ensure ready access to all the services (e.g. health, education, employment, etc.).
- The progressive increase in lot sizes away from the RU5 land will minimise land use conflicts with the adjacent RU2 zone land uses

The proposal will therefore facilitate the orderly and economic development of rural lands for rural and related purposes by the provisions of rural lifestyle living in close proximity to an existing urban centre thereby reducing fragmentation of rural lands.

DIRECTION 3.1: RESIDENTIAL ZONES

Objectives

(1) The objectives of this direction are:

(a) to encourage a variety and choice of housing types to provide for existing and future housing needs,

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(b) to make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, and

(c) to minimise the impact of residential development on the environment and resource lands.

Where this direction applies

(2) This direction applies to all relevant planning authorities.

When this direction applies

(3) This direction applies when a relevant planning authority prepares a planning proposal that will affect land within:

(a) an existing or proposed residential zone (including the alteration of any existing residential zone boundary),

(b) any other zone in which significant residential development is permitted or proposed to be permitted.

What a relevant planning authority must do if this direction applies

(4) A planning proposal must include provisions that encourage the provision of housing that will:

(a) broaden the choice of building types and locations available in the housing market, and

(b) make more efficient use of existing infrastructure and services, and

(c) reduce the consumption of land for housing and associated urban development on the urban fringe, and (d) be of good design.

(5) A planning proposal must, in relation to land to which this direction applies:

(a) contain a requirement that residential development is not permitted until land is adequately serviced (or arrangements satisfactory to the council, or other appropriate authority, have been made to service it), and

(b) not contain provisions which will reduce the permissible residential density of land. Consistency

(6) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the provisions of the planning proposal that are inconsistent are:

(a) justified by a strategy which:

(i) gives consideration to the objective of this direction, and

(ii) identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites), and

(iii) is approved by the Director-General of the Department of Planning, or

(b) justified by a study prepared in support of the planning proposal which gives consideration to the objective of this direction, or

(c) in accordance with the relevant Regional Strategy, Regional Plan or Sub-Regional Strategy prepared by the Department of Planning which gives consideration to the objective of this direction, or

(d) of minor significance.

Comment:

The RU5 zone will allow for a variety of housing types and will have access to existing infrastructure and services in Laggan and Crookwell. The subject land is located adjacent to existing residential zoned land and is not located in an area of environmental or resource significance.

DIRECTION 4.3: FLOOD PRONE LAND

Objectives

(1) The objectives of this direction are:

(a) to ensure that development of flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005, and

(b) to ensure that the provisions of an LEP on flood prone land is commensurate with flood hazard and includes consideration of the potential flood impacts both on and off the subject land.

Where this direction applies

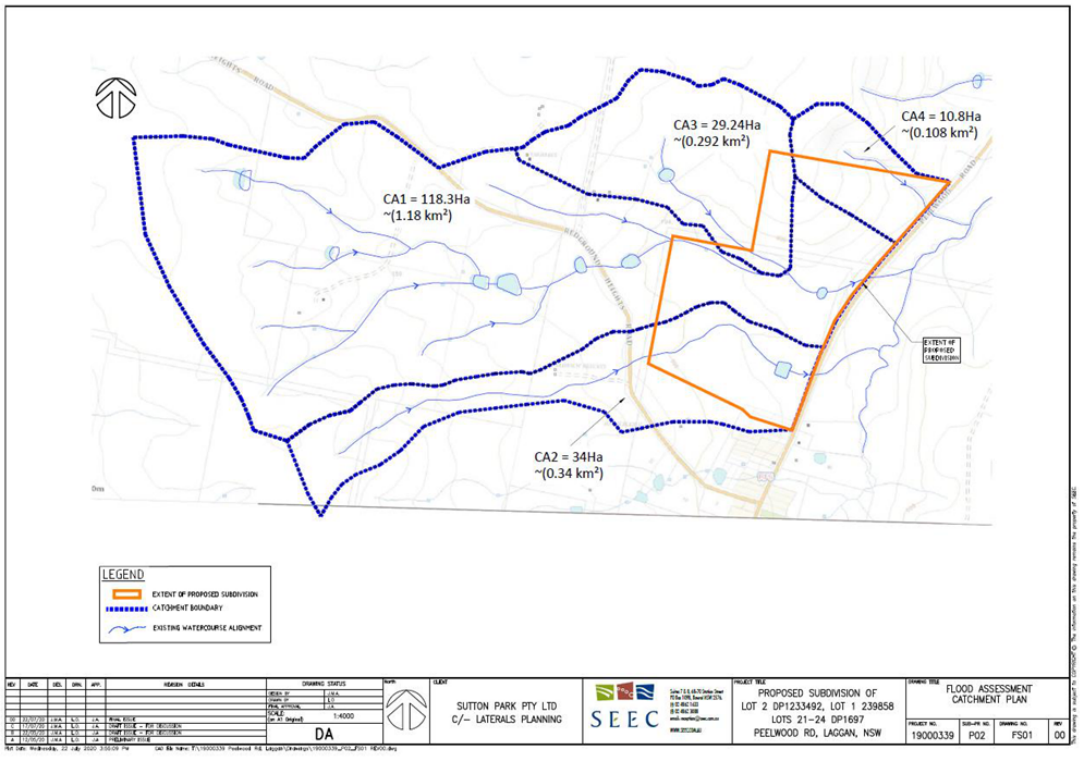
(2) This direction applies to all relevant planning authorities that are responsible for flood prone land within their LGA.

When this direction applies

(3) This direction applies when a relevant planning authority prepares a planning proposal that creates, removes or alters a zone or a provision that affects flood prone land.

Comment:

The land is not located in a hydrologic catchment and contains a small number of overland flow paths and intermittent creeks which drain to the east and discharge to Reedy Creek – see below.



Flood Assessment Catchment Plan

(Plan Source: Strategic Environmental and Engineering Consulting)

A preliminary Flood Assessment has been undertaken by Strategic Environmental and Engineering Consulting (SEEC) (see Annexure O) and the conclusion states that "*Section 6*

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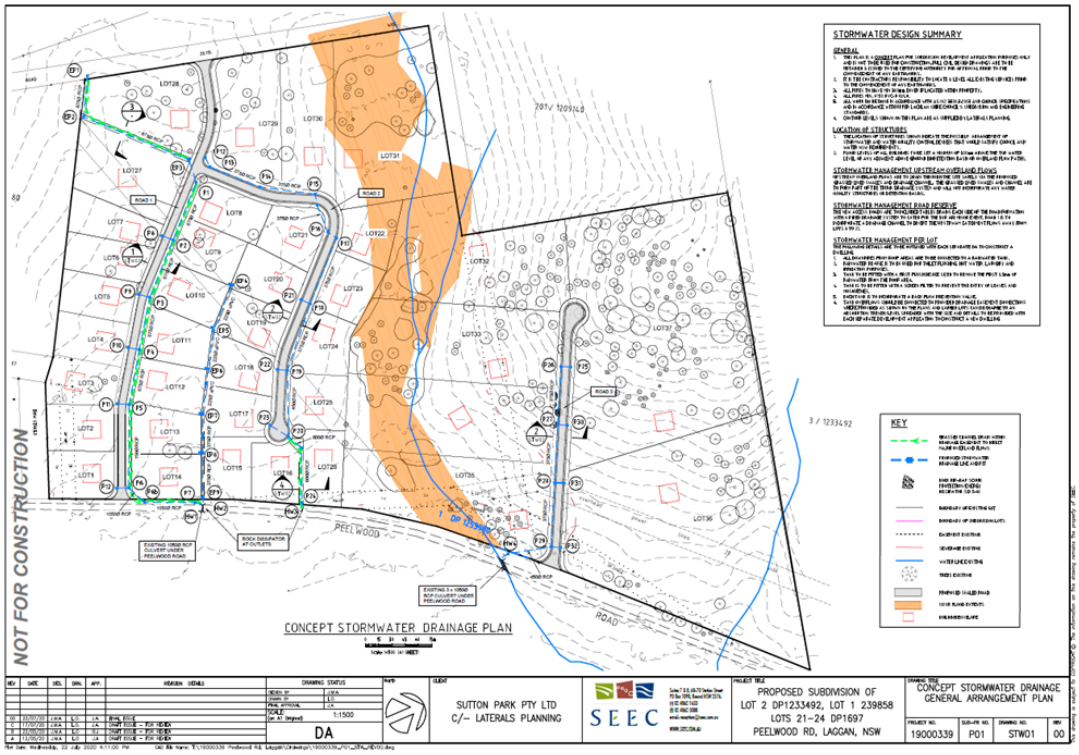
and the plan in Appendix D of this report detail the predicated flood assessment results. They illustrate the flood extents within the site and critical flow details for the pre and post development, 1% and 20%AEP (100 and 5 Year ARI) flood events.
It is proposed to retain the existing watercourse identified as Reach 1 and it is proposed to divert the upstream catchment contributing to Reach 2 away from the proposed lots 8 to 21 and redirect flows down the proposed new Road 1 via a combination of piped drainage system and grassed drainage channels. Preliminary post development modelling shows that this is achievable.
It is recommended that the floor level of any future dwellings adjacent to Reach 1 and any of the proposed drainage channels shown on the concept stormwater drainage plans are to be set 0.5m above the predicated 1% AEP flood level and not cut into the existing natural surface."

The land is not flood prone and a Conceptual Stormwater Drainage Plan is shown below:



Conceptual Stormwater Drainage Plan
(Plan Source: Strategic Environmental and Engineering Consulting)

DIRECTION 4.4: PLANNING FOR BUSHFIRE PROTECTION

Objectives

(1) The objectives of this direction are:

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

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

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What a relevant planning authority must do if this direction applies

(4) In the preparation of a planning proposal the relevant planning authority must consult with the Commissioner of the NSW Rural Fire Service following receipt of a gateway determination under section 56 of the Act, and prior to undertaking community consultation in satisfaction of section 57 of the Act, and take into account any comments so made,

(5) A planning proposal must:

(a) have regard to Planning for Bushfire Protection 2006,

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

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

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

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

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

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

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

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

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

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

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

Consistency

(7) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the council has obtained written advice from the Commissioner of the NSW Rural Fire Service, to the effect that, notwithstanding the non-compliance, the NSW Rural Fire Service does not object to the progression of the planning proposal.

Comment:

The subject land is located in a bushfire prone area – see extract from the Upper Lachlan Bushfire Prone Land map at Annexure H. Only a small part of the development area is shown to be bushfire prone and a preliminary bushfire assessment has been undertaken by Australian Bushfire Solutions with a copy of the report at Annexure P which concludes that:

"This assessment indicates that that an APZ of 15m will be required and as the subdivision development is within a grassland environment, building construction requirements in conformity with AS 3959 – 1999 will not be required."

DIRECTION 5.1: IMPLEMENTATION OF REGIONAL STRATEGIES

Objective

(1) The objective of this direction is to give legal effect to the vision, land use strategy, policies, outcomes and actions contained in regional strategies.

What a relevant planning authority must do if this direction applies

(4) Planning proposals must be consistent with a regional strategy released by the Minister for Planning.

Consistency

(5) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General), that the extent of inconsistency with the regional strategy:

(a) is of minor significance, and

(b) the planning proposal achieves the overall intent of the regional strategy and does not undermine the achievement of its vision, land use strategy, policies, outcomes or actions.

Comment:

An increase in the permissible density of land is justified in terms of its consistency with Regional Strategy (see Annexure M and N). The proposal is consistent with the outcomes and actions nominated in Regional Strategies. The site is located in close proximity to an existing urban centre.

DIRECTION 5.10: IMPLEMENTATION OF REGIONAL PLANS

Objective

(1) The objective of this direction is to give legal effect to the vision, land use strategy, goals, directions and actions contained in Regional Plans.

Where this direction applies

(2) This direction applies to land to which a Regional Plan has been released by the Minister for Planning.

When this direction applies

(3) This direction applies when a relevant planning authority prepares a planning proposal.

What a relevant planning authority must do if this direction applies

(4) Planning proposals must be consistent with a Regional Plan released by the Minister for Planning.

Consistency

(5) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Secretary of the Department of Planning and Environment (or an officer of the Department nominated by the Secretary), that the extent of inconsistency with the Regional Plan:

(a) is of minor significance, and

(b) the planning proposal achieves the overall intent of the Regional Plan and does not undermine the achievement of its vision, land use strategy, goals, directions or actions.

Comment:
The planning proposal is consistent with the objectives and actions contained within the Sydney - Canberra Regional Strategy 2006 - 2031. See Section B, Item 3 above.

DIRECTION 6.1: LOCAL PLAN MAKING
Objective
(1) The objective of this direction is to ensure that LEP provisions encourage the efficient and appropriate assessment of development.
Where this direction applies
(2) This direction applies to all relevant planning authorities.
When this direction applies
(3) This direction applies when a relevant planning authority prepares a planning proposal.
What a relevant planning authority must do if this direction applies
(4) A planning proposal must:
(a) minimise the inclusion of provisions that require the concurrence, consultation or referral of development applications to a Minister or public authority, and
(b) not contain provisions requiring concurrence, consultation or referral of a Minister or public authority unless the relevant planning authority has obtained the approval of:
(i) the appropriate Minister or public authority, and
(ii) the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General), prior to undertaking community consultation in satisfaction of section 57 of the Act, and
(c) not identify development as designated development unless the relevant planning authority:
(i) can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the class of development is likely to have a significant impact on the environment, and
(ii) has obtained the approval of the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) prior to undertaking community consultation in satisfaction of section 57 of the Act.
Consistency
(5) A planning proposal must be substantially consistent with the terms of this direction.
Comment:
This Planning Proposal will not introduce any additional burdens to future development proponents that require concurrence, consultation or referral to the Minister or public authority.

Section C - Environmental, Social and Economic Impact

7. ***Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal?***
An ecological assessment of the subject land has been undertaken by Capital Ecology and a copy is attached at Annexure N. This assessment includes the following background information and conclusions:
   (i) **Background:**
   This EVCA provides preliminary identification and assessment of the values of recognised biodiversity conservation significance occurring within the study area, specifically those currently listed pursuant to the Commonwealth Environment

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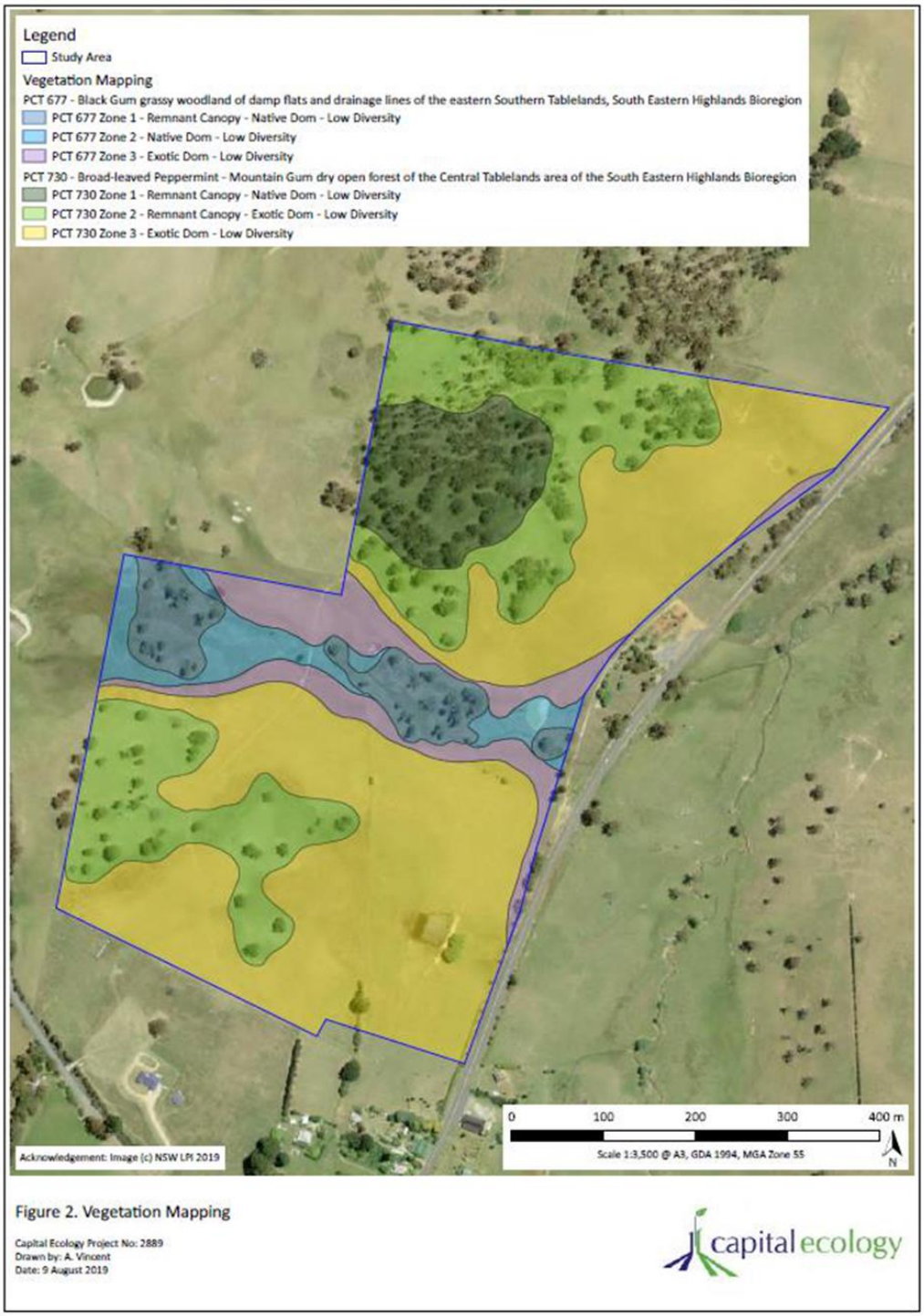
Protection and Biodiversity Conservation Act 1999 (EPBC Act) and/or the NSW Biodiversity Conservation Act 2016 (BC Act).
This EVCA has been prepared based on:
• the results of database searches for the study area, including the Commonwealth EPBC Act Protected Matters Search Tool (PMST), and NSW Wildlife Atlas (BioNet);
• a review of relevant studies and other background information, including the surveys and sources referenced herein;
• a field survey on 24 June 2019, completed to assess and record the ecological values of the study area; and
• the knowledge of the authors regarding the biota of the locality, specifically the threatened ecological communities, flora, and fauna (and associated habitat) with the potential to occur in the lowland grassland, woodland and forest ecosystems of the South Eastern Highlands bioregion of NSW.

(ii) Conclusions and Recommendations:
The following are the key conclusions or our assessment.
1. The study area's climax vegetation communities have been highly degraded by the land use history and associated vegetation and landform modification. Notwithstanding this, the patches designated 'PCT 677 Zone 1' and 'PCT 677 Zone 2' still support the canopy cover and/or the groundstorey floristic diversity sufficient to meet the listing criteria for the BC Act listed 'Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland' TEC.
2. The areas designated 'PCT 677 Zone 1', 'PCT 730 Zone 1', and 'PCT 730 Zone 2' have sufficient remnant canopy cover to constitute native vegetation under the BC Act. Additionally, 'PCT 677 Zone 2' has sufficient groundstorey cover of native species to constitute native vegetation under the BC Act.
3. The area designated 'PCT 677 Zone 1' contains the EPBC Act and BC Act listed species Black Gum Eucalyptus aggregata. Additionally, 'PCT 677 Zone 1' and 'PCT 677 Zone 2' both contain potential habitat for the EPBC Act and BC Act listed species River Swamp Wallaby-grass Amphibromus fluitans. Targeted surveys between November and March would be required to confirm presence/absence of this species.
Considering the above, we recommend the following for the proposed subdivision of the study area.
1. Impacts to vegetation zones 'PCT677 Zone 1' and 'PCT677 Zone 2' (refer Figure 2) should be avoided to the greatest extent practicable. Any proposed action/development impacting 'PCT677 Zone 1' would require referral to the Commonwealth DoEE under the EPBC Act due to the impact on a MNES (Black Gum). Additionally, both the above vegetation zones meet the criteria for the BC Act listed TEC 'Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland'. Any impact upon this TEC would trigger the BOS requirement to prepare a BDAR, likely resulting in the generation of a biodiversity offset liability.
2. Minimise the clearance of native vegetation. Any development proposal that would involve the clearance of 1 ha or more of the area classified as BC Act Native Vegetation (refer Figure 3) would trigger the BOS requirement to prepare an BDAR. If the clearance of over 1 ha of native vegetation cannot be avoided, then we note that impacts to PCT 677 are likely to be more constrained (i.e. more difficult

approval process and/or generate a greater offset liability) than PCT 730, and this should be considered in the planning process accordingly (as part of a BDAR).
3. Conducting targeted surveys for the EPBC Act and BC Act listed species River Swamp Wallaby-grass is unwarranted at this time, given the potential habitat for this species is confined to vegetation zones 'PCT677 Zone 1' and 'PCT677 Zone 2' which are already highly constrained due to their being a BC Act listed TEC and habitat for an EPBC Act and BC Act listed threatened species (Black Gum). We note that targeted surveys for River Swamp Wallaby-grass would be required for the preparation of a BDAR or EPBC Act referral, both of which would be required if impacts to 'PCT677 Zone 1' or 'PCT677 Zone 2' were proposed. As discussed above, we recommend avoiding these zones in any planned action/development to avoid EPBC Act referral and avoid triggering the BOS and its requirement to prepare a BDAR.
4. If the above described avoidance of the study area's listed values is not feasible, and therefore the BOS is triggered, a BDAR would need to be prepared for submission with the development application. We note that a BDAR requires floristic and targeted surveys which are subject to seasonal requirements. As mentioned above, the area designated 'PCT 677 Zone 1 and Zone 2' are likely to be highly constrained from a biodiversity perspective. Clearance of more than 1 ha of the native vegetation in 'PCT 730 Zone 1 and Zone 2' is likely to be approved, however it would result in the generation of a biodiversity offset liability, the value of which is determined by applying the BAM and preparation of a BDAR.
5. The conservation and rehabilitation of riparian land has many benefits both at the site scale and catchment scale (e.g. biodiversity improvement, control of erosion and sedimentation of receiving waterways etc.). Indeed, due to the very high benefit to cost ratio, rehabilitation of riparian land in the NSW South East Highlands bioregion is a top priority for the NSW Government. This means that conservation funding (e.g. through Landcare, NSW Environment Trust etc.) is prioritised for projects that involve direct conservation and rehabilitation of riparian land. As such, and given the significant conservation status and degree of constraint applicable to PCT 677 in the study area, we believe that funding could be successfully obtained to pay for rehabilitation works in PCT 677. Accordingly, we recommend that consideration be given during subdivision design and planning to establish PCT 677 Zone 1 and Zone 2 as a conservation area. This would involve fencing off the area to exclude stock, ongoing weed control, and potentially planting Black Gum and other native species to augment the existing vegetation (noting that in the absence of stock grazing the Black Gum are likely to regenerate naturally from the seed from the remaining mature trees).

The proposed plan of subdivision at Annexure L has been prepared in accordance with this ecological assessment and it is expected that the required restrictions on the development of the land will be achieved by restrictions on land titles and/or the preparation of a Conservation Agreement under the *Biodiversity Conservation Act 2016* being required by a future development consent. Therefore, there is no likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of this planning proposal.

Vegetation Mapping, Native Vegetation and Threatened Species Habitat and Ecological Communities mapping is shown on the following pages 46 to 48.



Capital Ecology Ecological Assessment – Figure 2 Vegetation Mapping

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Capital Ecology Ecological Assessment – Figure 3 Native Vegetation

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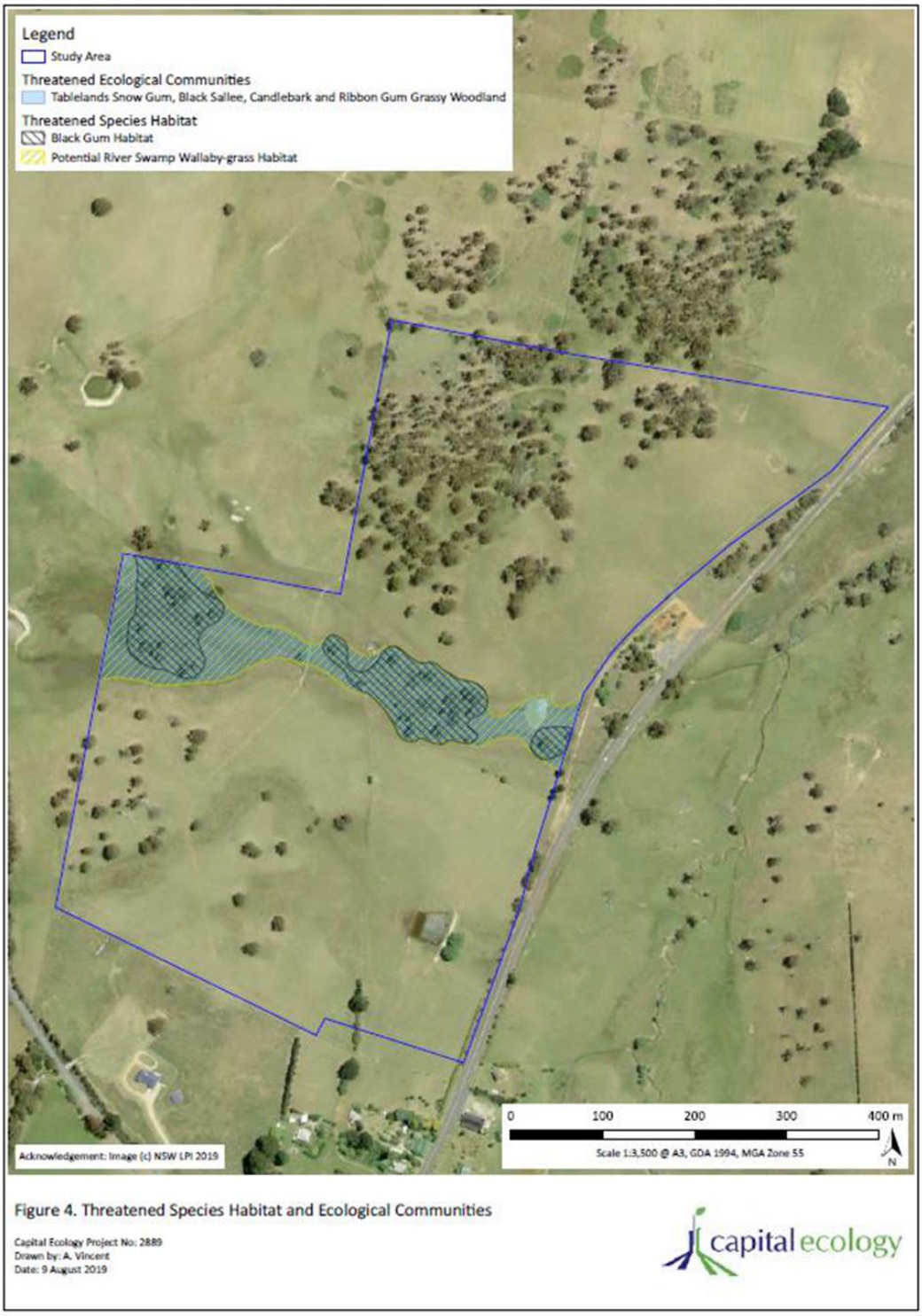

Capital Ecology Ecological Assessment – Figure 4 Threatened Species Habitat and Ecological Communities

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8. *Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?*

The study area is located within the flat and gently undulating and open slopes of an area immediately north of Laggan. The area is approx. 750m long and 450m wide with topography ranging from flat land to sloping landform with grades up to approx. 10%. The NSW Environment and Heritage Land and Soil Capability Mapping defines the study area as generally Class 4 incorporating *"Moderate to severe limitations. Land generally not capable of sustaining high impact land uses unless using specialised management practices with high level of knowledge, expertise, inputs, investment and technology. Limitations are more easily managed for lower impact land uses (e.g. grazing)."*

The land is not capable of sustaining high impact land uses and soil types include sand, sandy loam, clay and gravel of varying depth and moderate fertility. There are also a few outcrops of silty sandstone and quartz. The land is not located in a hydrologic catchment and contains a small number of overland flow paths and intermittent creeks which drain to the east to Reedy Creek. A preliminary Flood Assessment has been undertaken by Strategic Environmental and Engineering Consulting (SEEC) and a copy of the Assessment is included as Annexure O:

The Assessment concludes that:

> *"This report provides preliminary flood information to aid with future planning of the site with regards to future lot layout and building envelope locations. It is a study of the major water course flowing through the site only and does not include other minor tributaries/ drainage depressions within the site. Modelling of these should be included in a future detailed drainage assessment of the site along with other considerations such as stormwater and effluent disposal from future dwellings and site stability assessments.*
>
> *Section 6 and the plan in Appendix C of this report detail the results. They illustrate the flood extents within the site and critical flow details for the worst case, pre-development, 100 year ARI flood event.*
>
> *The results show the extent of the 100 year flood event within Byrnes Creek would be retained mainly within the existing creek alignment leaving sufficient areas for siting future building envelopes with levels above the future flood planning levels. The site also sits outside of the flood plain as described in the recent Collector Flood Study, 2014."*

There is no indication of any site contamination that would cause environmental or health impacts. Given the proximity to waste disposal facilities at Crookwell would suggest that illegal disposal of waste on the site is highly unlikely. There are no other likely environmental effects as a result of the planning proposal and the proposal is unlikely to have a significant impact on the environment or any adjoining lands.

9. *How has the planning proposal adequately addressed any social and economic effects?*

The area has a long history of agricultural use. The proposal provides an opportunity to achieve the highest and best use of land with suitable environmental protection measures.

The subject land is not identified as a heritage item nor is located in a heritage conservation area. An Aboriginal Due Diligence Assessment prepared by Apex Archaeology (copy at Annexure Q) concludes:

- No previously recorded Aboriginal sites are located within the study area.

- No archaeological material was identified on the ground surface within the study area.
- The study area is assessed as having no potential for subsurface archaeological deposits and this is confirmed by the site inspection.

The planning proposal will provide a positive economic impact in the Upper Lachlan Council area and particularly in the locality of Laggan and Crookwell.

Section D - State and Commonwealth Interests

10. Is there adequate public infrastructure for the planning proposal?

The study area is adequately serviced in terms of electricity, telecommunications and associated services (e.g. school bus and postal services). The area permits ready access to all the benefits offered by Goulburn, Crookwell and Canberra (e.g. health, education, employment, waste management facilities, recreational and social, etc.) via the classified roads and Hume Highway. The subject land is not serviced by reticulated water supply or mains sewer.

Access to development within the study area will be via the Peelwood Road and Redground Heights Road being under the care and control of the Upper Lachlan Shire Council. The proposed plan of subdivision at Annexure L includes a public road connecting Peelwood Road and Redground Heights Road which will permit traffic generated by the development to access these roads at grade intersections. The upgrading of road infrastructure and any additional public roads will be at the expense of the developer. A Traffic and Parking Impact Assessment has been prepared by Motion Traffic Engineers (copy at Annexure R). The report concludes that:

Based on the considerations presented in this report, it is considered that:

Traffic

- *The proposed Rezoning and Potential Subdivision is a moderate trip generator for the weekday AM and PM peak hour.*
- *The additional trips from the proposed Rezoning and Subdivision can be accommodated at the nearby intersections without noticeably affecting intersection performance, delays or queues.*
- *There are no traffic engineering reasons why a development consent for the proposed Rezoning and Potential Subdivision development at 30-36 Peelwood Road in Laggan should be refused.*

11. What are the views of State and Commonwealth public authorities consulted in accordance with the gateway determination?

Any requirement to consult State and Commonwealth public authorities, as advised by the Department, will be undertaken in accordance with the relevant community consultation requirements.

PART4-MAPPING

The following maps are included as part of the Planning Proposal:

Annexure A	Deposited Plans - DP 1233492 - Sheet 1, DP 239858 – Sheets 1, 2 and 3, DP1253980 – Sheet 1
Annexure B	Upper Lachlan LEP 2010 Zoning Map (Current)
Annexure C	Upper Lachlan LEP 2010 Minimum Lot Size Map (Current)
Annexure D	Upper Lachlan LEP 2010 Heritage Map
Annexure E	Upper Lachlan LEP 2010 NRS Biodiversity Map
Annexure F	Upper Lachlan LEP Natural Resource Sensitivity Land Map
Annexure G	Upper Lachlan LEP Natural Resource Sensitivity Water Map
Annexure H	Upper Lachlan Bushfire Prone Land Map
Annexure I	Land Subject to the Planning Proposal
Annexure J	Upper Lachlan LEP 2010 Zoning Map (Amended)
Annexure K	Upper Lachlan LEP 2010 Minimum Lot Size Map (Amended)
Annexure L	Proposed Subdivision Development

PART 5 - COMMUNITY CONSULTATION

The document "A guide to preparing local environmental plans" outlines the consultation required for different types of planning proposals and the gateway determination will specify the community consultation that must be undertaken on the planning proposal. It is expected that the exhibition period for this low impact proposal will be 14 days. A 'low' impact planning proposal is a planning proposal that, in the opinion of the person making the Gateway determination is:

- consistent with the pattern of surrounding land use zones and/or land uses;
- consistent with the strategic planning framework;
- presents no issues with regard to infrastructure servicing;
- not a principal LEP;
- does not reclassify public land.

The Planning Proposal will be notified in local newspapers that circulate the area affected, Council's website, in writing to adjoining landowners and public authorities. Details of the Planning Proposal and how to make a submission will be included in this notification. Laterals Planning will respond to any feedback from the Council, public authorities and the community in relation to the Planning Proposal.

PART 6 PROJECT TIMELINE

The following project timeline is provided for the planning proposal:

Anticipated commencement date *(date of Gateway determination):*

October 2020

Anticipated timeframe for the completion of required technical information:

November 2020

Timeframe for government agency consultation *(pre and post exhibition as required by Gateway determination):*

January / February 2021

Commencement and completion dates for public exhibition period:

April / May 2021

Dates for public hearing (if required):

Not required

Timeframe for consideration of submissions:

June 2021

Timeframe for the consideration of a proposal post exhibition:

June 2021

Date of submission to the department to finalise the LEP:

July 2021

Anticipated date RPA will make the plan (if delegated):

August 2021

Anticipated date RPA will forward to the department for notification:

August 2021

CONCLUSION and RECOMMENDATION

An assessment of the Planning Proposal has been completed in accordance with the guidelines prepared by NSW Department of Planning and is the best means of achieving the intended outcome of the planning proposal to rezone and amend the lot size for certain land being:

- Lot 2 DP 1233492 (part) from RU2 Rural Landscape zone to RU5 Village zone and reduce the minimum lot size from 80ha to 4,000m^2 to enable the development of dwelling houses on lots to be created in accordance with this Planning Proposal and under the *Upper Lachlan Local Environmental Plan 2010* (LEP 2010).

- Lot 2 DP 1233492 (part) and Lot 1 DP 239858 from RU2 Rural Landscape zone to RU4 Rural Small Holdings zone and reduce the minimum lot size from 80ha to 1ha (part) 2ha (part) and 5ha (part) to enable agricultural small holdings to be created in accordance with this Planning Proposal and under the *Upper Lachlan Local Environmental Plan 2010* (LEP 2010).

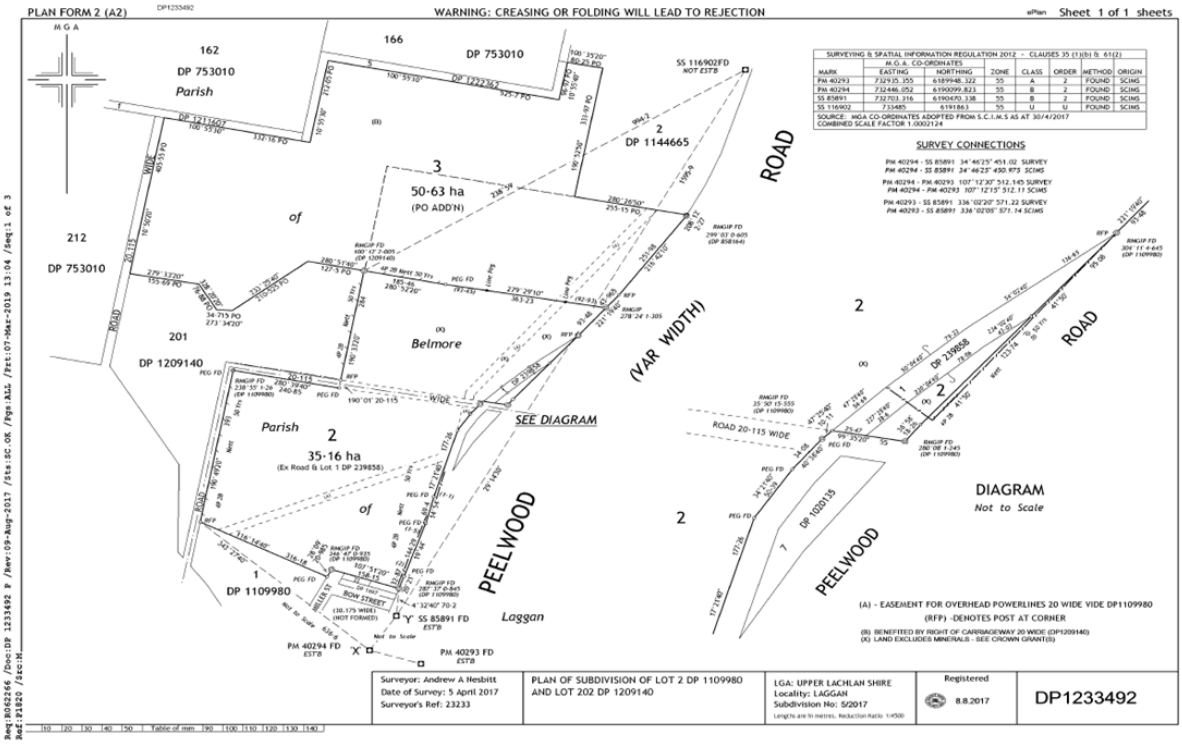
It is recommended that the Planning Proposal be endorsed by the Upper Lachlan Shire Council and forwarded to the Minister for Planning for a Gateway Determination in accordance with the *Environmental Planning and Assessment Act 1979* on the following grounds:

- An increase in the permissible density of land is justified in terms of its consistency with the objectives and actions contained within the *South East and Tablelands Regional Plan 2036* and *The Tablelands Regional Community Strategic Plan 2016-2036*.
- The Planning Proposal is consistent with the Upper Lachlan Shire Local Strategic Planning Statement 2040 (Draft) and in particular will provide an opportunity for new settlements close to existing urban service centres and provide value-adding to agriculture by small-scale intensive agriculture opportunities.
- The Planning Proposal complies with this identified growth area for Laggan.
- The Planning Proposal is consistent with the Upper Lachlan Community Strategic Plan Vision 2023 insofar that the development will provide for various lifestyle living opportunities whilst ensuring environmental sustainability, preservation of history and a sense of belonging in a community as well as providing services and facilities to enhance the quality of life and economic viability within the Council area.
- The proximity of the subject land to Laggan will support economic growth within the Upper Lachlan Council area and particularly in the Laggan / Crookwell environs.
- There is a demand for this type of development in the Upper Lachlan area.
- The Planning Proposal also meets all the relevant State, Regional and Local planning policies.

ANNEXURES

ANNEXURE A

DEPOSITED PLAN 1233492 - Sheet 1



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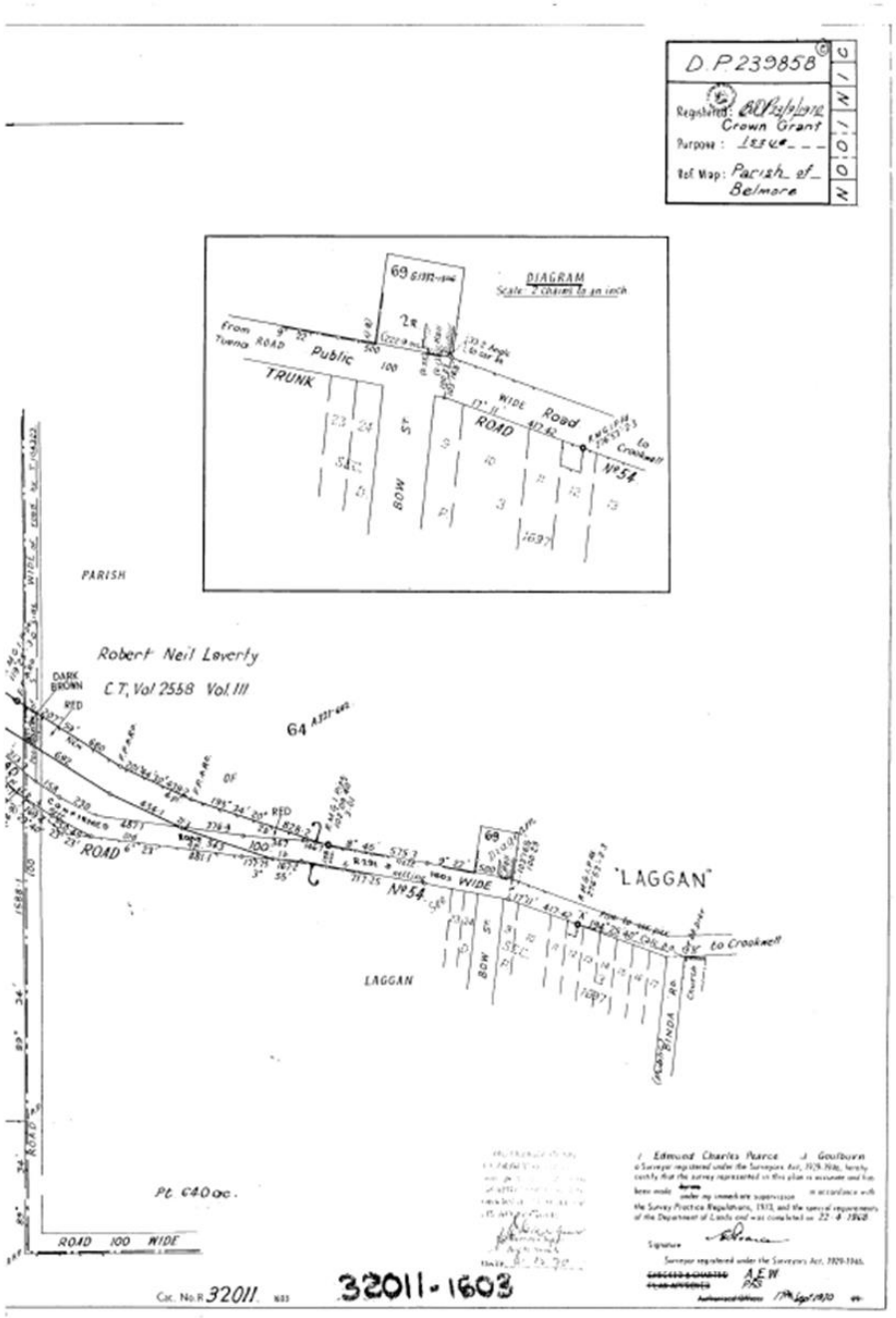
DEPOSITED PLAN 239858 – Sheet 1



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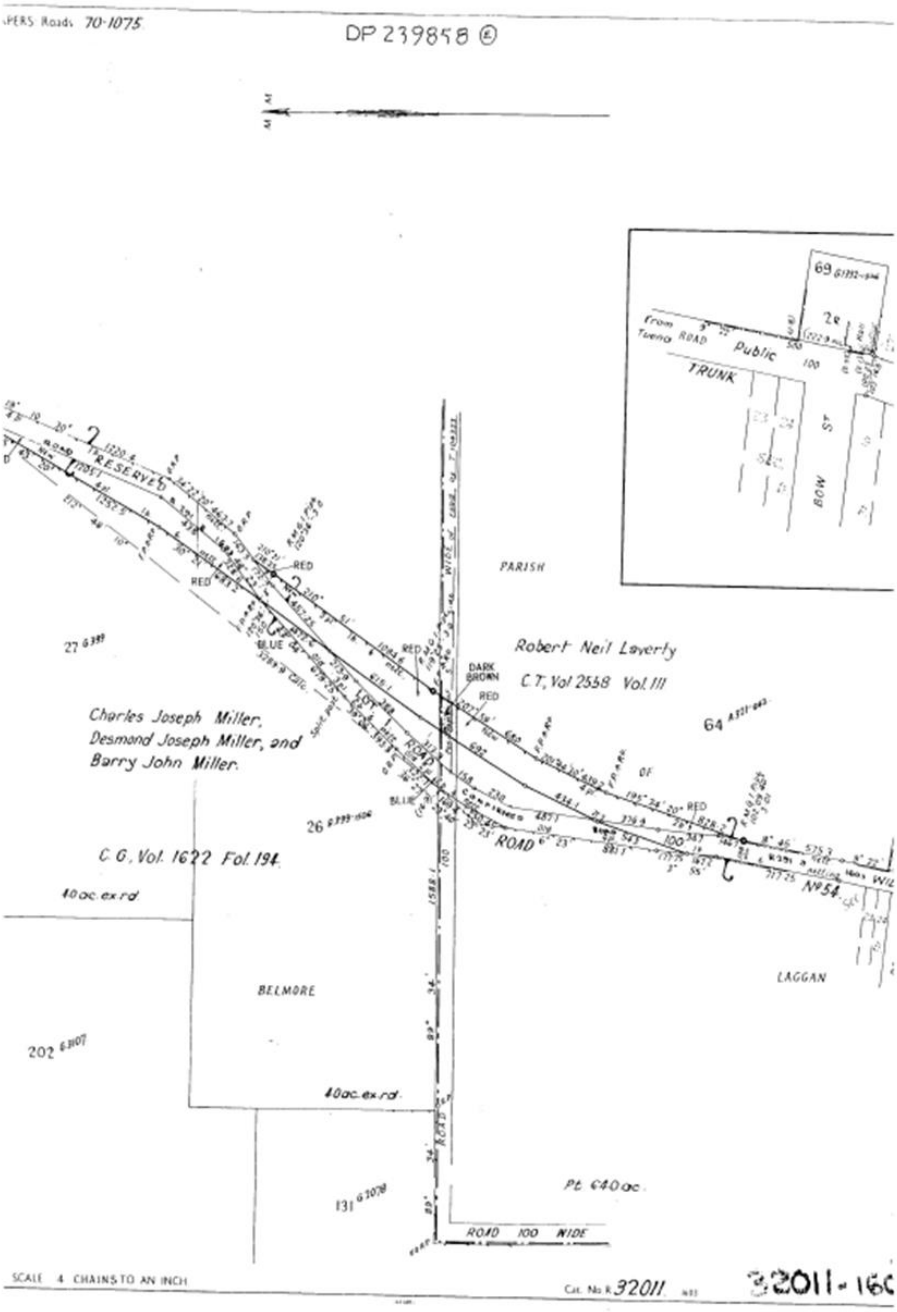
DEPOSITED PLAN 239858 – Sheet 2



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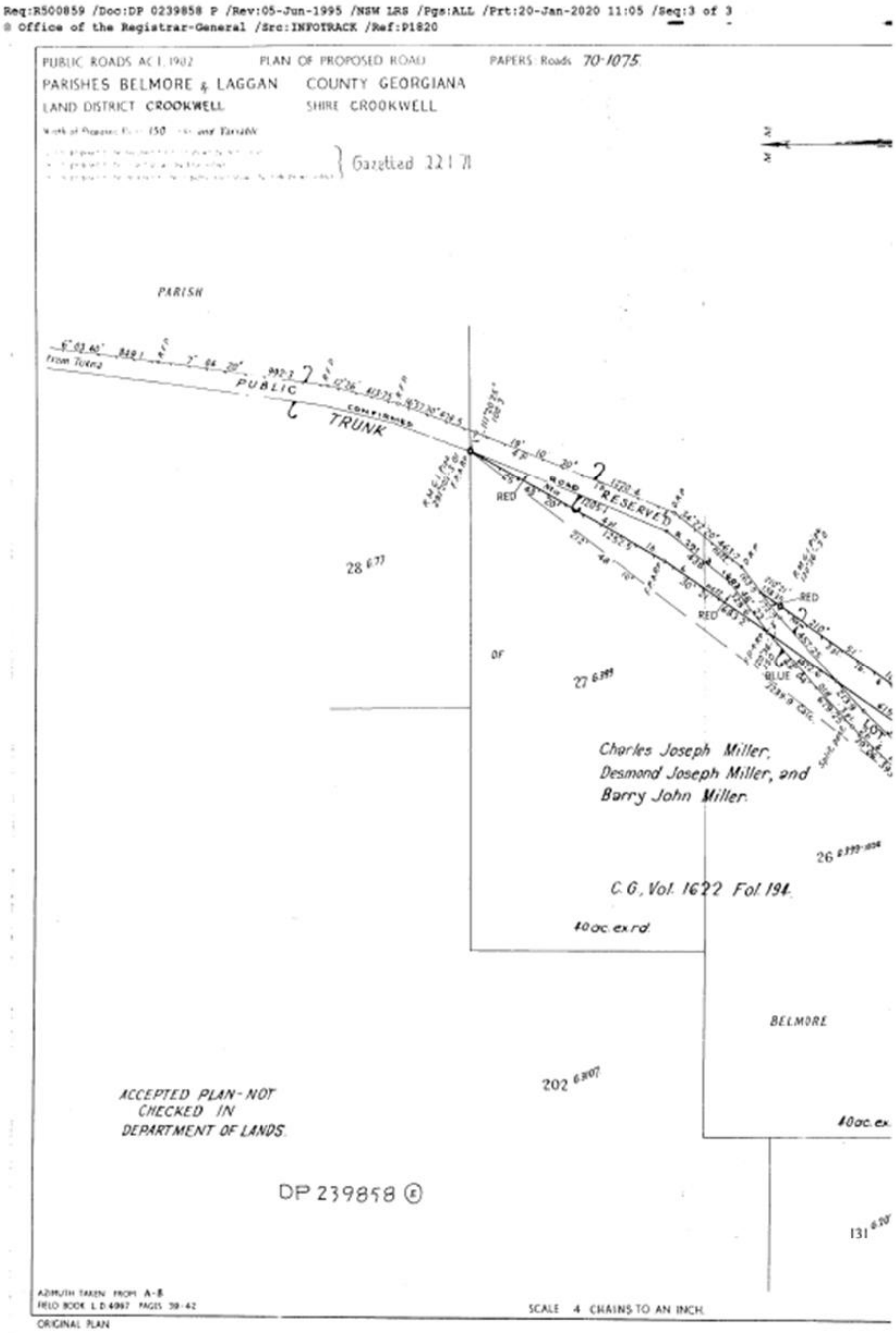
DEPOSITED PLAN 239858 – Sheet 3



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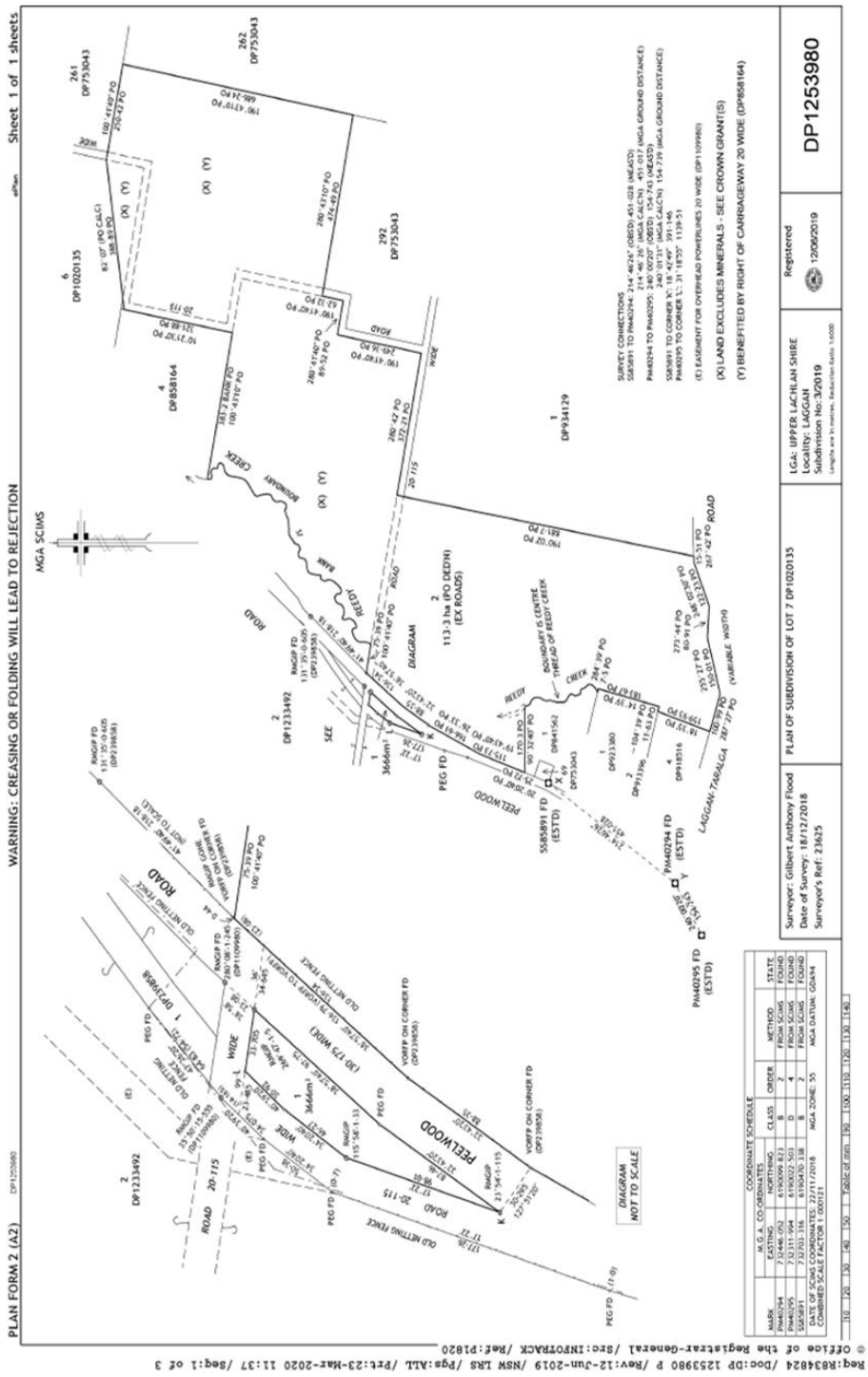
DEPOSITED PLAN 1253980 – Sheet 1



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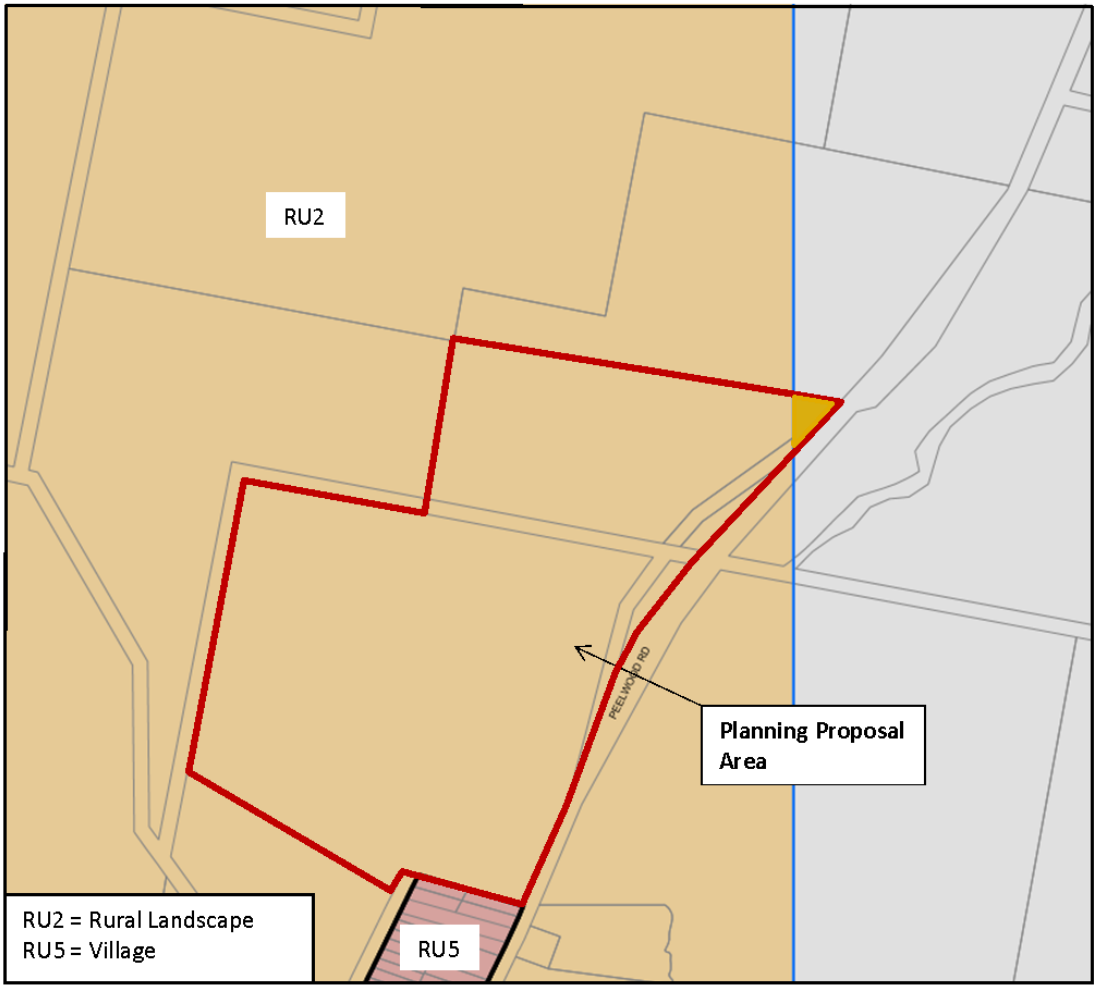
ANNEXURE B
UPPER LACHLAN LEP 2010 – ZONING MAP (Current)
(Source: NSW Legislation Website – Sheet LZN_005E)



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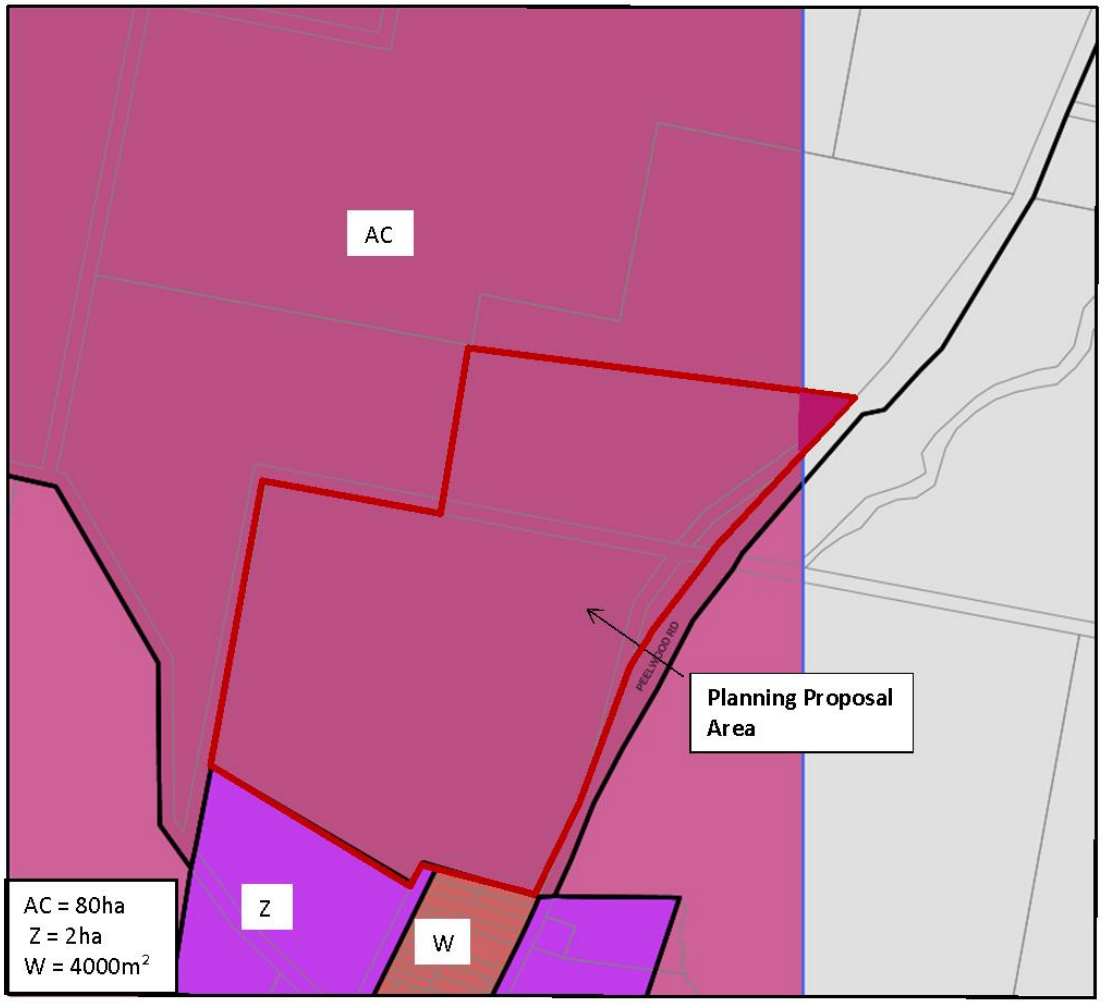
ANNEXURE C
UPPER LACHLAN LEP 2010 – MINIMUM LOT SIZE MAP (Current)
(Source: NSW Legislation Website – Sheet LSZ_ 005E)



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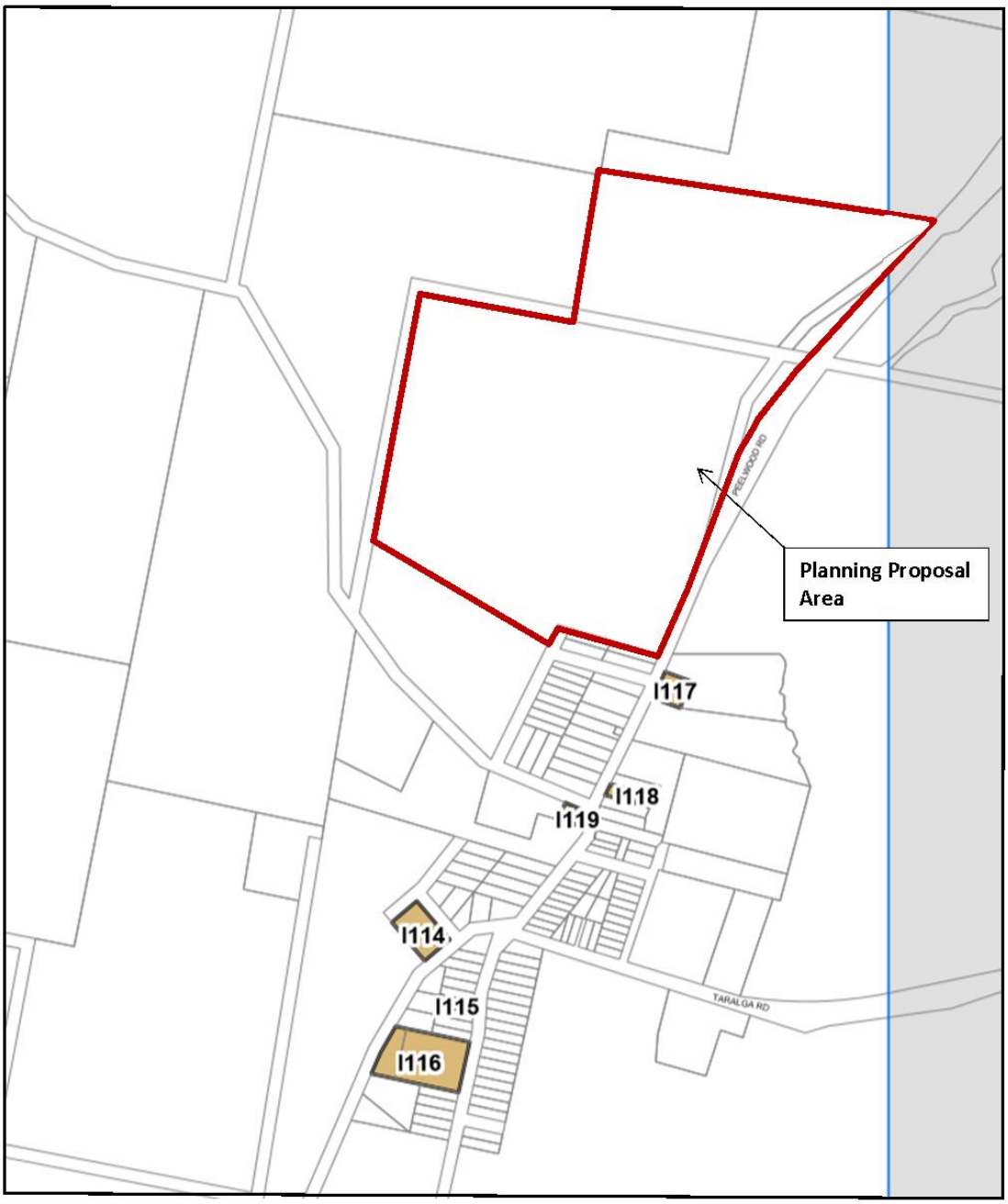
ANNEXURE D
UPPER LACHLAN LEP 2010 – HERITAGE MAP
(Source: NSW Legislation Website – Sheet HER_005E)



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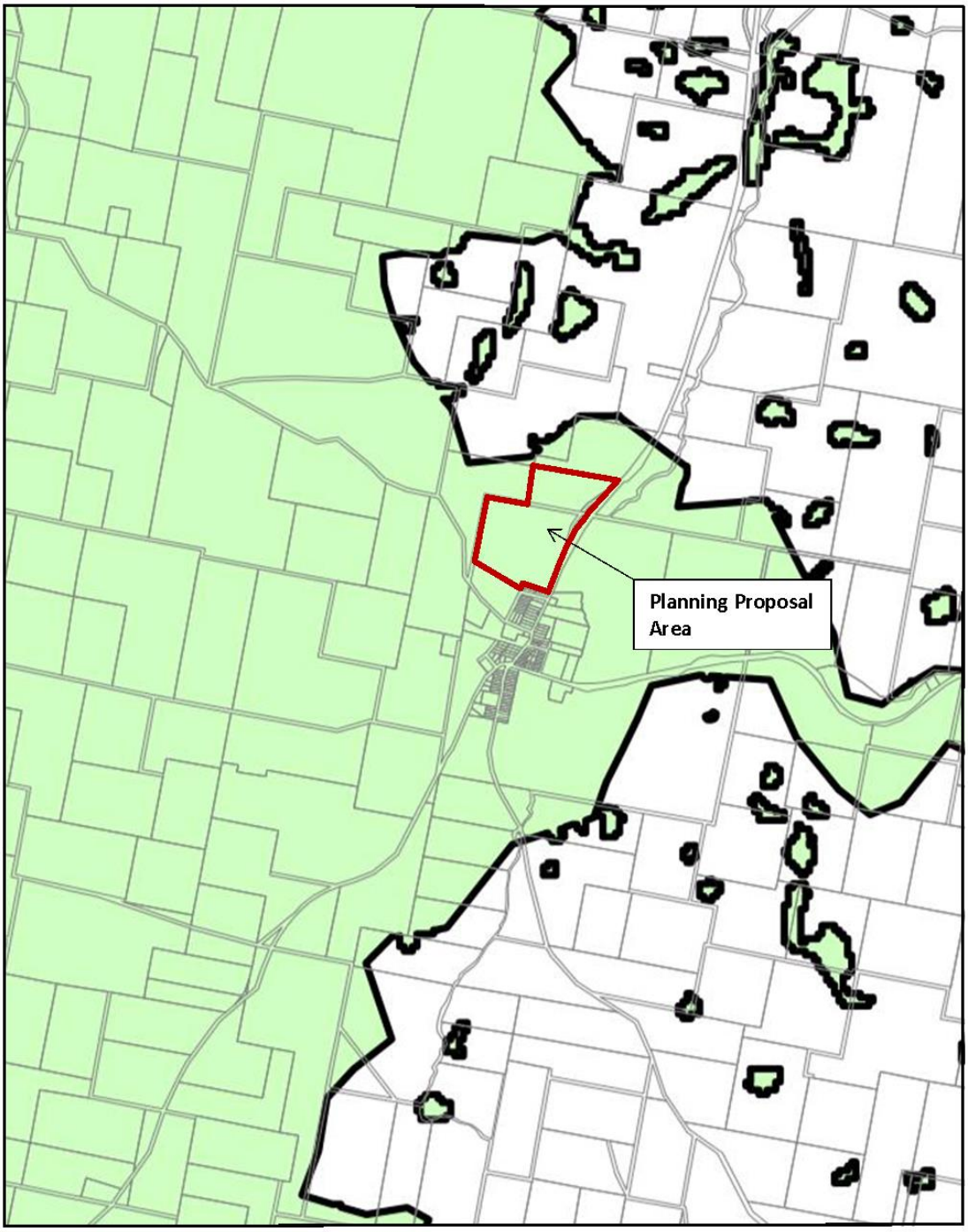
ANNEXURE E

UPPER LACHLAN LEP 2010 – NATURAL RESOURCE SENSITIVITY BIODIVERSITY MAP

(Source: NSW Legislation Website – Sheet NRB_005)



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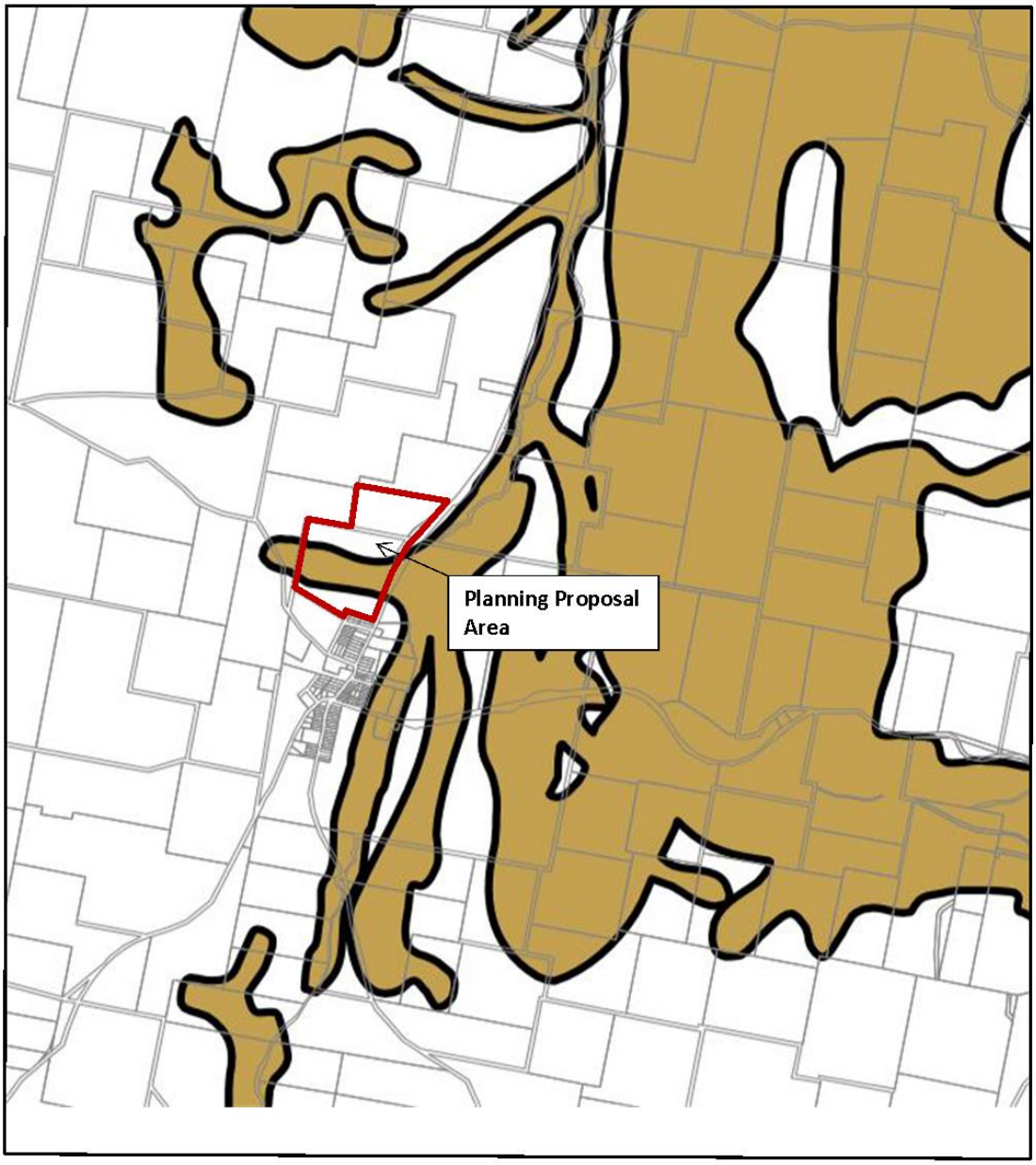
ANNEXURE F
UPPER LACHLAN LEP 2010 – NATURAL RESOURCE SENSITIVITY LAND MAP
(Source: NSW Legislation Website – Sheet NRL_005)



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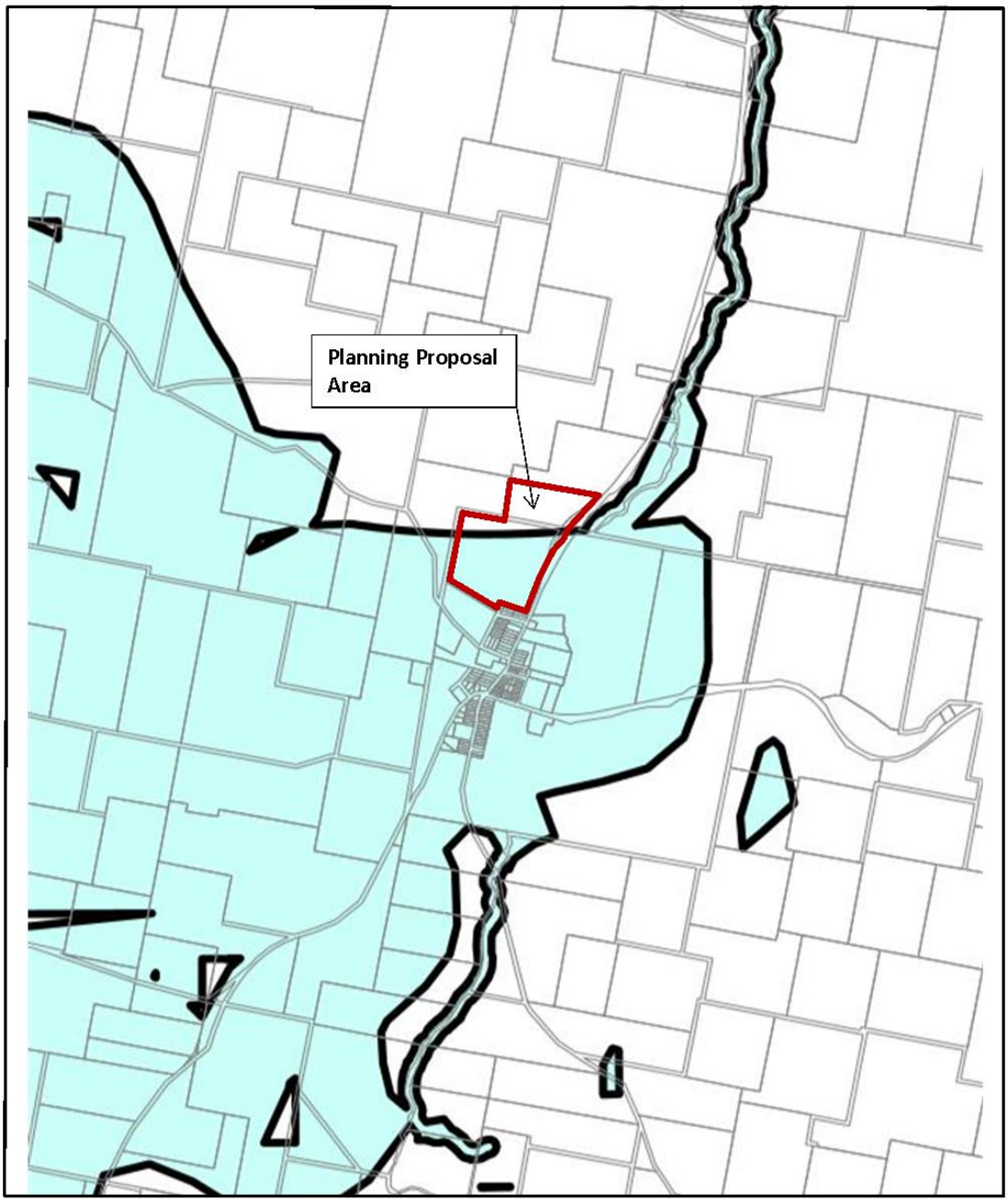
ANNEXURE G
UPPER LACHLAN LEP 2010 – NATURAL RESOURCE SENSITIVITY WATER MAP
(Source: NSW Legislation Website – Sheet NRW_005)



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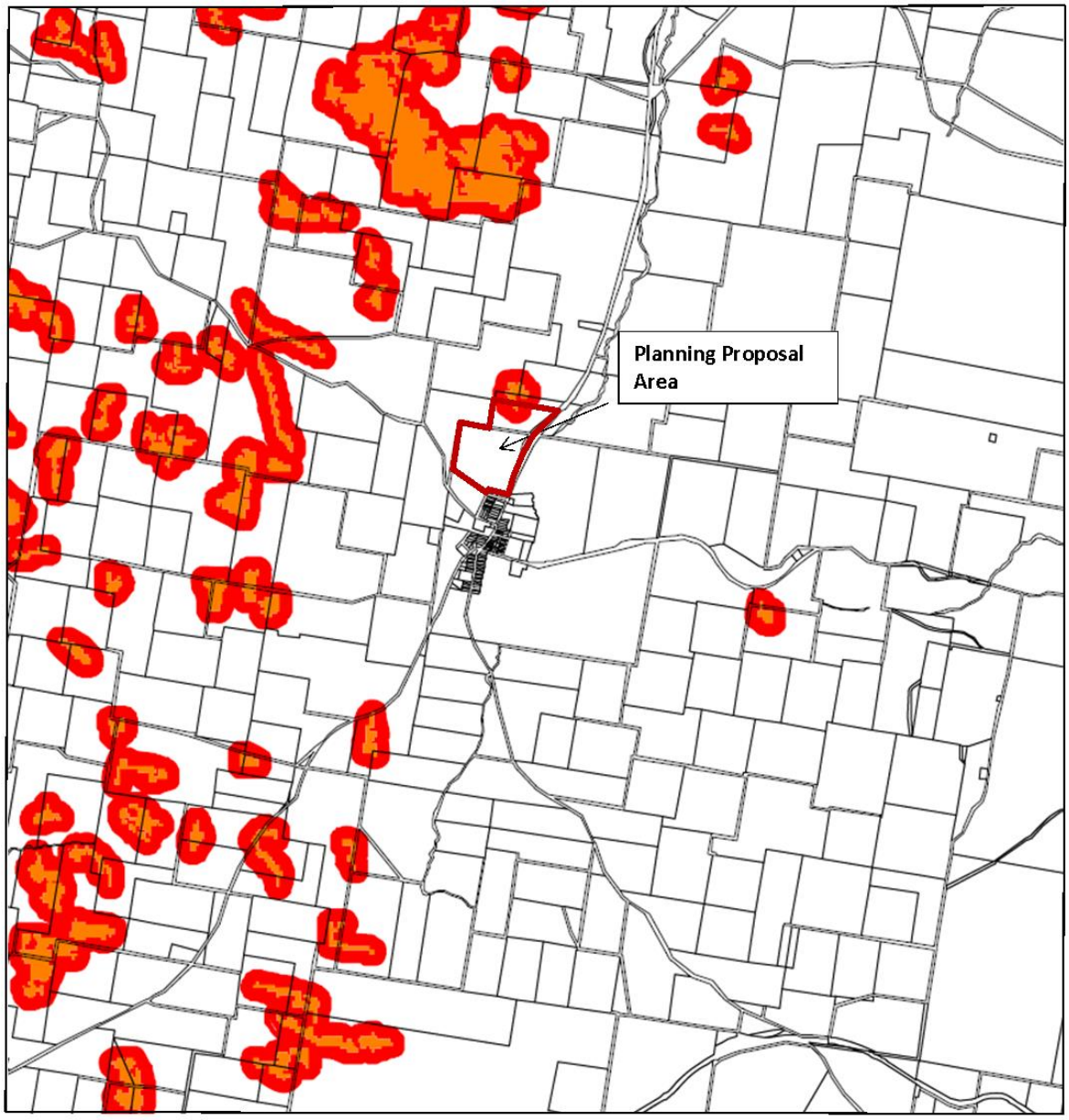
ANNEXURE H
UPPER LACHLAN BUSHFIRE PRONE LAND MAP
(Map Source: Upper Lachlan Council website)



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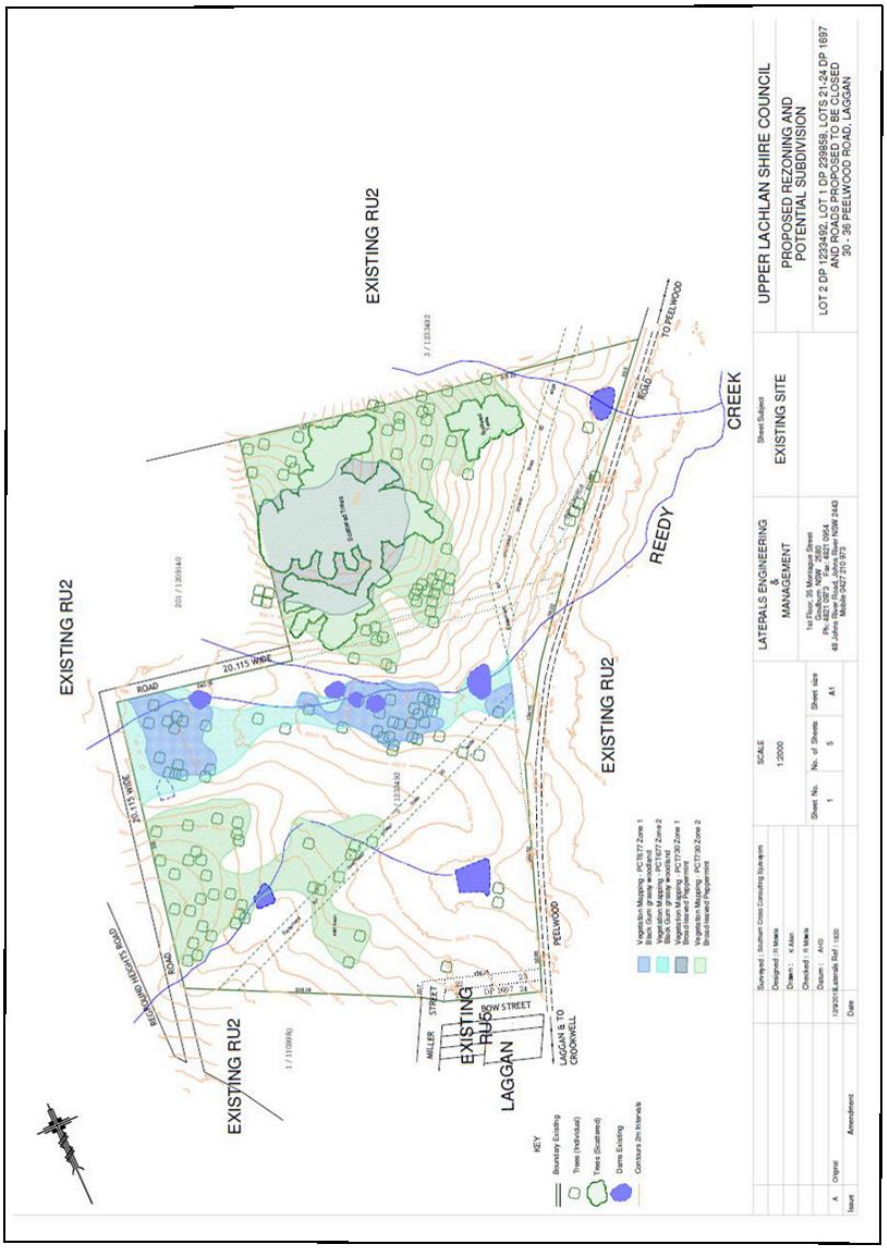
ANNEXURE I
LAND SUBJECT TO THE PLANNING PROPOSAL
(Base Map Source: Six Maps)



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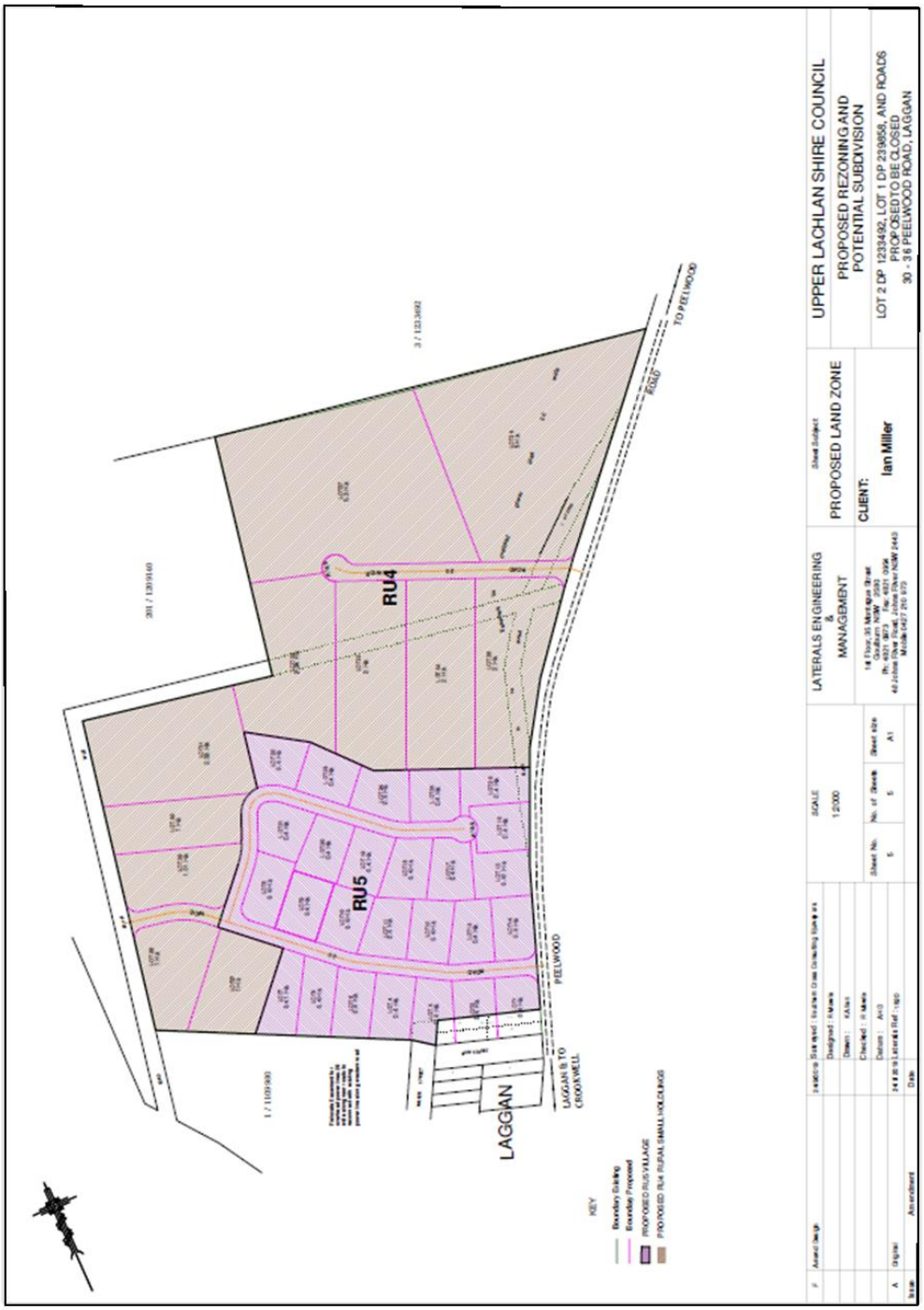
ANNEXURE J

AMENDMENT TO UPPER LACHLAN LAND ZONING MAP - SHEET LZN_005 and LZN_005E

(Plan Source: Laterals Planning)



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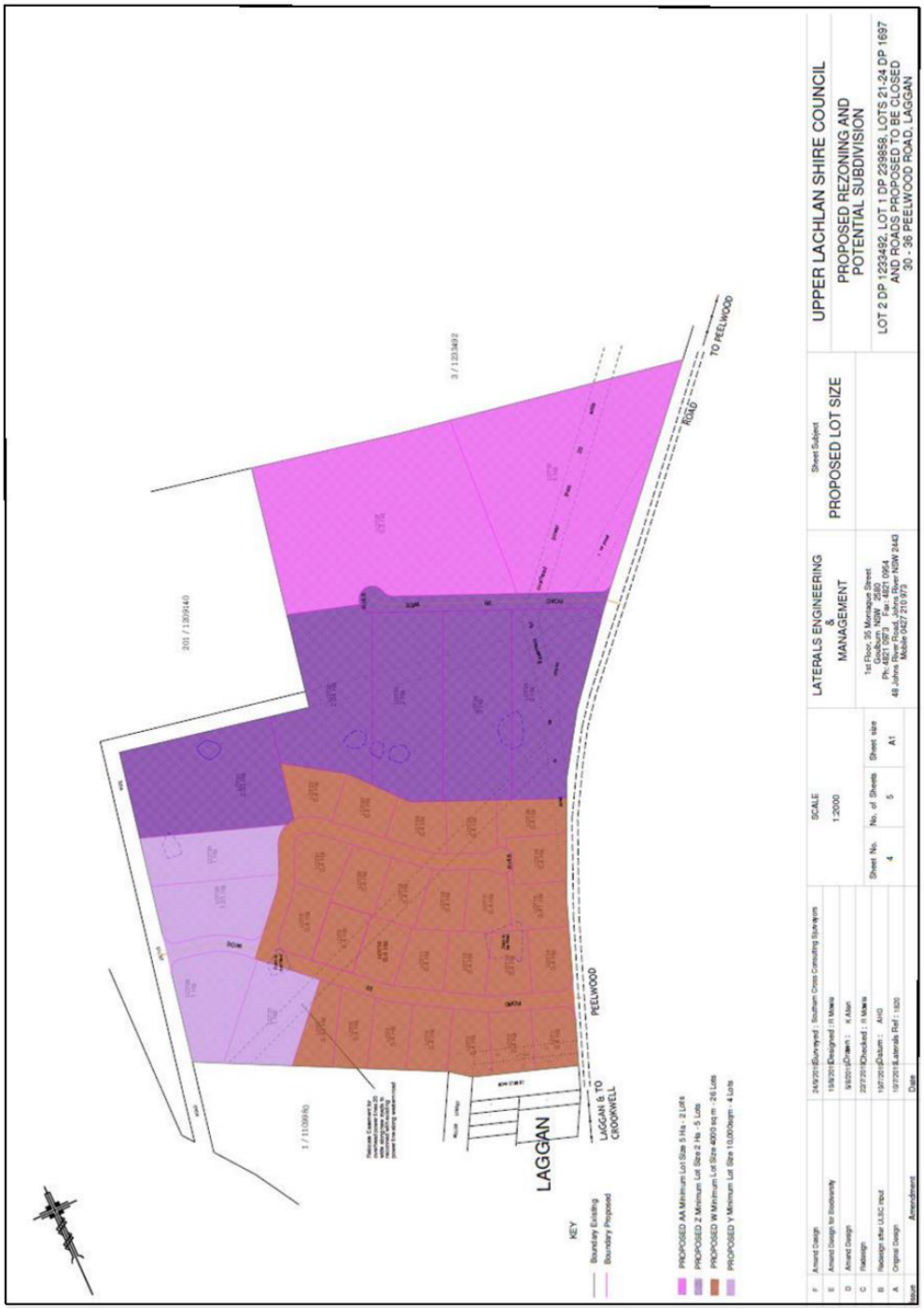
ANNEXURE K

AMENDMENT TO UPPER LACHLAN LAND LOT SIZE MAP - SHEET LSN_005 and LSN_005E

(Plan Source: Laterals Planning)



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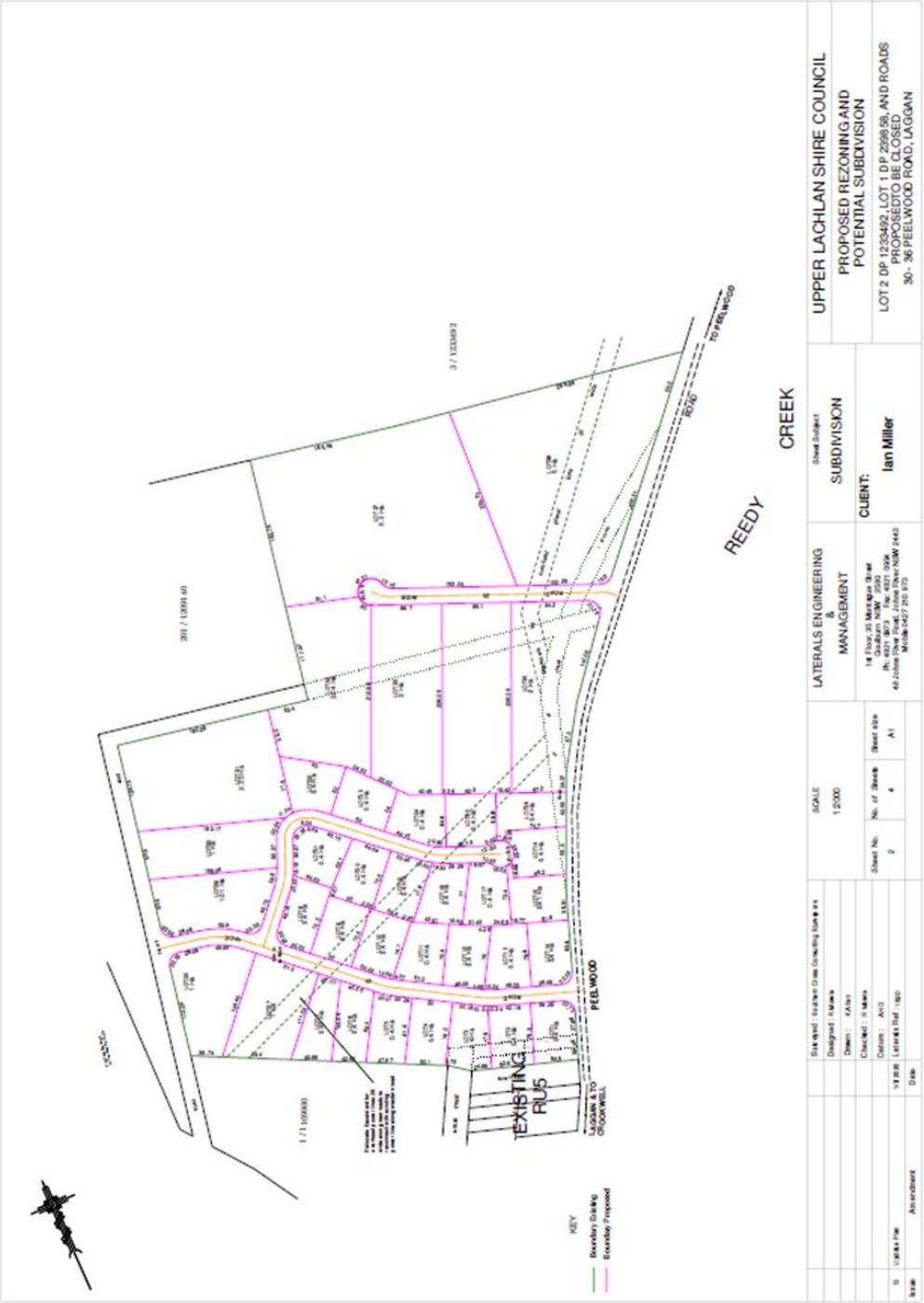
ANNEXURE L

PROPOSED SUBDIVISION DEVELOPMENT and 3D PERSPECTIVES

(Development Plan Source: Laterals Planning)

(3D Perspective Source: Randall and Dutaillis Architects)



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ANNEXURE M
STRATEGIC ENVIRONMENTAL AND ENGINEERING CONSULTING
FEASIBILITY ASSESSMENT FOR WASTEWATER MANAGEMENT

See separate attachment.

ANNEXURE N
CAPITAL ECOLOGY
ECOLOGICAL VALUES AND CONSTRAINTS ASSESSMENT

See separate attachment

ANNEXURE O
STRATEGIC ENVIRONMENTAL AND ENGINEERING CONSULTING
FLOOD ASSESSMENT

See separate attachment

ANNEXURE P
AUSTRALIAN BUSHFIRE SOLUTIONS
PRELIMINARY BUSHFIRE ASSESSMENT

See separate attachment

ANNEXURE Q
APEX ARCHAEOLOGY
ABORIGINAL DUE DILIGENCE ASSESSMENT

See separate attachment.

ANNEXURE R
MOTION TRAFFIC ENGINEERS
TRAFFIC AND PARKING IMPACT ASSESSMENT REPORT

See separate attachment.

SITE PHOTOGRAPHS

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North View

East View

South View

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Approximate Location Road No. 3 / Peelwood Road Intersection

Road No. 3 / Peelwood Road Intersection – Sight Distance South

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Road No. 3 / Peelwood Road Intersection – Sight Distance South

Approximate Location Road No. 1 / Peelwood Road Intersection

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Road No. 1 / Peelwood Road Intersection – Sight Distance North

Road No. 1 / Peelwood Road Intersection – Sight Distance South

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Upper Lachlan Shire Council
Crookwell Ph (02) 4830 1000
Facsimile: (02)4830 1045
Email: council@upperlachlan.nsw.gov.au
https://www.upperlachlan.nsw.gov.au/
ABN 81 011 241 552

Lodgement Options
Mail: PO Box 42 Gunning NSW 2581
In person: Crookwell Office, 44 Spring Street, Crookwell
Gunning Office, 123 Yass Street, Gunning
Opening Hours: 9am – 4pm Monday to Friday

PLANNING PROPOSAL APPLICATION FORM

Under the Environmental Planning and Assessment Act 1979

T Code: 292

Use this form to lodge a **Planning Proposal to amend the Upper Lachlan Local Environmental Plan (LEP) 2010**, which may include associated amendments to the Upper Lachlan Development Control Plan (DCP) 2010. This is a public document and may be made available to the community upon request.

Please note that a **Planning Proposal pre-lodgement meeting must be conducted prior** to lodging your Planning Proposal. You can request an appointment for a Planning Proposal pre-lodgement meeting please contact Council's Environment & Planning Department on (02) 4830 1000 or at council@upperlachlan.nsw.gov.au

Please place a mark in the relevant boxes and fill out all appropriate blank Steps. Please ensure you have submitted all relevant information to minimise delays. Once your application has been assessed you will be advised in writing of Council's Determination.

STEP 1 DESCRIPTION OF LAND SUBJECT OF PROPOSAL

Where the proposal involves multiple allotments all lot details must be provided.

House No. 297	Street Peelwood Road
Suburb or Town Laggan NSW	Postcode 2583

Lot No.	Section *(if applicable)*	Deposited Plan (DP)
2	–	1233492
1	–	1253980

STEP 2 DETAILS OF THE APPLICANT/S

Anyone can submit an application but if the applicant is not the owner of the land, then the Owner(s) written consent to lodge the application is required. All correspondence will be sent to the applicant. It is important to notify Council of any change of address and/or telephone number if this occurs during the processing of the application.

Name/ Company Name	Mr. Ian Miller
Contact Name (in the case of a Company)	–
Postal address	c/- Laterals Planning, P.O. Box 1326, Goulburn NSW 2580
Email	robert@laterals.com.au
Mobile 0428483558	Daytime Telephone 0428483558

STEP 3 PLANNING PROPOSAL DETAILS

Planning Proposal Type:

- ☐ **Minor** (No proposed changes to development standards and may include changing the wording of a clause or adding/removing a use from the land use table)
- ☐ **Minor** (Proposed rezoning and/or amendment of development standards for land with a site area of less than 1 hectare)
- ☑ **Major** (Proposed rezoning and/or amendment of development standards for land with a site area of more than 1 hectare)

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STEP 3 PLANNING PROPOSAL DETAILS CONTINUED...

Please tick all amendments to the Upper Lachlan Local Environmental Plan 2010 proposed in the Planning Proposal:

- [x] Zoning
- [ ] Land Use Table
- [ ] Additional Permitted Uses
- [ ] Heritage Conservation
- [x] Minimum Lot Size
- [ ] Other

Please provide a brief description of the proposed amendments to the Upper Lachlan Local Environmental Plan 2010 (e.g. proposed zoning change, extent of proposed changes to development standards, etc.):

- Lot 2 DP 1233492 part: RU2 Rural Landscape to RU5 Village zone & reduce minimum lot size from 80ha to 4,000m².
- Lot 2 DP 1233492 (part); Lot 1 DP 239856; Lot 1 DP 1253980: RU2 Rural Landscape to RU4 Rural Small Holdings & reduce minimum lot size from 80ha to 1ha (part), 2ha (part) & 5ha (part).

Does the Planning Proposal require a site-specific DCP or an amendment to the Upper Lachlan Development Control Plan 2010?

- [ ] Yes
- [x] No

IF APPLICABLE, PLEASE PROVIDE A BRIEF DESCRIPTION OF THE PROPOSED DEVELOPMENT CONTROL PLAN PROVISIONS (E.G. DESCRIPTION AND SCOPE OF WHAT THE DRAFT DCP AIMS TO ACHIEVE):

N. A.

STEP 4 PLANNING PROPOSAL PRE-LODGEMENT

A **PLANNING PROPOSAL PRE-LODGEMENT MEETING MUST BE CONDUCTED PRIOR** TO LODGING YOUR PLANNING PROPOSAL. YOU CAN REQUEST AN APPOINTMENT FOR A PLANNING PROPOSAL PRE-LODGEMENT MEETING PLEASE CONTACT COUNCIL'S ENVIRONMENT & PLANNING DEPARTMENT ON (02) 4830 1000 OR AT COUNCIL@UPPERLACHLAN.NSW.GOV.AU

Has a Planning Proposal pre-lodgement meeting been conducted relating to this Planning Proposal?

- [x] Yes
- [ ] No

Meeting Date: A number of meetings Planning Officer: Vivien Straw

STEP 5 PRIVACY POLICY

The information you provide in this application will enable us, and any relevant state agency, to assess your application under the Environmental Planning and Assessment Act 1979 and other applicable State Legislation. If the information is not provided, your application may not be accepted.

If your application is for designated development or notified development, it will be available for public inspection and copying during a submission period. Written notification of the application will also be provided to the neighbourhood. You have the right to access and have corrected information provided in your application.
Please ensure that the information is accurate and advise us of any changes.

STEP 6 PRIVACY NOTIFICATION

The personal information that Council is collecting from you is personal information for the purposes of the Privacy and Personal Information Protection Act 1998 (PPIPA). The intended recipients of the personal information are officers within Council, data service providers engaged by the Council from time to time and any other agent of Council.

If you cannot provide, or do not wish to provide, the information sought, the Council may be unable to process your application. You may make application for access or amendments to information held by Council. You may also make a request that Council suppress your personal information from a public register. Council will consider any such application in accordance with the PPIPA.

STEP 7 POLITICAL DONATIONS AND GIFTS	
Please be aware of the Statutory obligations to disclose **Political Donations and Gifts** that may apply to you or associated people if you are lodging a Development Application. A failure to meet your obligations is an offence. Links to information and Council's Political Donations and Gifts Disclosure Statements form are available from Council's website at https://www.upperlachlan.nsw.gov.au/planning/forms-checklists. All Political Donations and Gifts Disclosure Statements will be public documents and all information contained in them will be available to the public and government agencies. Does a Political Donations and Gifts Disclosure Statement accompany this application?	☑ No ☐ Yes

STEP 8 PAYMENT OPTIONS

Council accepts payments by cash, cheque, money order, eftpos or credit card (Visa and Mastercard only) at Council's Administration Office. All cheques are to made payable to **Upper Lachlan Shire Council**. Should you wish to mail your application package to Council and wish to use the credit card facility, please download a Mail Order/Telephone Order credit card processing form which can be found at https://www.upperlachlan.nsw.gov.au/planning/forms-checklists or alternatively enclose a cheque or money order.

Please contact the Upper Lachlan Shire Council's Environment & Planning Department on (02) 4830 1000 or council@upperlachlan.nsw.gov.au to arrange a fee quote for your application.

STEP 9 SIGNATURE OF ALL OWNER/S

ALL OWNERS OF THE LAND TO BE DEVELOPED MUST SIGN THE APPLICATION PRIOR TO THE APPLICATION BEING SUBMITTED. IF OWNERS OF THE LAND ARE ALSO THE APPLICANT/S STEP 11 BELOW MUST STILL BE COMPLETED.

- If you are not the owner of the land, you must have all the owner/s sign the application. You can only sign on behalf of the owner/s if you have power of attorney or a letter of authority.
- If Council is the owner of the land, you will need to obtain owners consent prior to lodging the developmentapplication.

As the owner/s of the above property, I/we consent to this application and consent to the Council, its servants or agents entering upon the property without first having given notice, for the purpose of carrying out all or any inspections which the Council may deem appropriate in connection with the processing of this application.

Conflict of Interest declaration

To ensure transparency in Council's decision making process and to avoid potential conflicts of interest owners are to make a declaration as to whether they are a Council employee or Councillor or are a friend/relative/associate to a Council employee or Councillor.

I am a Council employee or Councillor ☑ No ☐ Yes

I am a friend, relative or associate to a Council employee or Councillor ☑ No ☐ Yes (*state relationship below*)

- *Relationship*:

Owner Signature	**Owner Signature**
Name IAN Miller DIRECTOR IR+JB INVESTMENTS	**Name** JENNY Miller DIRECTOR IR+JB INVESTMENTS
Date 24/7/20	**Date** 24/7/20

STEP 10 SIGNATURE OF ALL APPLICANT/S

By signing this application,

1. I confirm that the application form is completed and the information (e.g. Number and type of plans, etc) required by Council is attached.
2. I licence Council to make all documents lodged with this application of which I am the copyright owner publicly available on Council's website both during the assessment of this application and thereafter, and further licence Council to reproduce all such documents for any purpose associated with the exercise of its functions under the Environmental Planning & Assessment Act 1979 in respect of this application, and for the purpose of complying with its obligations under the Government Information (Public Access) Act 2009.
3. I warrant that to the extent that I do not own the copyright in any documents lodged with this application, the Council is licensed by the copyright owner to use the documents lodged with this application in accordance with paragraph 2 above.
4. I indemnify the Council against all claims and actions in respect of a breach of copyright arising from any unauthorised use of any documents lodged with this application.

Note: ALL correspondence will be forwarded to the applicant, including the determination.

Conflict of Interest declaration

To ensure transparency in Council's decision making process and to avoid potential conflicts of interest applicants are to make a declaration as to whether they are a Council employee or Councillor or are a friend/relative/associate to a Council employee or Councillor.

I am a Council employee or Councillor ☑ No ☐ Yes

I am a friend, relative or associate to a Council employee or Councillor ☑ No ☐ Yes (*state relationship below*)

- *Relationship*:

Applicant Signature	**Applicant Signature**
Name IAN MILLER	**Name** JENNY MILLER
Date 24/7/20	**Date** 24/7/20

Page 4 of 5

CHECKLIST OF DOCUMENTATION TO ACCOMPANY YOUR APPLICATION

This checklist will assist with the lodgement of your application by ensuring you have included all the necessary details. This will prevent delays in processing your application. **Please do not lodge your Planning Proposal until you have checked each item on this checklist and indicated whether you have included the required information.** **Please be aware that if the required information is not provided, your application will not be accepted by Council.**

	REQUIRED INFORMATION	SUPPLIED
1. Application Form	a. Have all contact details been provided for the Applicant at Step 2?	☑ Yes
	b. Has the proposal been adequately described at Step 3?	
	c. Is the application Integrated Development as noted at Step 10? If so please ensure that the application fee to each of the relevant State Authorities has been provided and the required administration fee/s paid.	
	d. Has a planning proposal pre-lodgement meeting been undertaken and copies of all correspondence from Council attached?	
	e. Have ALL owner/s provided consent at Step 5? *Note if owner is a company then two (2) directors or one (1) director and one (1) company secretary must sign. If the owner is a Strata then a Strata Seal is required.*	
	f. Have ALL applicant/s provided consent at Step 6? *Note if applicant is a company then two (2) directors or one (1) director and one (1) company secretary must sign.*	
2. Planning Proposal Report *(addressing mandatory requirements of Guide to Preparing Planning Proposals and Guide to Preparing Local Environmental Plans)*	a. Does the report detail the objectives and intended outcomes of the planning proposal?	✓ Yes
	b. An explanation of the provisions that are to be included in the Upper Lachlan Local Environmental Plan (LEP) 2010 is included?	
	c. Justification and process for implementation for proposed amendments and outcomes (including compliance assessment against relevant Section 117 Ministerial Directions; justification that the proposal is the best means of achieving the desired outcomes; consideration of alternative options; and consideration of relevant state, regional, and local planning strategies) included?	
	d. Draft amended LEP mapping of current and proposed statutory changes included?	
	e. Proposed community consultation (including consultation with any relevant government agencies) included?	
	f. Site Plan drawn to scale (with North point clearly shown) indicating physical features such as trees, topography, existing buildings, and all adjoining properties and/or buildings	
	g. Detailed analysis of the site and surrounding locality identifying any relevant significant issues that need to be addressed in considering the planning proposal (e.g. site constraints and other development barriers)	
	h. Photos of the site and surrounding area	
	i. Relevant plans and concept drawings demonstrating the proposed amendments	
	j. Explanation of any intended activities for the site if the planning proposal is successful and their potential impacts on the surrounding area (e.g. traffic and parking, noise, solar access, privacy, etc.)	
	k. Details of substantial public benefit that would result from the planning proposal (e.g. public domain improvements, provision of public open space, community facilities, affordable housing, etc.)	
	l. Draft site-specific development control plan*	
3. Relevant Environmental Impact Studies *(relevant studies vary depending on complexity of planning proposal and nature of issues)*	Urban Design Analysis (including building mass/shadow diagrams)	☑ Yes
	Development Yield Analysis (potential residential yield &	
	Transport & Accessibility Study (including parking, pedestrian, & traffic)	
	Commercial/Retail Viability Analysis/Economic Impact Report*	
	Flood Study*	
	Site Contamination (in accordance with SEPP 55)	
	Bushfire Hazard*	
	Water Quality*	
	Acid Sulphate Soil*	
	Heritage Impact*	
	Acoustic Report*	
	Other relevant miscellaneous studies*	

* May be required/requested as determined by relevant planning authority

Page **5** of **5**

Laterals

Planning
Engineering & Management
Environmental

The General Manager
Upper Lachlan Shire Council
P O Box 42
GUNNING NSW 2581

Attention: Vivian Straw

RE: Planning Proposal – Laggan Lane Estate
Lot 2 DP 1233492, Lot 1 DP 1253980 and Lot 1 DP 239858

Dear Vivian

Please find attached a Planning Proposal application for the land indicated above in the Laggan locality – the application fee ($5,520.00) has been paid separately by the applicant, Mr Ian Miller. The Planning Proposal is submitted to the Upper Lachlan Shire Council to rezone and amend the lot size for the certain land being:

- Lot 2 DP 1233492 (part) from RU2 Rural Landscape zone to RU5 Village zone and reduce the minimum lot size from 80ha to 4,000m2 to enable the development of dwelling houses on lots to be created in accordance with this Planning Proposal and under the Upper Lachlan Local Environmental Plan 2010 (LEP 2010).
- Lot 2 DP 1233492 (part), Lot 1 DP 239858 and Lot 1 DP 1253980 from RU2 Rural Landscape zone to RU4 Rural Small Holdings zone and reduce the minimum lot size from 80ha to 1ha (part), 2ha (part) and 5ha (part) to enable agricultural small holdings to be created in accordance with this Planning Proposal and under the Upper Lachlan Local Environmental Plan 2010 (LEP 2010).

An assessment of the Planning Proposal has been completed in accordance with the guidelines prepared by NSW Department of Planning and this assessment concludes:

- An increase in the permissible density of land is justified in terms of its consistency with the objectives and actions contained within the *South East and Tablelands Regional Plan 2036* and *The Tablelands Regional Community Strategic Plan 2016-2036*.
- The Planning Proposal is consistent with the Upper Lachlan Shire Local Strategic Planning Statement 2040 (Draft) and in particular will provide an opportunity for new settlements close to existing urban service centres and provide value-adding to agriculture by small-scale intensive agriculture opportunities.
- The Planning Proposal complies with this identified growth area for Laggan.
- The Planning Proposal is consistent with the Upper Lachlan Community Strategic Plan Vision 2023 insofar that the development will provide for various lifestyle living opportunities whilst ensuring environmental sustainability, preservation of history and a sense of belonging in a community as well as providing services and facilities to enhance the quality of life and economic viability within the Council area.

- The proximity of the subject land to Laggan will support economic growth within the Upper Lachlan Council area and particularly in the Laggan / Crookwell environs.
- There is a demand for this type of development in the Upper Lachlan area.
- The Planning Proposal also meets all the relevant State, Regional and Local planning policies.

Council support for this Planning Proposal is requested and please contact me on 0428 483 558 or at robert@laterals.com.au if you require any additional information or wish to discuss the project.

I attach one (1) bound copy and an electronic copy of the reports.

Yours faithfully,

Robert Mowle
LATERALS ENGINEERING and MANAGEMENT
30 July 2020

SEEC

Strategic Environmental & Engineering Consulting

Feasibility Assessment for Wastewater Management

For Proposed Subdivision Development at: Lot 2 DP 1233492, Lots 21-24 DP 1697 and Lot 1 DP 239858 Peelwood Road, Laggan

Prepared by:

Ciaran Bromhead

Strategic Environmental and Engineering Consulting (SEEC) Pty Ltd
PO Box 1098, Bowral NSW 2576
Tel. 02 4862 1633
Fax. 02 4862 3088
Email reception@seec.com.au
Web www.seec.com.au

SEEC Reference: 19000339

22 July 2020

SEEC

Strategic Environmental and Engineering Consulting

PO Box 1098, Bowral, NSW, 2576
phone: (02) 4862 1633
fax: (02) 4862 3088
email: reception@seec.com.au
www.seec.com.au

Project Reference: 19000339-WW-01
Date of Assessment: 22/07/2020

Signed:

Andrew Macloed
Director
SEEC

Document Certification

This report has been developed based on agreed requirements as understood by SEEC at the time of investigation. It applies only to a specific task on the nominated lands. Other interpretations must not be made, including changes in scale or application to other projects. The contents of this report are based on a professional appraisal of the conditions that existed at the time of our investigation. Where subsurface investigations have been done the results are only applicable to the specific sampling or testing locations and only to the depth(s) investigated. Because of natural geological variability, and/or because of possible anthropogenic influences, the subsurface conditions reported can change abruptly. Such changes can also occur after the site investigation. The accuracy of the conditions provided in this report is limited by these possible variations and influences and/or is limited by budget constraints imposed by others and/or by adequate accessibility.

Copyright

Document Issue Table

Version	Date	Author	Reviewed	Notes
Draft A	19/05/2020	CB	AM & LO	
01 Final	22/07/2020	CB	Client	

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1 INTRODUCTION

Strategic Environmental and Engineering Consulting have been commissioned by Laterals Planning, on behalf of the property owner, to provide this Wastewater Site Assessment at Lot 2 DP 1233492, Lots 21-24 DP 1697 and Lot 1 DP 239858 Peelwood Road, Laggan (Figure 1). It will accompany a development application to subdivide the land into twenty six (26) RU4 -W allotments, five RU4 – Z allotments, four RU5 – Y allotments and two RU5 – AA allotments (Figure 2 and 3). The purpose of this report is to demonstrate that an Effluent Management Area (EMA) can feasibly be sited on each of the newly-created rural/residential lots. It does not provide details of a specific system to be used on a lot and must not be used by the purchasers of any of the proposed lots.

This study includes:

- Undertaking a site inspection and soil survey to assess the suitability of each proposed allotment for onsite effluent disposal;
- Assessment of soil texture, depth, pH, electrical conductivity, dispersion potential, and phosphorous sorption;
- Discussion of suitable methods for treatment and land application of effluent;
- Hydraulic and nutrient modeling to determine the necessary size of effluent management areas;
- Preparation of a site plan showing suitable effluent management areas;
- A discussion of any special management initiatives; and,
- Preparation of this written report for submission to Council.

The site and soil investigation is undertaken in accordance with:

- AS/NZS 1547: 2012 On-site Domestic Wastewater Management (Standards Australia / Standards New Zealand, 2012).
- Environment and Health Protection Guidelines: Onsite Sewage Management for Single Households (Department of Local Government, 1998).

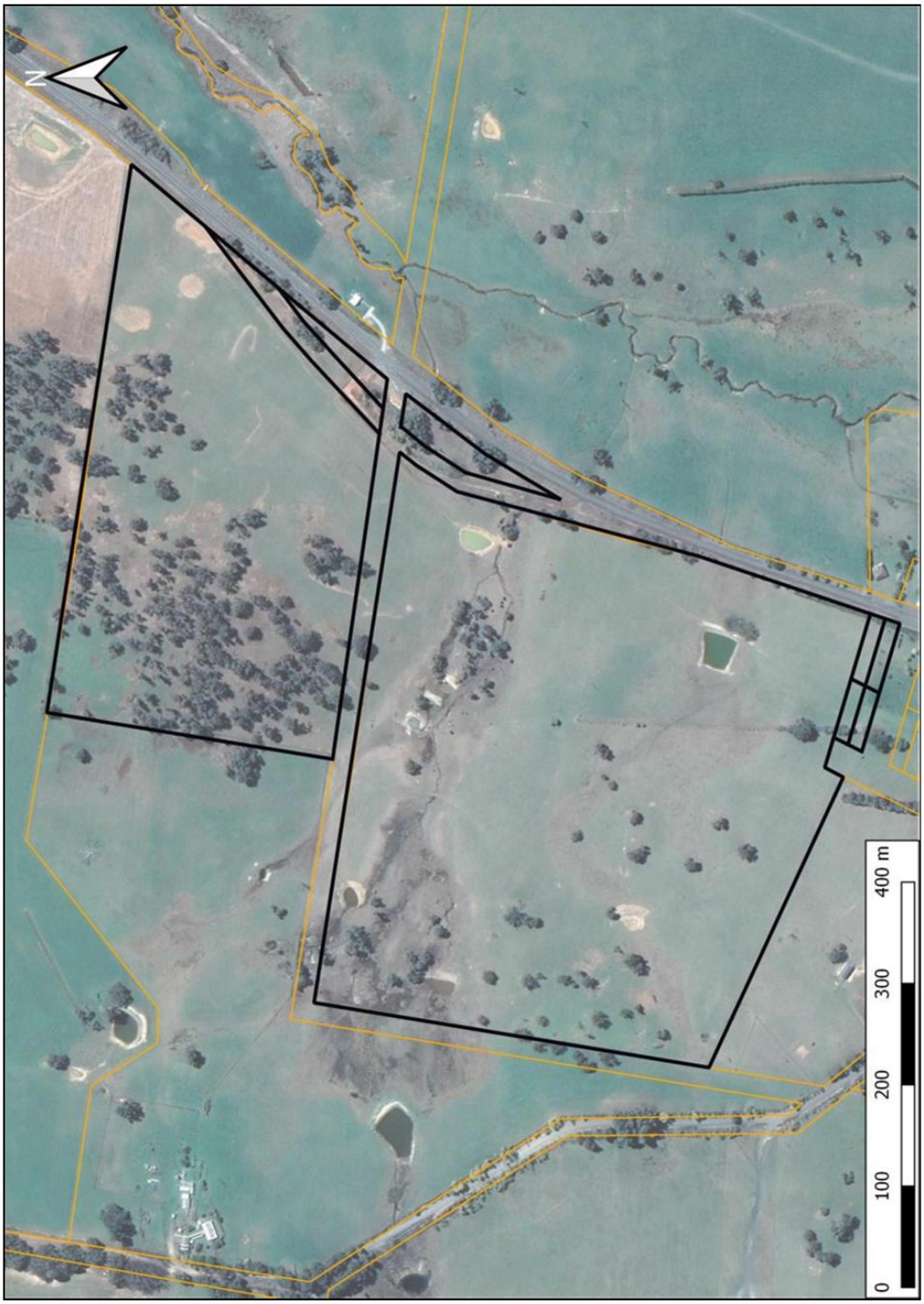


Figure 1: Existing Lot 2 DP 1233492, Lots 21-24 DP 1697 and Lot 1 DP 239858

2 PROPOSED DEVELOPMENT

It is proposed to subdivide Lot 2 DP 1233492, Lots 21-24 DP 1697 and Lot 1 DP 239858 into 26) RU4 -W allotments, five RU4 – Z allotments, four RU5 – Y allotments and two RU5 – AA allotments (Figure 2 and 3). Lots range from a minimum of 4,000 m^2 to a maximum of 5 ha in size (Figure 3).

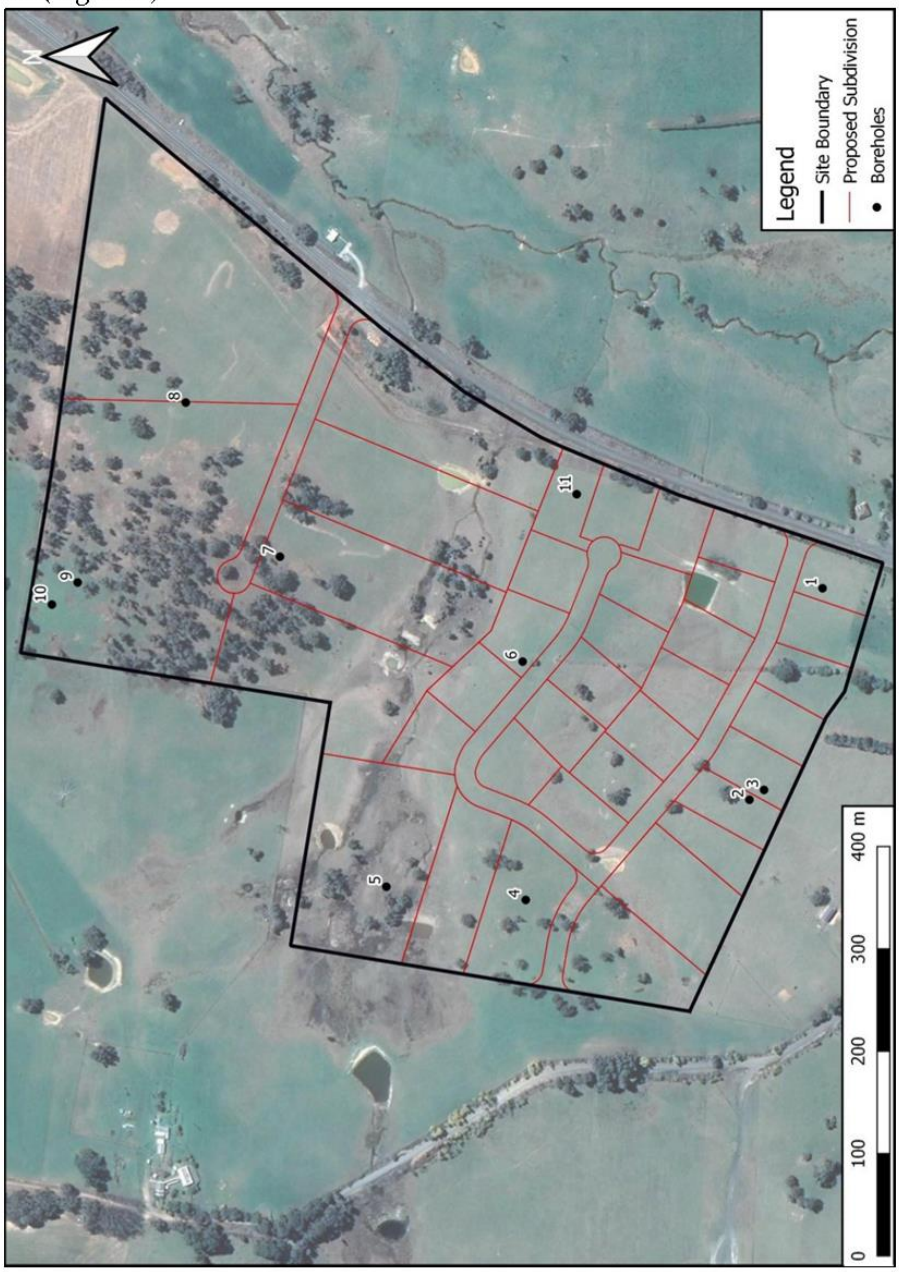


Figure 2: Proposed subdivision and approximate borehole locations.

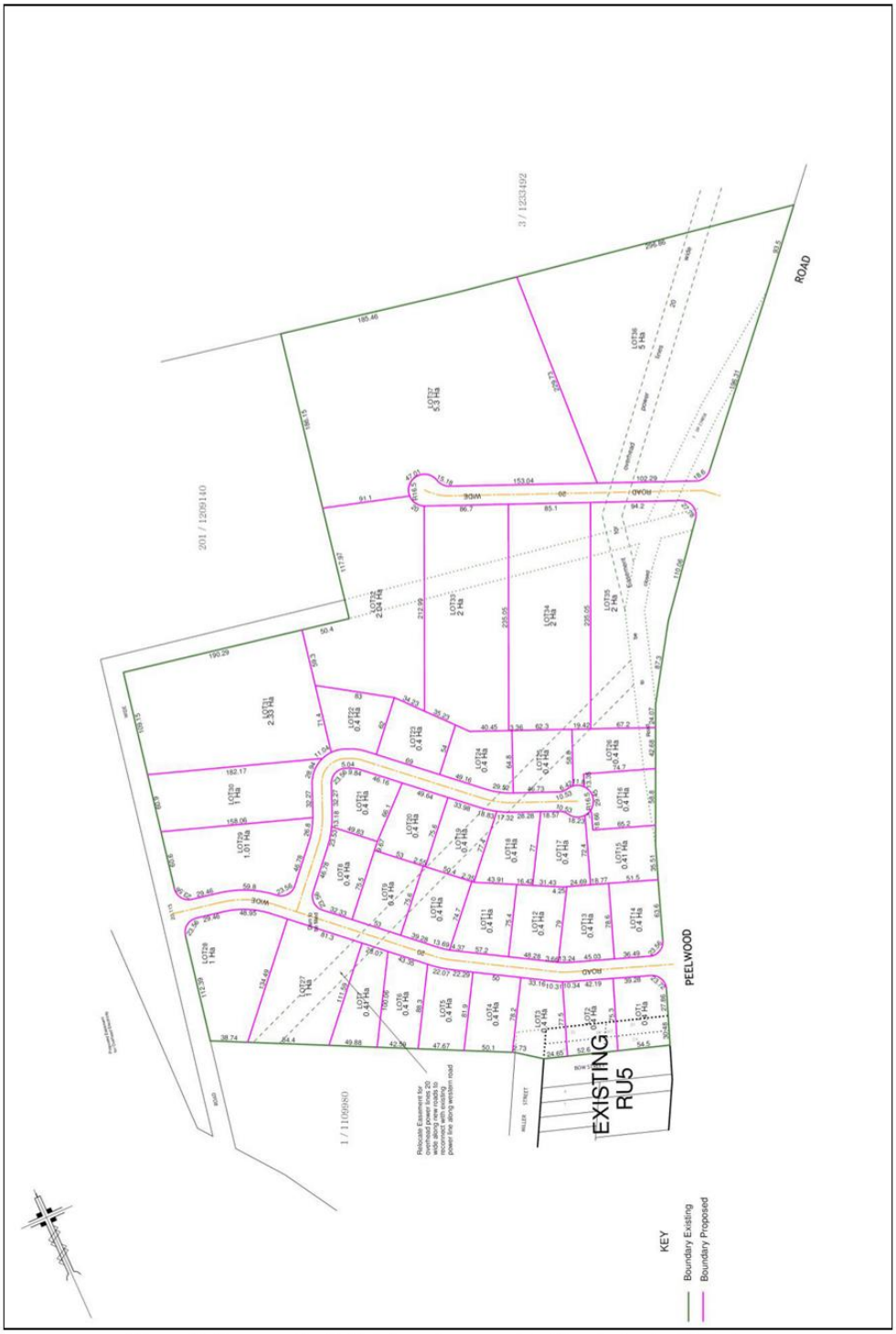


Figure 3: Proposed subdivision plan provided by Laterals Planning.

3 ASSUMPTIONS

It is assumed that the new lots would be rural residential developments and could potentially include:

- New rural home (assumed five-bedrooms) and access;
- Workshops, garages, etc.

This report is a conceptual Wastewater Assessment to show that post-subdivision each new lot could feasibly manage treated wastewater. However, future owners would require a site specific Wastewater Site Assessment for their individual lot, considering their proposed development and their preferences. This report must not be relied upon for the design or installation of a wastewater system on any of the proposed lots.

4 SITE ASSESSMENT

4.1 Introduction

A site assessment was undertaken by Ciaran Bromhead of SEEC on the 17th October 2019. The assessment was undertaken following Table 4 in the Environment and Health Protection Guidelines: Onsite Sewage Management for Single Households (Department of Local Government, 1998), which describes a rating system for onsite effluent management constraints. Several possible site constraints are considered including, but not limited to:

- Proximity to permanent and intermittent watercourses;
- Landform, site gradient and drainage characteristics;
- Aspect and exposure;
- Extent of surface rock and outcrop;
- Climate of the area;
- Existing vegetation; and
- Available land area.

The following sections provide a brief commentary on the levels of constraint for onsite effluent disposal across this site. The "Limitations" are defined in DLG (1998).

4.2 Location and General Site Conditions

Lot 2 DP 1233492 is a 26 ha (approx.) rural lot located on the western side of Peelwood Road, Laggan. Lots 21-24 DP 1697 and Lot 1 DP 1253980 are located on the south-eastern extent of Lot 2 DP 1233492 and will be dissolved for the purpose of this subdivision. The property is bound by similar rural properties to the north, east and west and by Laggan village to the south. The existing topography consists of long foot slopes and undulating low rises. The northern portion of the site consists of stepper slopes grades at approx. 20% to the south-east towards an intermittent watercourse (Figure 5). There is a drainage depression that runs through the southern central portion of the site. This depression intersects two dams which have been scheduled to be filled in. During development of the proposed subdivision this depression will be diverted and run down the side of the proposed road (Appendix 1).

4.3 Climate

Laggan experiences a temperate climate, with warm summers and cool winters. According to the Australian Bureau of Meteorology, nearby Crookwell Post Office (Site No. 070025) receives 859.6 mm of annual average rainfall per year and nearby Goulburn Tafe (Site No. 070263) experiences 1,262.6 mm of evaporation. Rainfall is slightly heavier during winter then evenly distributed across the rest of the year, while evaporation is significantly greater in summer (Figure 4) (*Moderate Limitation*).

Table 1: Average monthly rainfall and evaporation (Crookwell and Goulburn)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rain (mm)	69.7	54.5	57.9	57.8	65.6	88.9	83.9	88.8	74.9	76.3	65.9	67.4	859.6
Evap (mm)	195.3	145.6	124	75	49.6	33	37.2	58.9	84	120.9	150	189.1	1262.6

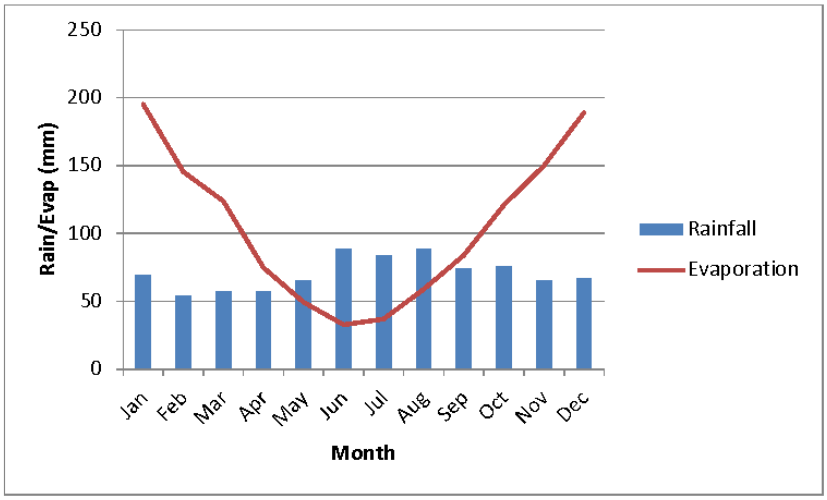


Figure 4: Graph showing Rainfall and Evaporation

4.4 Flood Potential

There are several existing drainage depressions running though the site. Flood mapping completed by SEEC has found that proposed lots 22-24, and 30-35 are affected by the 1:100 ARI Flood Level (Appendix 1). A significant portion of proposed Lots 22 and 31 are located below the 1:100 ARI Flood Level. Wastewater generated on these lots must be treated to a minimum standard of secondary-treatment and disposed of by subsurface irrigation only. All electrical components of the Aerated Wastewater Treatment Systems (AWTSs) installed onsite must be located above the 1:100 ARI Flood Level (*Moderate Limitation*).

4.5 Exposure

Land identified as potentially suited to on-site effluent management on all proposed lots are well exposed to sun and wind (*Minor Limitation*).

4.6 Slope

Figure 5 shows the topography on-site. All land identified as potentially suited to on-site effluent management on proposed lots 1-31 grades at approximately 7% or less (*Minor*

Limitation). The majority of land on proposed lots 32-37 grades at 17% or less (*Moderate Limitation*).

4.7 Stormwater Run-on

Some of the land identified as potentially suited to on-site effluent management might be subject to some degree of run-on. An upslope drain/berm could be required on some lots (*Minor Limitation*).

4.8 Proximity to Watercourses and Dams

According to NSW Spatial Services there are several drainage depressions and an intermittent watercourse flowing through this site, from the west to the east (Figure 5). During the site inspection the intermittent watercourse was dry. There were signs of erosion towards the eastern extent of the intermittent watercourse. A 40m buffer has been applied to all drainage depressions, proposed overland drainage swales and the intermittent watercourse. (*Moderate Limitation*).

4.9 Surface Rock

No surface rocks were identified during our site investigation (*Minor Limitation*).

4.10 Groundwater Seepage

Several areas of moisture tolerant vegetation were observed in proximity to the intermittent watercourse during our inspection (Figure 5). Subsurface soil conditions in this area showed signs of mottling in the moist subsoil. These areas have been avoided for the purposes of effluent management (*Moderate Limitation*).

4.11 Groundwater

Upper Lachlan Shire Council requires that no onsite effluent disposal occur within 250 m of bores used for potable water supply. According to WaterNSW's online ground water map there are no bores used for potable water supply within a 250 m radius of the proposed EMAs (*Minor Limitation).*

4.12 Erosion Potential

There were some signs of localised erosion, although soil erosion is not expected to be a significant problem on this generally well-vegetated site (*Minor Limitation*).

4.13 Fill

No fill was encountered during our investigation (*Minor Limitation*).

4.14 Vegetation

The site is well vegetated with a good covering of improved pasture. This vegetation provides good opportunity for the retention of water and nutrients resulting from onsite effluent disposal (*Minor Limitation*).

4.15 Land Availability

No less than 615 m^2 of land potentially suited to on-site effluent management has been identified on all proposed lots (Appendix 1) (refer to Section 6.2) (*Minor Limitation*). All lands suitable for effluent management have been given a 40 m buffer to dams, drainage depressions and the proposed overland drainage swale located downslope of the proposed EMAs (*Minor Limitation*). There are instances where land suitable for effluent management is less than 40m to a proposed stormwater pit. As such secondary-treatment must be adopted on proposed lots 10-15 (*Moderate Limitation)*.

Future owners would need to be considerate of their available (and required) EMAs when planning potential developments. As previously mentioned, this is a conceptual Wastewater Assessment and future owners would require a site specific Wastewater Site Assessment to suit their individual development and preferences.

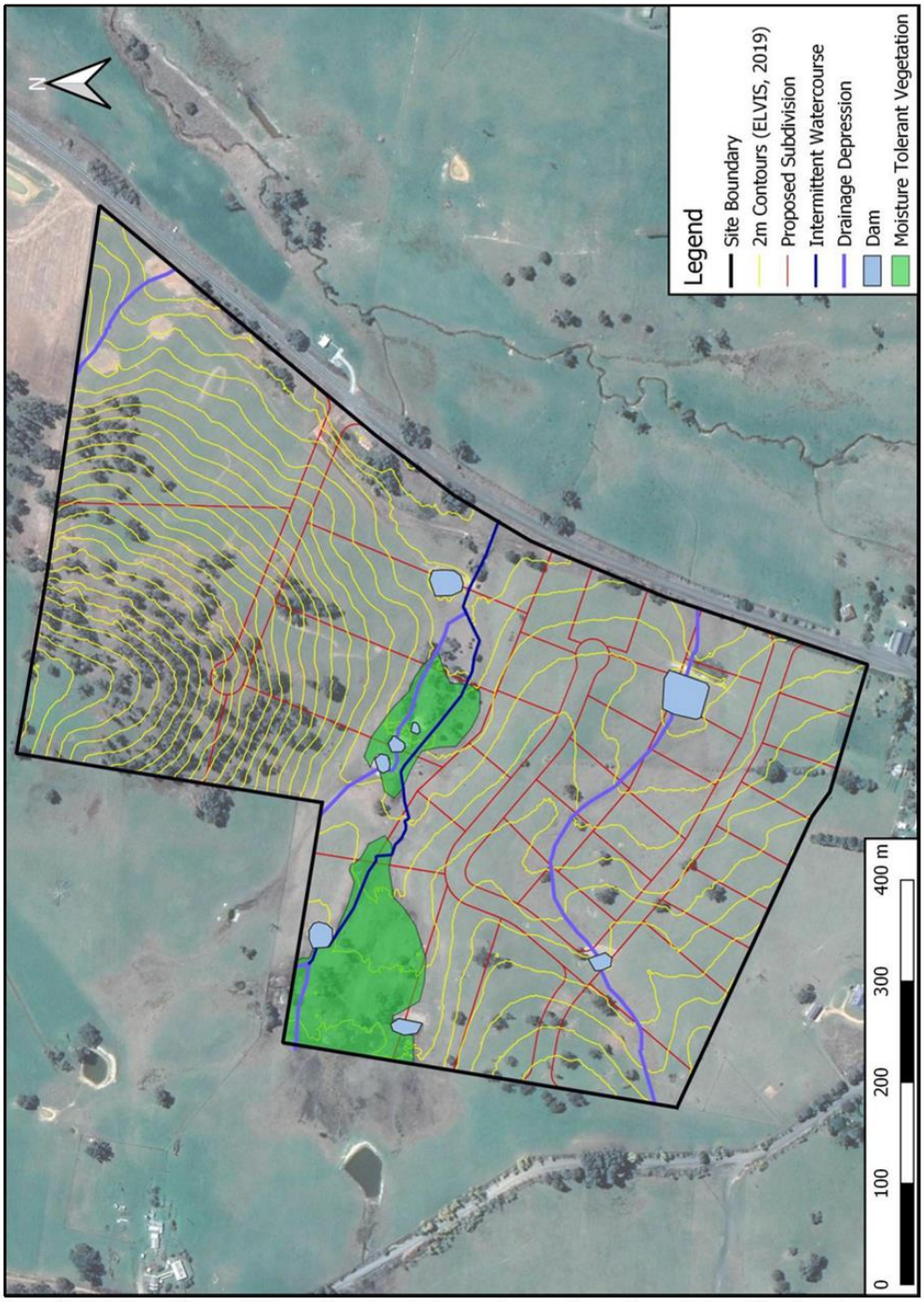


Figure 5: Existing site conditions showing drainage depressions, dams, intermittent watercourse, moisture tolerant vegetation and 2m contours (NSW Spatial Services, 2019 and ELVIS, 2019).

5 Soils and Geology

5.1 Soil Landscape Mapping

Soil Landscape mapping by eSPADE (2019) identifies the site is on the *Blakney Creek Soil Landscape* (Figure 6).

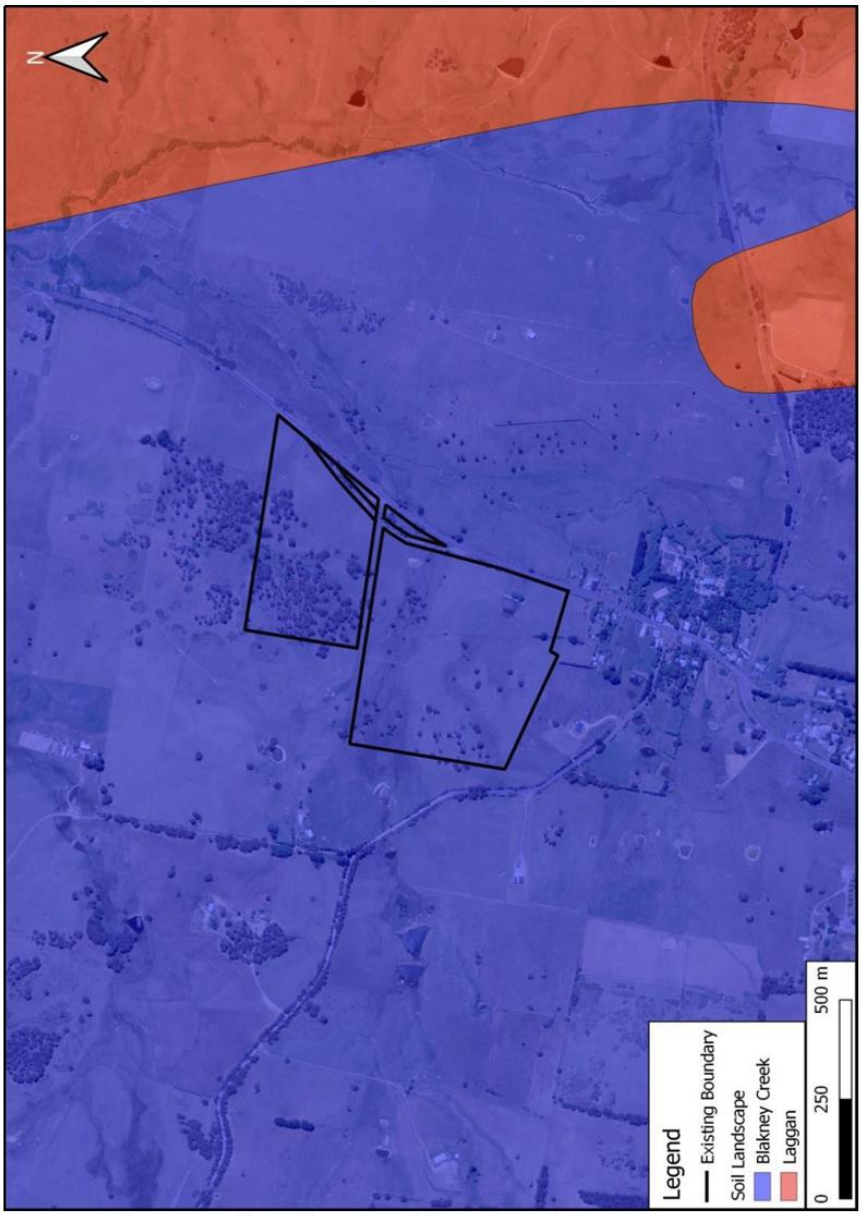


Figure 6: Soil Landscapes and boundary of Lots 2 DP 1233492.

5.2 Site Specific

Eleven bores were excavated by SEEC staff while on site (Figure 2). The soil profiles for each were similar consisting of:

Bore 1

0-250 mm	Weak greyish brown fine sandy clay loam topsoil. 30-35 mm ribbon.
250-650 mm	Well-structured orange brown, sandy clay loam. 40 mm ribbon.
650-1,200+ mm	Well-structured orange brown, clay loam. 40-45 mm ribbon.

Bore 2

0-250 mm	Weak greyish brown fine sandy clay loam topsoil. 30-35 mm ribbon.
250-650 mm	Well-structured orange brown, sandy clay loam. 40 mm ribbon.
	Refusal on rock fragments.

Bore 3

0-200 mm	Weak greyish brown fine sandy clay loam topsoil. 30-35 mm ribbon.
200-800 mm	Well-structured orange brown, sandy clay loam. 40 mm ribbon.
	Refusal on rock fragments.

Bore 4

0-200 mm	Weak greyish brown fine sandy clay loam topsoil. 30-35 mm ribbon.
200-850 mm	Well-structured reddish brown, clay loam. 40-45 mm ribbon.
850-1,200+	Weak reddish brown, clay loam. 20% quartz fragments

Bore 5

0-150 mm	Dark brown sandy clay loam topsoil. 25-30 mm ribbon.
150-300	Waterlogged gleyed sandy clay loam. 30 mm ribbon.
300-1,100	Mottled reddish brown clay loam. 50 mm ribbon.

Bore 6

0-400 mm	Well-structured reddish brown sandy clay loam topsoil. 40 mm ribbon.
400-1,200+ mm	Well-structured reddish brown, clay loam. 40-45 mm ribbon.

Bore 7

0-400 mm	Well-structured reddish brown sandy clay loam topsoil. 40 mm ribbon.
400-600 mm	Well-structured reddish brown clay loam to light clay 50 mm ribbon.

600-750	Weak flaky sandy clay. 20% rock fragments.

Bore 8

0-200 mm	Weak greyish brown fine sandy clay loam topsoil. 30-35 mm ribbon.
200-600 mm	Well-structured reddish brown, clay loam. 40-45 mm ribbon.
600-1,200+ mm	Moderately-structured light brown light clay. 55 mm ribbon. 10% rock fragments.

Bore 9

0-50 mm	Massive grey sandy loam topsoil.
50-400 mm	Massive greyish brown sandy clay loam.
400-600	Massive yellowish brown light clay. 15% rock fragments.

Bore 10

0-50 mm	Massive grey sandy loam topsoil.
50-400 mm	Massive greyish brown sandy clay loam.
400-600	Massive yellowish brown light clay. 15% rock fragments.

Bore 11

0-200 mm	Well-structured reddish brown sandy clay loam topsoil. 40 mm ribbon.
200-1,200+ mm	Well-structured reddish brown, clay loam. 40-45 mm ribbon.

5.3 Soils Summary

The bores and soil testing showed the soils at this site:

- Are moderately deep (800-1,200+ mm) with the exception of boreholes 2, 9 and 10 (600-800 mm) (*Minor – Moderate Limitation*).
- Moderately to well drained: bores generally revealed fine sandy clay loam topsoil over clay loam to light clay subsoils (*Moderate Limitation*).
- Are non-acidic: subsoil is pH 6.1 (*Minor Limitation*);
- Are unlikely to be dispersive. Laboratory results found an Emerson Aggregate Test (EAT) class 5 (Appendix 3) (*Minor Limitation*).
- Have a good ability to sorb phosphorous. P sorb = 660 (Appendix 3) (*Minor Limitation*).

6 Wastewater Management

6.1 Design Wastewater Load

The Design Wastewater Load is calculated assuming a five-bedroom dwelling (Upper Lachlan Shire Council, 2008) on each proposed lot with access to a tank water supply (120 L/person/day). This equates to 1,200 L/day wastewater generated for each proposed lot based on a maximum occupancy of 10 persons.

6.2 General Recommendations

6.2.1 Lots 1-30

The majority of land on proposed Lots 1-26 slopes less than 10% and exhibit a moderately deep (800 -1,200+ mm) soil profile. As such the lands are suited to surface and subsurface disposal methods. The suitability of surface spray disposal methods will be dependent on each lot's individual development.

6.2.2 Lot 22 and 31

The majority of proposed Lots 22 and 31 are located in the headwaters of the intermittent watercourse on soils identified as mottled and waterlogged (Section 5.2 BH5). A flood investigation conducted by SEEC has also found that the majority of proposed Lot 31 is located below the 1:100 ARI Flood Level. Therefore we have proposed subsurface irrigation on proposed Lots 22 and 31.

6.2.3 Lots 32-37

The majority of land on proposed Lots 27-37 slopes greater than 10% and exhibit a shallow to moderately deep profile (600-1,200+ mm). As such we recommend that subsurface disposal be adopted.

6.3 Feasibility to Install A Wastewater System

Due to the well-structured Category 4 soils found across much of the site, it is recommended that wastewater be disposed via irrigation methods. Wastewater can only be irrigated after secondary treatment and disinfection in an AWTS or similar. As such, the following recommendations are based on the assumption that each proposed lot will install a secondary treatment system such as an AWTS.

6.3.1 Lots 1-21 and Lots 23-30

Depending on the final size and location of any development, irrigation could be either surface or subsurface. The required area of each EMA is calculated by undertaking a hydraulic balance and a nutrient balance. A Design Irrigation Rate (DIR) of 3.5 mm/day (well-structured category 4 soil) is used. This equates to an Effluent Application Area (EAA) of approximately 343 m^2. However, nutrient modelling requires a minimum total EMA of 615 m^2 (Appendix 2). Therefore, the total EMA would be 615 m^2 comprising of:

- 343 m^2 of irrigation (the EAA) built to the requirements of AS/NZS1547:2012 and
- 272 m^2 of Nutrient Uptake Area (NUA) immediately downslope of the irrigation area and left undeveloped.

Once installed vegetation over the EMAs must be managed as either fully managed lawn (clippings removed) or improved pasture to maximise nutrient uptake.

6.3.2 Lots 22 and 31

Due to the majority of Lots 22 and 31 being located below the 1:100 ARI Flood Level, subsurface irrigation must be adopted. The required area of EMA is calculated by undertaking a hydraulic balance and a nutrient balance. A DIR of 3.5 mm/day (well-structured category 4 soil) is used. This equates to an EAA of approximately 343 m^2. However, nutrient modelling requires a minimum total EMA of 615 m^2 (Appendix 2). Therefore, the total EMA would be 615 m^2 comprising of:

- 343 m^2 of subsurface irrigation built to the requirements of AS/NZS1547:2012 and
- 272 m^2 of NUA immediately downslope of the irrigation area and left undeveloped.

Once installed vegetation over the EMAs must be managed as either fully managed lawn (clippings removed) or improved pasture to maximise nutrient uptake

6.3.3 Lots 32-37

As slopes across these lots are generally greater than 10%, subsurface irrigation must be adopted. The required area of EMA is calculated by undertaking a hydraulic balance and a nutrient balance. A DIR of 2.8 mm/day (well-structured category 4 soil on slopes between 10-20%) is used. This equates to an EAA of approximately 429 m^2. However, nutrient modelling requires a minimum total EMA of 615 m^2 (Appendix 2). Therefore, the total EMA would be 615 m^2 comprising of:

- 429 m^2 of subsurface irrigation built to the requirements of AS/NZS1547:2012 and
- 186 m^2 of NUA immediately downslope of the irrigation area and left undeveloped.

Once installed vegetation over the EMAs must be managed as either fully managed lawn (clippings removed) or improved pasture to maximise nutrient uptake.

6.4 General Requirements for Effluent Management Areas

6.4.1 Vegetative Cover

An EMA must be well vegetated before it is commissioned to prevent runoff and possible erosion. Vegetation is required to promote nutrient uptake. Grass is generally the most suitable form of vegetation and, at the time of inspection, the site had a good covering of improved pasture grasses suitable for effluent management. Given the nature of nearby

similar rural properties in Laggan Village all proposed RU4 - W are expected to have fully managed lawns.

6.4.2 Protection from Stock and Vehicles

Future owners should identify their EMA and ensure it is protected from stock and/or vehicle access (fence it off if need be).

6.4.3 Buffers

Buffers are required to effluent management areas from lot boundaries and the built environment. They vary depending on the relative position of the effluent management area to a given feature (Table 2):

Table 2: Buffer distances (Upper Lachlan Shire Council *'Onsite sewage Management Strategy, 2008'*.

	Secondary-treated surface irrigation	Secondary-treated subsurface irrigation or subsoil disposal
Property boundary, driveways, walkways and paths	• 6 m up-gradient and 3 m down-gradient of driveways and property boundaries • 3 m to walkways and paths	• 6 m up-gradient and 3 m down-gradient
Dwellings and swimming pools	• 15 m to dwellings • 6m to swimming pools	
Permanent and intermittent watercourses	• 100 m from permanent surface waters (e.g. rivers, streams, lakes etc.) • 40 m to other watercourses (e.g. farm dams, intermittent watercourses and drainage channels).	
Bore or well used for domestic consumption	250 m	

All areas identified as suitable for effluent disposal has been given a 3-6 m buffer to the proposed property boundaries. Lots 16, 22, 23 and 28 have either an existing drainage depression or proposed grassed swale located downslope of the land identified as suitable for effluent management. The identified EMA's have been located 40m or more from these features.

6.4.4 Future Management

Council will require AWTSs be inspected every three months by a qualified person and the results of that inspection sent to council. It would also be the responsibility of new owners to maintain their effluent disposal areas by ensuring effluent is distributed evenly over the entire effluent management area and it is regularly mown.

7 Summary and Conclusion

The purpose of this report is to assess the feasibility to manage wastewater on each of the newly created Lots 1-37, thereby demonstrating for subdivision purposes that an onsite wastewater management system could theoretically be sited on each of those lots. This report does not provide details of a specific system to be used on a lot and must not be used by the purchasers of any of the proposed lots.

We have determined that an EMA could feasibly be sited on each of Lots 1 to 37, but with a number of caveats and conditions as detailed in this report and summarised below.

- Lots 1-21 and 23-30 are suitable for surface or subsurface irrigation after secondary treatment in an AWTS, or similar.

- A majority of Lots 22 and 31 are located below the 1:100yr ARI Flood Level, and therefore must be disposed by subsurface irrigation after secondary treatment in an AWTS, or similar.

- Surfaces on Lots 32-37 generally slope at 10% or more and therefore must be disposed via subsurface irrigation after secondary treatment in an AWTS, or similar.

Given the conceptual nature of this assessment, it is expected that future proponents would require a *site specific* Wastewater Site Assessment to suit their individual development and preferences. Site-specific assessments must be considerate of the mitigation measures contained herein. As noted previously, this report assesses the theoretical feasibility to establish an EMA on each of the proposed lots and must not be relied upon by future purchasers of those lots.

8 References

Department of Local Government (1998). Environment and Health Protection Guidelines: *Onsite Sewage Management for Single Household.*

DLWC/SCA (2002). Soil Landscapes of The Sydney Catchment Authority's Hydrological Catchments. NSW Department of Land and Water Conservation and Sydney Catchment

eSPADE (2020). NSW Office of Environment and Heritage.

Standards Australia / Standards New Zealand (2012). AS/NZS 1547:2012 *On-site Domestic Wastewater Management.*

WaterNSW (2015). *Neutral or Beneficial Effect on Water Quality Assessment Guideline.*

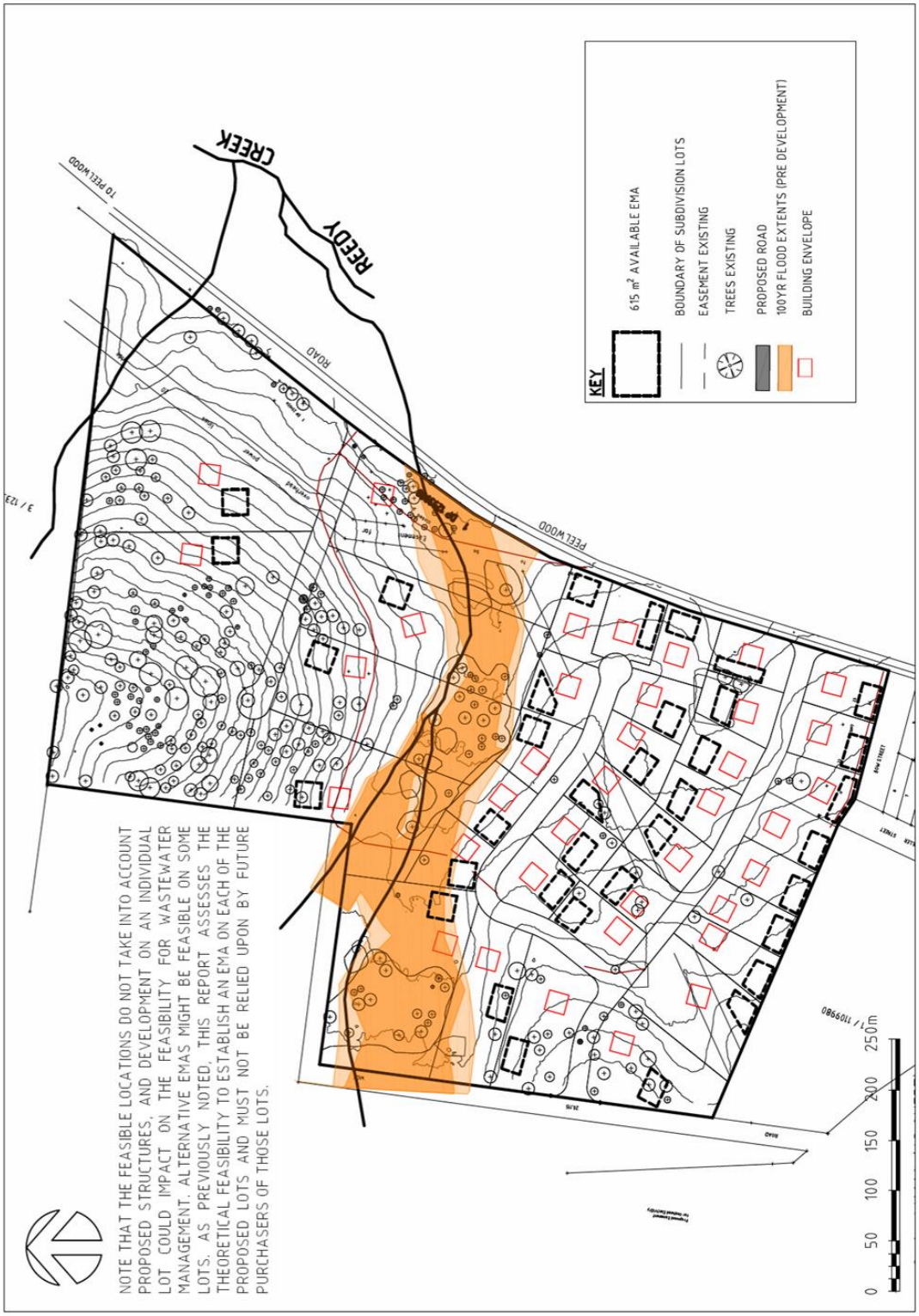
WaterNSW (2018). *Developments in the Sydney Drinking Water Catchment – Water Quality Information Requirements.*

WaterNSW (2019). *Designing and Installing On-Site Wastewater Systems. A WaterNSW Current Recommended Practice.*

9 Appendices

9.1 Appendix 1 – Feasible locations of EMAs.

See over page. Note that the feasible locations do not take into account proposed structures, and development on an individual lot could impact on the feasibility for wastewater management. Alternative EMAs might be feasible on some lots. As previously noted, this report assesses the theoretical feasibility to establish an EMA on each of the proposed lots and must not be relied upon by future purchasers of those lots.



SEEC

19000339-WW-01

9.2 Appendix 2 – Nutrient Balance

Wastewater Volume	1200	(L/day)
Vegetation in EMA	Improved Pasture	

Nitrogen Balances

A = (C x Q) / Lx

Where:

A = Land Area (m2)		
C = Concentration of Nutrient =	30	mg/L
Q = Wastewater Flow =	1200	L/day
Lx = Critical Loading Rate =	76	(mg/m^2/day)

A = 474 m^2

Phosphorus Balances

Step 1: P Sorption Calculation Basalt soils?

Psorb (topsoil)	clay loam	300	mg/kg	from SCA (2012)
Psorb (subsoil)	clay loam	660	mg/kg	from lab results
Bulk Density (topsoil)	clay loam	1500	kg/m3	from SCA (2012)
Thickness (topsoil)		200	mm	
Coarse Frags (topsoil)		0	%	
Bulk Density (subsoil)	clay loam	1500	kg/m3	from SCA (2012)
Thickness (subsoil)		800	mm	
Coarse Frags (subsoil)		0	%	
Calculated Psorb (topsoil)		900	kg/ha	
Calculated Psorb (subsoil)		7920	kg/ha	
Assumed P-sorb		3087	kg/ha	(insitu P-sorb is 35% calculated P-sorb)

Step 2: Determine the required area to sorb phorphorus (50 year design life):

P absorbed =	8820	x 0.35
=	3087	kg/ha
=	0.3087	kg/m2

P uptake = 6.5 mg/m^2/day

Determine the amount of phosphorus generated over that time:

Concentration of phosphorus =	12	mg/L
Phosphorus generated = Concentration x volume of wastewater =	262.8	kg

Area Required:

P generated / (P sorbed + P uptake) = 615 m^2 of Improved Pasture

9.3 Appendix 3 – Laboratory Results

Department of Primary Industries

Report No. **WN191144**

Biosecurity Laboratory Operations
Environmental Laboratory
1243 Bruxner Highway, WOLLONGBAR NSW 2477
Phone: 02 6626 1103 Email: wollongbar.csu@dpi.nsw.gov.au

Kim Passfield
SEEC Pty Ltd
PO Box 1098
BOWRAL NSW 2576

Soil Analysis Report

1 sample(s) of soil received on 28/10/19. Tested as per the following methods.
Testing commenced 28/10/19

Method	Method Description
S202	Soil Electrical Conductivity
S201	Soil pH in 1:5 water or 1:5 $CaCl_2$ suspension
SP901	Soil colour and texture **
SP903	Determination of the Emerson Class Number of Soil **
S259	Determination of Soil Phosphorus Sorption**
S273	Gillman & Sumpter Exchangeable Cations

** Where shown, indicates NATA accreditation does not cover the performance of this service.

Results relate only to the items tested.
Notes:

- *When required, samples air dried at 40°C as per Soil Chemical Methods - Australasia (Rayment and Lyons 2011).*
- *Results are expressed on an air-dry weight basis unless otherwise stated.*
- *Physical soil testing results are calculated on 105°C dry weight.*
- *This report should not be reproduced except in full.*
- *Samples will be retained for one calendar month from the date of the final report. Samples will then be discarded.*
- *Clients wishing to recover their samples must contact the laboratory within this period. This laboratory will return residual samples at client expense.*

Date of issue 6/11/19

NATA
Accredited for compliance with ISO/IEC 17025 – Testing
Accreditation No. 14173
ACCREDITED FOR TECHNICAL COMPETENCE

ASPAC

Approved for Release by:
Michael Rowe
Technical Officer

DPI Environmental Laboratory Page 1 of 2

SEEC

19000339-WW-01

Laboratory No. Client's ID	Units	Limit of Reporting	1 19000339 laggan-seec
Soil Analysis			
Electrical Conductivity	dS/m	0.0010	0.007
pH (Water)	pH units	0.04	6.1
pH ($CaCl_2$)	pH units	0.04	4.4
Texture			Sandy clay loam
Emerson aggregate test			Class 5
P Sorption	mg/kg	25	660
Exchangeable Cations			
Aluminium	cmol(+)/kg	0.10	0.99
Calcium	cmol(+)/kg	0.030	1.5
Potassium	cmol(+)/kg	0.010	0.30
Magnesium	cmol(+)/kg	0.0070	1.9
Sodium	cmol(+)/kg	0.030	0.094
CEC (effective)	cmol(+)/kg	0.20	4.8
Calcium/ Magnesium			0.80
Percent Aluminium Saturation	% of ECEC		21
Exchangeable Calcium	% of ECEC		32
Exchangeable Potassium	% of ECEC		6.2
Exchangeable Magnesium	% of ECEC		40
Exchangeable Sodium Percentage	% of ECEC		2.0

17 September 2019

Mr Ian Miller

C/O-

Mr Robert Mowle
Laterals Engineering and Management
35 Montague Street, Goulburn NSW 2580
T: 02 4821 0973
M: 0428 483 558
E: robert@laterals.com.au

Ecological Values and Constraints Assessment for Lot 2 DP1233492, Laggan, NSW.

Capital Ecology project no. 2889

Dear Mr Miller,

This letter provides an Ecological Values and Constraints Assessment (EVCA) for Lot 2 DP1233492, Laggan, NSW (the 'study area', Figure 1). The study area encompasses approximately 35.60 ha and is located in the south-western part of 297 Peelwood Road, immediately north of the village of Laggan. It is understood that the study area is being investigated for a proposed subdivision as part of Upper Lachlan Shire Council's plan to rezone the land to increase available residential land in Laggan and thereby revitalise the village and broader locality.

This EVCA provides preliminary identification and assessment of the values of recognised biodiversity conservation significance occurring within the study area, specifically those currently listed pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the NSW *Biodiversity Conservation Act 2016* (BC Act).

This EVCA has been prepared based on:

- the results of database searches for the study area, including the Commonwealth EPBC Act Protected Matters Search Tool (PMST), and NSW Wildlife Atlas (BioNet);
- a review of relevant studies and other background information, including the surveys and sources referenced herein;
- a field survey on 24 June 2019, completed to assess and record the ecological values of the study area; and
- the knowledge of the authors regarding the biota of the locality, specifically the threatened ecological communities, flora, and fauna (and associated habitat) with the potential to occur in

the lowland grassland, woodland and forest ecosystems of the South Eastern Highlands bioregion of NSW.

This EVCA is divided into the following sections.

1. Methods.
2. Results.
3. Assessment of Potential for Impacts.
4. Conclusions and Recommendations.

1. Methods

1.1 Database and Literature Review

To inform the field surveys, Capital Ecology completed a desktop review, involving the following.

- A list of threatened species (flora and fauna), threatened populations and threatened ecological communities (TECs) listed pursuant to the EPBC Act with the potential to occur in the study area was obtained using the Commonwealth Government Department of the Environment and Energy's (DoEE) online EPBC Act Protected Matters Search Tool (PMST) on 7 June 2019.
- A review of the NSW Wildlife Atlas (BioNet) point data for the significant ecological values of the locality (i.e. within a 10 km radius of the study area). These values include species listed as threatened pursuant to the EPBC Act and/or the BC Act, together with flora species considered 'rare or uncommon in NSW' and fauna species which are otherwise of a conservation focus.
- A review of previous and current studies undertaken by Capital Ecology and others in the region.

1.2 Vegetation Survey and Mapping

1.3.1 Plant Community Type (PCT) mapping

On 24 June 2019, Capital Ecology undertook a field survey to identify, assess, and map the current vegetation and habitat values in the study area. The first step of the vegetation survey involved identifying the Plant Community Types (PCTs) occurring in the study area (as defined in NSW Vegetation Information System[1]). The PCTs were identified by driving and walking across and around the study area, reading the landscape and considering numerous landscape elements, such as the:

- presence, species, growth form, and density of remnant canopy trees and/or stags or stumps of these;
- presence and species of midstorey shrubs and trees;
- floristic composition of the groundstorey; and
- the landscape position and other geographical features (elevation, aspect, soils, apparent hydrology etc.).

[1] https://www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm.

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1.3.2 Vegetation Zone definition and mapping

Each of the mapped PCTs were assessed and divided into Vegetation Zones based on the structure, floristic composition, and overall condition ('intactness') of the vegetation. Mapping of the Vegetation Zones was undertaken by driving and walking the boundaries and recording them using a combination of hand-held GPS and marking directly on to high resolution orthorectified aerial photograph field maps.

1.3 Likelihood of Occurrence Assessment

The Likelihood of Occurrence Assessment for threatened flora and fauna species is a categorisation used to determine the likelihood that the subject species occurs within a study area. The results are based on the findings of completed desktop studies and a field survey, expert opinion, and consideration of the species' currently recognised distribution and preferred habitat.

Threatened species and populations identified in the Likelihood of Occurrence Assessment include all of those identified during the database and literature review as potentially occurring in the locality. More specifically, threatened species included are those identified on the EPBC Act PMST, those identified on BioNet as previously recorded in the locality, and those not previously identified but considered by Capital Ecology to have some potential to occur in the study area.

The likelihood of a species occurring in the study area is categorised as either negligible, low, moderate, or high. A species that has been identified in the study area during the survey for this EVCA or by other confirmed records is expressed as confirmed.

The completed Likelihood of Occurrence Assessment is provided as Appendix C. Species assigned a moderate or higher likelihood of occurrence in the study area, other than if this is limited to transient visitation, are considered in more detail in Section 2.5 (threatened flora) and Section 2.6 (threatened fauna) of this EVCA.

2. Results

2.1 Study Area Description

The study area is 35.60 ha in size, zoned 'RU2: Rural Landscape' under the Upper Lachlan Local Environmental Plan 2010, and is identified on the Natural Resources Sensitivity Map. The study area is bordered by:

- the village of Laggan to the south;
- the remainder of the 297 Peelwood Road property to the north and other rural land to the west; and
- Peelwood Road to the east, beyond which is rural land.

Much of the study area was historically cleared. These areas have since been sown to crops and pasture under rotation. At the time of survey, the cultivated portions of the study area were sown to Cultivated Oats *Avena sativa* which was grazed by cattle.

Two tributaries of Reedy Creek flow through the study area in a west to east direction, later joining the main channel of Reedy Creek beyond Peelwood Road to the east. The northern of these tributaries is a

substantial watercourse (identified as a third order stream, Strahler 1952[2]) which is characterised by scattered small pools along a broad and waterlogged riparian zone. The extent of this waterlogged area roughly defines the lower boundary of the cultivated land. The other tributary is a minor drainage line (identified as a first order stream, Strahler 1952) which is currently cropped and is likely to convey water only following substantial rainfall.

Patches of remnant native vegetation have been retained in the riparian zone along the larger tributary of Reedy Creek, and other patches have been retained on the higher elevated land in the north and southwest of the study area. The trees in the riparian zone are predominantly remnant Black Gum *Eucalyptus aggregata* and those on the higher land are a monoculture of Broad-leaved Peppermint *Eucalyptus dives*. The groundstorey in the uncultivated portions of the study area is native dominant and of low diversity, with the most abundant species being the grazing tolerant Wallaby Grasses *Rytidosperma spp*. and Weeping Grass *Microlaena stipoides*

2.2 Vegetation

Before European settlement the study area is likely to have been characterised by a band of grassy riparian woodland (PCT 677) across the damp zone associated with the larger tributary of Reedy Creek, possibly with additional smaller patches of this woodland along the smaller tributary. This riparian woodland would have merged along a relatively narrow ecotone into dry sclerophyll forest (PCT 730) on the study area's higher elevated hill slopes and crests (Table 1).

Table 1. PCTs recorded in the study area.

PCT	PCT name	PCT description	Occurrence in the study area	TEC status Commonwealth / NSW	PCT % cleared
677	Black Gum grassy woodland of damp flats and drainage lines of the eastern Southern Tablelands, South Eastern Highlands Bioregion	This community occurs on shallow, yellow to red podzolic clay to loam soils derived from sedimentary, metamorphic and igneous substrates on foot-slopes and hill slopes. In its climax form this community would have been characterised by a canopy dominated by Brittle Gum, often with Red Stringybark, Broad-leaved Peppermint, Long-leaved Box, and occasionally Argyle Apple, with a sparse shrubstorey and sparse to moderately dense groundstorey supporting a moderate diversity of native forbs.	This PCT was mapped across the damp zone associated with the larger tributary of Reedy Creek.	Endangered (refer Section 2.3)	60%

[2] Strahler, AN (1952). *Hypsometric (area-altitude) analysis of erosional topology*. Geological Society of America Bulletin 63 (11): 1117–1142.

PCT	PCT name	PCT description	Occurrence in the study area	TEC status Commonwealth / NSW	PCT % cleared
730	Broad-leaved Peppermint - Mountain Gum dry open forest of the Central Tablelands area of the South Eastern Highlands Bioregion	This open grassy woodland occurs in broad valleys from Delegate to the Upper Shoalhaven River catchment, on clay loam soils derived from Ordovician, Silurian, and Devonian sediments and acid volcanics.	This PCT was mapped throughout the remainder of the study area, notably across the study area's higher elevated hill slopes and crests.	Not listed	60%

As noted above, the study area has been utilised for agriculture for an extended period and the majority of the vegetation which occurs today is highly modified. As shown in Figure 2, the below described vegetation zones for each PCT were identified, assessed, and mapped during the field survey. Appendix A provides the list of flora species recorded in the study area during the field survey.

PCT 677 – Black Gum grassy woodland of damp flats and drainage lines of the eastern Southern Tablelands, South Eastern Highlands Bioregion

As shown in the representative photographs provided below as Plates 1 to 3, PCT 677 occurs as the following three discernible vegetation zones.

- PCT 677 Zone 1 – Remnant Canopy – Native Dom – Low Diversity. This zone comprises approximately 2.05 ha of predominately native vegetation, characterised by a patchy remnant canopy and regeneration dominated by Black Gum with associate Snow Gum *Eucalyptus pauciflora,* an absent shrubstorey, and a groundstorey dominated by the common native grasses Wallaby Grasses, Weeping Grass, and River Tussock-grass *Poa labillardieri*. Exotic species such as Blackberry *Rubus fruticosus*, Couch Grass *Cynodon dactylon*, and Flatweed *Hypochaeris radicata* are also present, however generally at low density.
- PCT 677 Zone 2 – Native Dom – Low Diversity. Analogous to Zone 1, but lacking the remnant canopy and regeneration, Zone 2 comprises approximately 1.61 ha of predominately native vegetation.
- PCT 677 Zone 3 – Exotic Dom – Low Diversity. This zone comprises approximately 2.80 ha of exotic vegetation. Both the canopy and shrubstorey are absent, and the groundstorey is sown to Cultivated Oats and Clover *Trifolium* sp..

Plate 1. Representative photograph of PCT 677 Zone 1

Plate 2. Representative photograph of PCT 677 Zone 2

Plate 3. Representative photograph of PCT 677 Zone 3

PCT 730 – Broad-leaved Peppermint - Mountain Gum dry open forest of the Central Tablelands area of the South Eastern Highlands Bioregion

As shown in the representative photographs provided below as Plates 4 to 6, PCT 730 occurs as the following three discernible vegetation zones.

- PCT 730 Zone 1 – Remnant Canopy – Native Dom – Low Diversity. This zone comprises approximately 2.99 ha of predominately native vegetation, characterised by a patchy to largely intact canopy of mature remnant Broad-leaved Peppermint, an absent midstorey and shrubstorey, and a groundstorey dominated by the common native grasses Wallaby Grasses and Weeping Grass with patches of Kangaroo Grass *Themeda triandra* and Bracken Fern *Pteridium esculentum*. Exotic species such as Sheep's Sorrel *Acetosella vulgaris*, Spear thistle *Cirsium vulgare*, and Flatweed are also present.
- PCT 730 Zone 2 – Remnant Canopy – Exotic Dom – Low Diversity. This zone comprises approximately 8.88 ha of mature remnant Broad-leaved Peppermint over an exotic groundstorey sown to Cultivated Oats and Clover. This combination of species in the groundstorey is the result of recent pasture improvement.
- PCT 730 Zone 3 – Exotic Dom – Low Diversity. This zone comprises approximately 17.30 ha of exotic vegetation. Both the canopy and shrubstorey are absent, and the groundstorey is sown to Cultivated Oats and Clover.

Plate 4. Representative photograph of PCT 730 Zone 1

Plate 5. Representative photograph of PCT 730 Zone 2

Plate 6. Representative photograph of PCT 730 Zone 3

2.3 Threatened Ecological Communities

2.3.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

Two EPBC Act listed threatened ecological communities (TECs) have the potential to occur in the locality, both listed as critically endangered under the EPBC Act:

- 'Natural Temperate Grassland of the South Eastern Highlands' (NTG-SEH), and
- 'White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland' (EPBC Act Box-Gum Woodland).

Natural Temperate Grassland of the South Eastern Highlands – listed as critically endangered pursuant to the EPBC Act

Description – As detailed in Commonwealth of Australia (2016[3]), the NTG-SEH TEC is characterised by grassy vegetation dominated by moderately tall (25–50cm) to tall (50–100cm), dense to open tussock grasses in the genera *Rytidosperma*, *Austrostipa*, *Bothriochloa*, *Poa* and *Themeda*. Up to 70% of all plant species may be forbs. The community may be treeless or contain up to 10% cover of trees, shrubs or sedges. Natural Temperate Grassland occurs within the biogeographical region of the South Eastern Highlands in valleys influenced by cold air drainage and in broad plains.

Presence in the study area – Absent – No part of the study area supports, or would have historically supported, grassland ecological communities. As such, the study area does not support this TEC.

[3] Commonwealth of Australia (2016). *Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community*.

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland – listed as critically endangered pursuant to the EPBC Act

Description – The White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC is characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs (where shrub cover comprises less than 30% cover), and a dominance or prior dominance of White Box and/or Yellow Box and/or Blakely's Red Gum trees. This TEC occurs along the western slopes and tablelands of the Great Dividing Range from southern Queensland through New South Wales and the Australian Capital Territory to Victoria.

Presence in the study area – Absent – No part of the study area supports, or would have historically supported, woodland with White Box, Yellow Box or Blakely's Red Gum as one of the most common species. As such, the study area does not support this TEC.

2.3.2 Biodiversity Conservation Act 2016 (NSW)

Two BC Act listed ecological communities have the potential to occur in the study area:

- 'White Box – Yellow Box – Blakely's Red Gum Woodland' (BC Act Box-Gum Woodland)'; and
- 'Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions'.

BC Act Box-Gum Woodland

This community, listed as endangered in NSW, is described below, together with an assessment of likelihood of occurrence in the study area.

Description – The below description is extracted from the NSW *Final Determination for the TSC Act endangered listed ecological community White Box – Yellow Box – Blakely's Red Gum Woodland*) (NSW Scientific Committee 2002, gazetted 15 March 2002[4]).

> *White Box Yellow Box Blakely's Red Gum Woodland is found on relatively fertile soils on the tablelands and western slopes of NSW and generally occurs between the 400 and 800 mm isohyets extending from the western slopes, at an altitude of c. 170 m to c. 1200 m, on the northern tablelands (Beadle 1981). The community occurs within the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands and NSW South Western Slopes Bioregions.*
>
> *White Box Yellow Box Blakely's Red Gum Woodland includes those woodlands where the characteristic tree species include one or more of the following species in varying proportions and combinations – Eucalyptus albens (White Box), Eucalyptus melliodora (Yellow Box) or Eucalyptus blakelyi (Blakely's Red Gum). Grass and herbaceous species generally characterise the ground layer. In some locations, the tree overstorey may be absent as a result of past clearing or thinning and at these locations only an understorey may be present. Shrubs are generally sparse or absent, though they may be locally common.*

[4] NSW Scientific Committee (2002). *Final Determination for the TSC Act endangered listed ecological community White Box – Yellow Box – Blakely's Red Gum Woodland*. Gazetted 15 March 2002.

Although the final determination does not provide specific listing criteria against which to assess a patch of vegetation, a useful key is provided in *Identification Guidelines for Endangered Ecological Communities – White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland)* (NPWS 2002[5]), which draws its information from the final determination. As described in the final determination and the associated key, the definition for the BC Act Box-Gum Woodland TEC is extremely broad. In effect, any land for which the climax community is Box-Gum Woodland that has not been cultivated, become a stock camp, or otherwise been entirely modified, is likely to meet the minimum definition of the BC Act listed TEC.

Presence in the study area – Absent – The dominant tree species in the study area are not characteristic of the BC Act definition for the Box-Gum Woodland TEC. As such, the study area does not support vegetation which meets the criteria for this community under the BC Act.

BC Act Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland

This community, listed as endangered in NSW, is described below, together with an assessment of likelihood of occurrence in the study area.

Description – The below description is extracted from the NSW *Final Determination for the TSC Act endangered listed ecological community Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions* (NSW Scientific Committee 2011, gazetted 10 June 2011[6]).

> *Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland typically forms an open-forest, woodland or open woodland that transitions into grassland at low tree cover. The canopy is dominated by Eucalyptus pauciflora (Snow Gum), E. rubida (Candlebark), E. stellulata (Back Sallee) and E. viminalis (Ribbon Gum), either as single species or in combinations. A shrub layer may be present and sub-shrubs are often a component of the ground stratum; characteristic species include Hymenanthera dentata and Melichrus urceolatus. The ground layer is dominated by grasses and other herbaceous species including Themeda australis, Poa spp., Austrostipa spp., Austrodanthonia spp., Leptorhynchos squamatus, Chrysocephalum apiculatum, and Asperula conferta. This community may also occur as secondary grassland where the dominant trees have been removed but the ground stratum remains.*
>
> *The ecological community mainly occurs on valley floors, margins of frost hollows, footslopes and undulating hills between approximately 600 and 1400 m in altitude. It occurs on a variety of substrates including granite, basalt, metasediments and Quaternary alluvium. The ecological community occurs as a part of a mosaic of native vegetation communities including swamps, bogs, wetlands, grasslands and sclerophyll forests.*

The final determination does not provide specific listing criteria against which to assess a patch of vegetation, however the presence of the key canopy eucalypts and a native dominated ground stratum are described as the key characteristics of the community. The final determination also states that the community may also occur as secondary grassland. In this regard, based on the final determination, a

[5] NSW NPWS (2002). *Identification Guidelines for Endangered Ecological Communities - White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland)*. NSW National Parks and Wildlife Service.
[6] NSW Scientific Committee (2011). *Final Determination for the TSC Act endangered listed ecological community Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions*. Gazetted 10 June 2011.

logical interpretation of the minimum criteria for a patch to constitute the listed community is that the patch must:

1. support a canopy which is dominated by the key eucalypt species and occurs in at least moderately intact condition; or
2. where the canopy has been cleared, the ground stratum remains in at least moderately intact condition (i.e. native dominated with moderate to high diversity).

Presence in the study area – Present – Both Zone 1 and Zone 2 of PCT 677 support a canopy dominated by a key eucalypt species of this TEC and/or have a groundstorey in moderately intact condition. Accordingly, as shown in Figure 4, PCT 677 Zones 1 and 2 are consistent with the definition for this TEC.

2.4 Native vegetation extent

As per the BC Act, native vegetation is defined according to Part 5A of the *Local Land Services Act 2013* (LLS Act), which states:

> *"(1) For the purposes of this Part, native vegetation means any of the following types of plants native to New South Wales:*
>
> *(a) trees (including any sapling or shrub or any scrub),*
>
> *(b) understorey plants,*
>
> *(c) groundcover (being any type of herbaceous vegetation),*
>
> *(d) plants occurring in a wetland.*
>
> *(2) A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible."*

As per this definition, planted vegetation which comprises plant species native to NSW, regardless of whether or not the species are indigenous to the specific region and/or PCT of the study area, is classified as native vegetation.

The Commonwealth Government[7,8], ACT Government[9], and previous NSW Government[10] assessment guidelines for the temperate grassland and woodland PCTs of the NSW/ACT Southern Tablelands region each declare vegetation as native dominant if 50% or more of the perennial groundlayer is comprised of native species. However, no such threshold is defined by the Biodiversity Assessment Method (BAM), and the Office of Environment and Heritage have advised (Tobi Edmonds pers. comm., September 2018) that the criteria for use in determining native vs. exotic dominance must be more stringent than the previously applied 50/50 rule. It is understood that this is due to the potential for seasonal variation

[7] Commonwealth of Australia (2006). *Policy Statement 3.5: White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands*. Commonwealth Department of Environment and Heritage.
[8] Commonwealth of Australia (2016). Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community.
[9] ACT Government (2012). *Survey guidelines for determining lowland vegetation classification and condition in the ACT*, Conservation, Planning and Research, ACT Government.
[10] NSW Government (2014). *BioBanking Assessment Methodology 2014*. NSW Government Office of Environment and Heritage.

and/or assessor disparity to substantially alter the BAM mapping result. For example, a patch of vegetation that is classified as 55% native in one season may be classified as 45% native in another.

With regard to the above, for the purposes of this EVCA:

1. 'Native vegetation' is defined as any plant, naturally occurring or planted, which is native to NSW.
2. Exotic vegetation is defined as any plant which is not native to NSW.
3. A polygon of vegetation is 'native vegetation' if:
   a. 35% (i.e. approximately one-third) or more of the perennial groundlayer comprises species native to NSW; and/or
   b. species native to NSW are present in one or more of the other strata.

In accordance with the above, Zone 1 and Zone 2 of PCT 677 and Zone 1 and Zone 2 of PCT 730 constitute BC Act native vegetation. This combined area is shown as 'Native Vegetation' in Figure 3.

2.5 Threatened Flora Occurrence

The EPBC Act and BC Act vulnerable listed species Black Gum *Eucalyptus aggregata* is present in the study area. This species is the dominate canopy species of PCT 677 Zone 1 and would once have occurred throughout PCT 677 Zone 2 and Zone 3.

The study area contains characteristically suitable habitat for the EPBC Act and BC Act vulnerable listed species River Swamp Wallaby-grass *Amphibromus fluitans*. No specimens were identified during the field survey, however this species is known to occur in the locality and the presence of its aboveground growth is known to be dependent on seasonal conditions and the occurrence of flooding events. The field survey for this EVCA was also conducted outside of the flowering season (November – March).

No other EPBC Act and/or BC Act listed threatened flora species were recorded in the study area during the field survey, nor are any identified as occurring in the study area on the NSW Wildlife Atlas (BioNet) (refer Figure 5). As detailed in the Likelihood of Occurrence Assessment (refer to Appendix C), whilst there is some potential for several threatened or rare flora species to occur in the study area, the land use history and associated disturbance of the study area is likely to preclude the persistence of these species.

2.6 Fauna Habitat and Threatened Fauna Occurrence

2.6.1 Native fauna recorded

Several native fauna species were recorded during the survey, including common birds such as Australian Magpie *Gymnorhina tibicen* and Crimson Rosella *Platycercus elegans*, and the common frogs Common Eastern Froglet *Crinia signifera* and Whistling Tree Frog *Litoria verreauxii*. Appendix B lists the fauna species recorded during the field survey. All of these are common species in NSW and the region.

Note that no targeted surveys were completed and that these species were recorded incidentally.

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2.6.2 Threatened fauna habitat

As recorded during the survey, the study area supports the fauna habitat features described in Table 2.

Table 2. Fauna habitat features.

Habitat Feature	Description	Relevant Native Fauna Species/Assemblages
Remnant eucalypts	There is a substantial number of remnant trees in the study area, some of which contain functional hollows.	All remnant trees, young and mature, are likely to provide foraging resources for a variety of birds and marsupials. Any mature, hollow bearing trees in the study area are likely to provide a nesting resource for birds, bats, and marsupials, potentially including threatened species.
Native groundstorey vegetation	Several portions of study area support a low diversity native groundstorey (i.e. PCT 677 Zone 1 and Zone 2, PCT 730 Zone 1).	The grasses and forbs are likely to provide a foraging resource to a variety of native birds, reptiles, and herbivorous mammals, such as the Eastern Grey Kangaroo *Macropus giganteus* and Common Wombat *Vombatus ursinus*. Open areas with reduced canopy cover are likely to provide a hunting resource for raptors and other predatory birds.
Oat crop	Much of the study area supports a sown oat crop (i.e. PCT 677 Zone 3 and PCT 730 Zone 2 and Zone 3).	This monoculture crop would provide a limited grazing resources for common birds, reptiles, and herbivorous mammals. Open areas are likely to provide a hunting resource for raptors and other predatory birds.
Creeks/streams	A substantial third order tributary of Reedy Creek passes through the study area, and a small dam is located in the eastern extent of the study area.	The tributary in the study area is likely to provide habitat of value to some aquatic flora or fauna. Two frog species were recorded during the field survey, and the tributary is likely to provide suitable habitat for a variety of other common aquatic fauna species. The small dam is likely to provide limited habitat to waterbirds and other common aquatic fauna species.

As detailed in the Likelihood of Occurrence Assessment (Appendix C), whilst several EPBC Act and/or BC Act listed birds may visit the study area on a transient basis to forage, given the agricultural use of the land and associated high degree of vegetation modification, the habitat in the study area is unlikely to be of significance to any threatened fauna species. Nevertheless, as there is some potential (albeit low) that threatened birds (i.e. Little Eagle *Hieraaetus morphnoides*) and mammals (gliders, insectivorous bats etc.) may nest/roost in the study area's retained mature eucalypt trees, the habitat value of these trees should be more closely investigated should their clearance be proposed.

2.7 Pest Animals

The exotic pest species European Rabbit *Oryctolagus cuniculus* was recorded in the study area during the field survey. Additionally, it can be assumed that the exotic pest species European Brown Hare *Lepus europaeus* and Red Fox *Vulpes vulpes* will be present or visit the study area.

2.8 Pest Plants

Table 3 lists the two high threat weeds recorded in the study area.

Table 3. High threat weeds.

Table key.

- WoNS - (Commonwealth) Weed of National Significance.
- Regional Priority Weed in the South East Local Land Services region under the *NSW Biosecurity Act 2015*.
  - P = Prevention.
  - E = Eradication.
  - C = Containment.
  - AP = Asset Protection.
  - LM = Species subject to Local Management programs.

Species Name	Common Name	Status	Occurrence in Study Area
Shrubs			
Rubus fruticosus	Blackberry	WoNS, LM	The landowner has recently completed an extensive program of works to poison and then physically remove the Blackberry which occurred along the larger tributary of Reedy Creek. The species now only occurs in this area as a few scattered reshooting plants. Blackberry was not observed elsewhere in the study area.
Trees			
Ligustrum lucidum	Broad-leaf Privet	–	Several planted windbreaks containing this species occur in the southern portion of the study area.

2.9 Summary of Ecological Values and Potential Constraints

As shown in Figure 4, this assessment has identified the following two significant ecological values as occurring in the study area.

- The presence of the EPBC Act and BC Act vulnerable listed species Black Gum *Eucalyptus aggregata*.
- The presence of the BC Act listed TEC 'Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland'.

This assessment has also identified the following significant ecological value as potentially occurring in the study area.

- The presence of characteristically suitable habitat for the EPBC Act and BC Act listed species River Swamp Wallaby-grass *Amphibromus fluitans*.

3. Assessment of Potential for Impacts

3.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

The EPBC Act is the key Commonwealth Government legislation for the protection and conservation of Australia's environment and biodiversity. The EPBC Act provides the legislative framework for the assessment and approval mechanism requiring that proposed 'actions' to be assessed in terms of their

potential to impact upon 'Matters of National Environmental Significance' (MNES). MNES currently listed under the EPBC Act of relevance to the study area are:

- threatened species and ecological communities; and
- migratory species (protected under international agreements).

Where a potential impact on a MNES may occur as a result of a proposed action, the significance of that impact must be assessed. Should it be determined that a proposed action may have a significant impact on one or more listed matters, referral of the action to the Commonwealth Minister for Environment and Energy is required for consideration, and potentially assessment and approval, under the EPBC Act. If impacts to MNES cannot be avoided or substantially minimised/mitigated, the Minister is likely to declare the action a 'controlled action'. In such a case a formal offset would likely be required to offset the residual significant impact/s, the specifics of which would be determined in accordance with the EPBC Act Environmental Offsets Policy (Commonwealth of Australia 2012[11]).

Matters of National Environmental Significance

As detailed in the EPBC Act Significant Impact Guidelines (Commonwealth of Australia 2013[12]), whilst there are several criteria against which to assess the likelihood that a proposed action will significantly impact an EPBC Act listed ecological threatened species or community, it is important to note that the first states that –

> *"An action will require approval if the action has, will have, or is likely to have a significant impact on a species listed in any of the following categories:*
>
> - *extinct in the wild*
> - *critically endangered*
> - *endangered, or*
> - *vulnerable."*

<u>With regard to the above, an action/development which would impact areas containing Black Gum (refer Figure 4) would require referral under the EPBC Act.</u> Additionally, any action/development impacting on the riparian habitat would require targeted surveys for River Swamp Wallaby-grass in the appropriate season and conditions. <u>Any impact to confirmed River Swamp Wallaby-grass habitat would require referral under the EPBC Act.</u>

With regard to other MNES, whilst there is the potential for migratory species to periodically forage in the study area, the study area is unlikely to provide important habitat for any migratory species.

3.2 Biodiversity Conservation Act 2016

Under the BC Act, the Biodiversity Offsets Scheme (BOS) is triggered, and a Biodiversity Development Assessment Report (BDAR) prepared applying the NSW Biodiversity Assessment Method (BAM) by an

[11] Commonwealth of Australia (2012). *EPBC Act Environmental Offsets Policy*. Australian Government Department of Sustainability, Environment, Water, Population and Communities.
[12] Commonwealth of Australia (2013). *Matters of National Environmental Significance - Significant Impact Guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth Department of the Environment.

accredited BAM Assessor must accompany a development application, for a proposed development which:

1. *will involve clearance of native vegetation (including trees, understorey plants, groundcover plants, and wetland plants) or a prescribed impact (as set out in clause 6.1 of the Biodiversity Conservation Regulation 2017 [BC Regulation]) on land identified on the Biodiversity Values Map; and/or*

2. *will exceed the native vegetation clearance threshold for the smallest minimum lot size associated with the zoning of the subject land; and/or*

3. *may significantly impact one or more BC Act listed entities (i.e. threatened species or ecological communities).*

Biodiversity Values Map

The study area is not identified on the Biodiversity Values Map.

https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap

Native vegetation clearance

The minimum lot size for the study area is 'AC = 80,000 m^2'. In this regard, as stated in Part 7, Clause 7.2 of the *Biodiversity Conservation Regulation 2017* (BC Regulation), if native vegetation clearance was to exceed 1 ha then a BDAR would be required for the proposed development.

The study area is approximately 35,600 m^2 (35.60 ha) in size. As detailed in this EVCA and illustrated in Figure 3, the vegetation zones containing a remnant canopy and/or native dominant groundstorey constitute native vegetation under the BC Act (i.e. Zones 1 and 2 of both PCT 677 and PCT 730, refer Figure 3).

In accordance with the above, based on the current minimum lot size, a development would trigger the BOS if the area of native vegetation clearance exceeds 1 ha. It is noted that the minimum lot size, and therefore the native vegetation clearance threshold, will likely change once the land is rezoned to an urban zoning.

Potential to impact one or more BC Act listed entities

As described in Section 2.9, the study area contains:

- the BC Act listed TEC – Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland;
- the BC Act listed flora species – Black Gum *Eucalyptus aggregata*; and
- potential habitat for the BC Act listed flora species – River Swamp Wallaby-grass *Amphibromus fluitans*.

Any proposed development that will impact one or more of these entities will require assessment to determine whether the impact is likely to be significant.

4. Conclusions and Recommendations

The following are the key conclusions or our assessment.

1. The study area's climax vegetation communities have been highly degraded by the land use history and associated vegetation and landform modification. Notwithstanding this, the patches designated 'PCT 677 Zone 1' and 'PCT 677 Zone 2' still support the canopy cover and/or the groundstorey floristic diversity sufficient to meet the listing criteria for the BC Act listed 'Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland' TEC.

2. The areas designated 'PCT 677 Zone 1', 'PCT 730 Zone 1', and 'PCT 730 Zone 2' have sufficient remnant canopy cover to constitute native vegetation under the BC Act. Additionally, 'PCT 677 Zone 2' has sufficient groundstorey cover of native species to constitute native vegetation under the BC Act.

3. The area designated 'PCT 677 Zone 1' contains the EPBC Act and BC Act listed species Black Gum *Eucalyptus aggregata*. Additionally, 'PCT 677 Zone 1' and 'PCT 677 Zone 2' both contain potential habitat for the EPBC Act and BC Act listed species River Swamp Wallaby-grass *Amphibromus fluitans*. Targeted surveys between November and March would be required to confirm presence/absence of this species.

Considering the above, we recommend the following for the proposed subdivision of the study area.

1. Impacts to vegetation zones 'PCT677 Zone 1' and 'PCT677 Zone 2' (refer Figure 2) should be avoided to the greatest extent practicable. Any proposed action/development impacting 'PCT677 Zone 1' would require referral to the Commonwealth DoEE under the EPBC Act due to the impact on a MNES (Black Gum). Additionally, both the above vegetation zones meet the criteria for the BC Act listed TEC 'Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland'. Any impact upon this TEC would trigger the BOS requirement to prepare a BDAR, likely resulting in the generation of a biodiversity offset liability.

2. Minimise the clearance of native vegetation. Any development proposal that would involve the clearance of 1 ha or more of the area classified as BC Act Native Vegetation (refer Figure 3) would trigger the BOS requirement to prepare an BDAR. If the clearance of over 1 ha of native vegetation cannot be avoided, then we note that impacts to PCT 677 are likely to be more constrained (i.e. more difficult approval process and/or generate a greater offset liability) than PCT 730, and this should be considered in the planning process accordingly (as part of a BDAR).

3. Conducting targeted surveys for the EPBC Act and BC Act listed species River Swamp Wallaby-grass is unwarranted at this time, given the potential habitat for this species is confined to vegetation zones 'PCT677 Zone 1' and 'PCT677 Zone 2' which are already highly constrained due to their being a BC Act listed TEC and habitat for an EPBC Act and BC Act listed threatened species (Black Gum). We note that targeted surveys for River Swamp Wallaby-grass would be required for the preparation of a BDAR or EPBC Act referral, both of which would be required if impacts to 'PCT677 Zone 1' or 'PCT677 Zone 2' were proposed. As discussed above, we recommend avoiding these zones in any planned action/development to avoid EPBC Act referral and avoid triggering the BOS and its requirement to prepare a BDAR.

4. If the above described avoidance of the study area's listed values is not feasible, and therefore the BOS is triggered, a BDAR would need to be prepared for submission with the development application. We note that a BDAR requires floristic and targeted surveys which are subject to seasonal requirements. As mentioned above, the area designated 'PCT 677 Zone 1 and Zone 2'

are likely to be highly constrained from a biodiversity perspective. Clearance of more than 1 ha of the native vegetation in 'PCT 730 Zone 1 and Zone 2' is likely to be approved, however it would result in the generation of a biodiversity offset liability, the value of which is determined by applying the BAM and preparation of a BDAR.

5. The conservation and rehabilitation of riparian land has many benefits both at the site scale and catchment scale (e.g. biodiversity improvement, control of erosion and sedimentation of receiving waterways etc.). Indeed, due to the very high benefit to cost ratio, rehabilitation of riparian land in the NSW South East Highlands bioregion is a top priority for the NSW Government. This means that conservation funding (e.g. through Landcare, NSW Environment Trust etc.) is prioritised for projects that involve direct conservation and rehabilitation of riparian land. As such, and given the significant conservation status and degree of constraint applicable to PCT 677 in the study area, we believe that funding could be successfully obtained to pay for rehabilitation works in PCT 677. Accordingly, we recommend that consideration be given during subdivision design and planning to establish PCT 677 Zone 1 and Zone 2 as a conservation area. This would involve fencing off the area to exclude stock, ongoing weed control, and potentially planting Black Gum and other native species to augment the existing vegetation (noting that in the absence of stock grazing the Black Gum are likely to regenerate naturally from the seed from the remaining mature trees).

Overall, with consideration of the study area's land use history and current ecological values, it is our view that the proposed rezoning and subsequent subdivision and development of the study area is a reasonable proposition. Provided that the above recommendations are appropriately incorporated, development in the study area could be designed to avoid significant impacts upon the ecological values of the study area and locality.

We trust that this EVCA provides the information and advice required. If, however, you should have any questions relating to this report, please do not hesitate to contact us.

Yours sincerely,

Robert Speirs	Alan Vincent
Director / Principal Ecologist	Field Ecologist

Attachments:

Figure 1. Locality Plan

Figure 2. Vegetation Mapping

Figure 3. Native Vegetation

Figure 4. Threatened Species Habitat and Ecological Communities

Figure 5. NSW Wildlife Atlas Data (BioNet)

Appendix A. Flora Species Recorded

Appendix B. Fauna Species Recorded

Appendix C. Likelihood of Occurrence Assessment

References

ACT Government (2012). *Survey guidelines for determining lowland vegetation classification and condition in the ACT*, Conservation, Planning and Research, ACT Government.

Commonwealth of Australia (2006). *Policy Statement 3.5: White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands*. Environment Protection and Biodiversity Conservation Act 1999. Australian Government Department of Environment and Heritage.

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NSW Government (2014). *BioBanking Assessment Methodology 2014*. NSW Government Office of Environment and Heritage.

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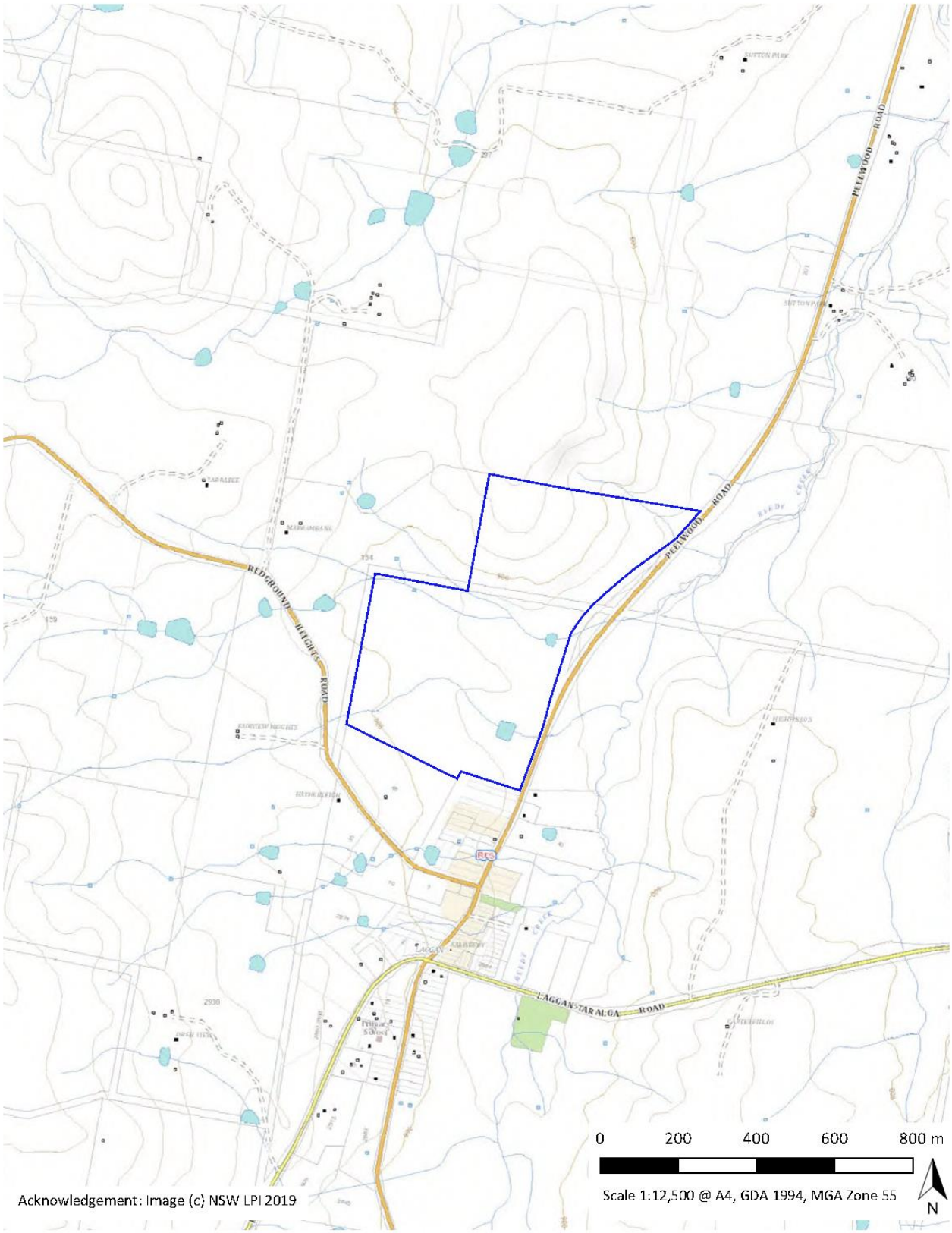

Figure 1. Locality Plan

Capital Ecology Project No: 2889
Drawn by: A. Vincent
Date: 9 August 2019

Legend

Study Area

capital ecology

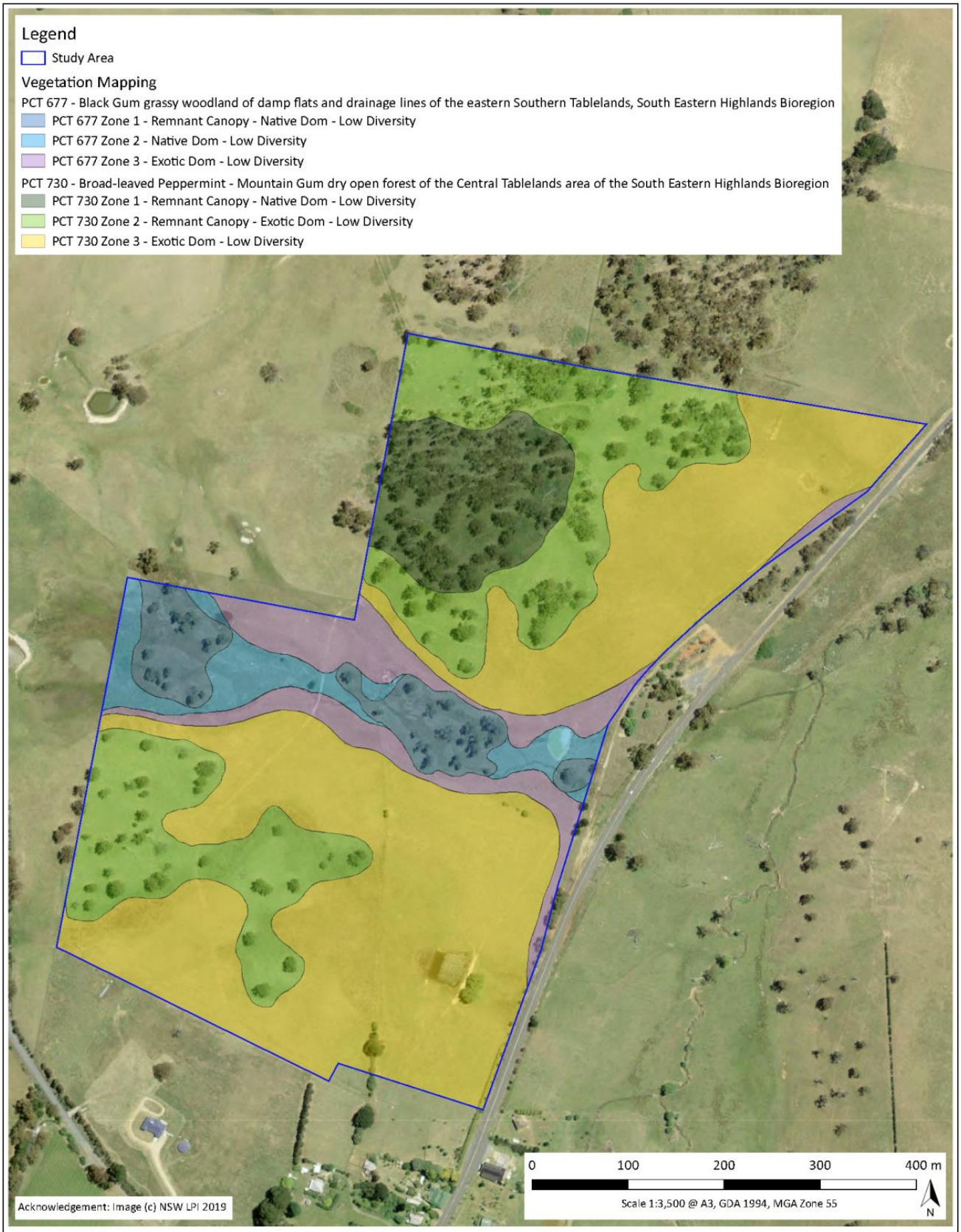

Figure 2. Vegetation Mapping

Capital Ecology Project No: 2889
Drawn by: A. Vincent
Date: 9 August 2019

capital ecology

Figure 3. Native Vegetation

Capital Ecology Project No: 2889
Drawn by: A. Vincent
Date: 9 August 2019

Legend
Study Area
Native Vegetation

capital ecology

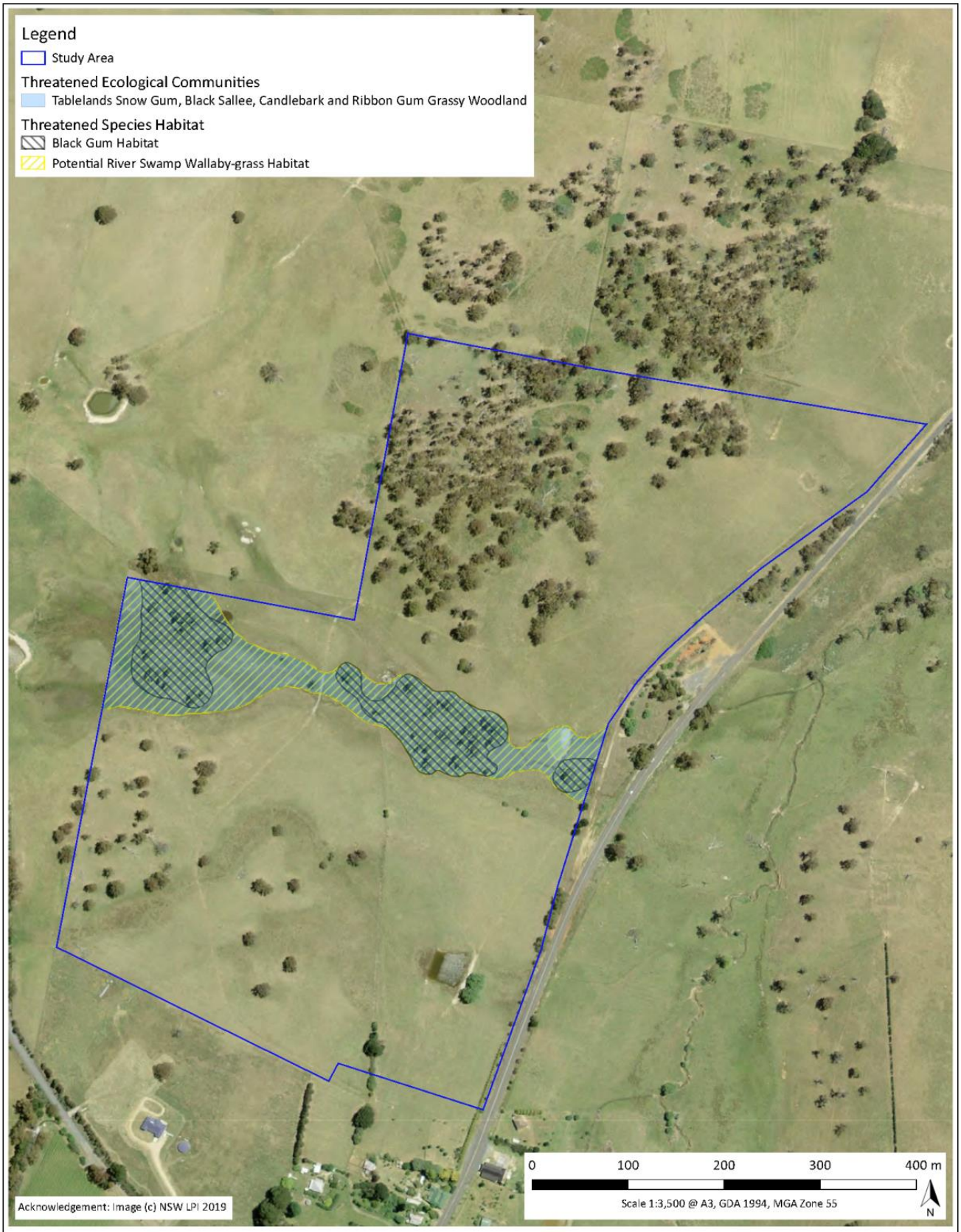

Figure 4. Threatened Species Habitat and Ecological Communities

Capital Ecology Project No: 2889
Drawn by: A. Vincent
Date: 9 August 2019

capital ecology

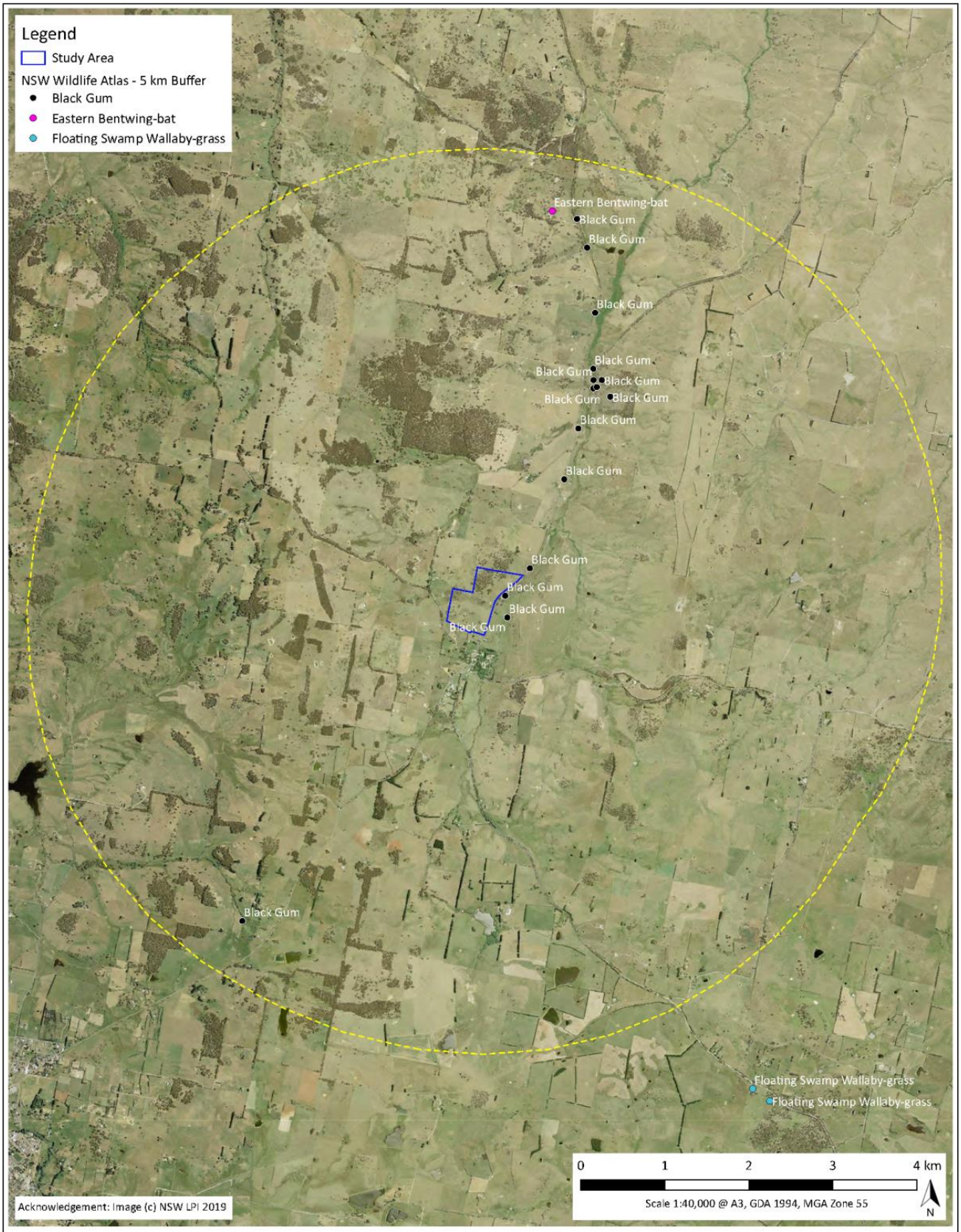

Figure 5. NSW Wildlife Atlas Data (BioNet)

Capital Ecology Project No: 2889
Drawn by: A. Vincent
Date: 9 August 2019

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Appendix A. Flora Species Recorded

Common name	Scientific name	BC Act status
Exotic		
Sheep's Sorrel	*Acetosella vulgaris*	-
Cape Weed	*Arctotheca calendula*	-
Cultivated Oat	*Avena sativa*	-
Brome Grass	*Bromus sp.*	-
Spear Thistle	*Cirsium vulgare*	-
Cotoneaster	*Cotoneaster glaucophyllus*	-
Couch grass	*Cynodon dactylon*	-
Cock's Foot	*Dactylis glomerata*	-
Claret Ash	*Fraxinus angustifolia*	-
Flatweed	*Hypochaeris radicata*	-
Broad-leaf Privet	*Ligustrum lucidum*	-
Apple Tree	*Malus sp.*	-
Radiata Pine	*Pinus radiata*	-
Poplar	*Populus sp.*	-
Blackberry	*Rubus fruticosus*	-
Clover	*Trifolium sp.*	-
Elm	*Ulmus sp.*	-
Native		
Australian Blackwood (Single Tree)	*Acacia melanoxylon*	Protected
Tall Sedge	*Carex appressa*	Protected
Common Spikerush	*Eleocharis acuta*	Protected
Black Gum	*Eucalyptus aggregata*	**Vulnerable**
Broad-leaved Peppermint	*Eucalyptus dives*	Protected
Snow Gum	*Eucalyptus pauciflora*	Protected
Black Sallee	*Eucalyptus stellulata*	Protected
Austral Rush	*Juncus australis*	Protected
Weeping Grass	*Microlaena stipoides*	Protected
Hairy Panic	*Panicum effusum*	Protected
River Tussock-grass	*Poa labillardieri*	Protected
Bracken Fern	*Pteridium esculentum*	Protected
Wallaby Grass	*Rytidosperma sp.*	Protected

Appendix B. Fauna Species Recorded

Class	Common name	Scientific name	BC Act status
Amphibia	Common Eastern Froglet	*Crinia signifera*	Protected
Amphibia	Whistling Tree Frog	*Litoria verreauxii*	Protected
Aves	Pacific Black Duck	*Anas superciliosa*	Protected
Aves	Grey Butcherbird	*Cracticus torquatus*	Protected
Aves	Australian Magpie	*Gymnorhina tibicen*	Protected
Aves	Noisy Miner	*Manorina melanocephala*	Protected
Aves	Crimson Rosella	*Platycercus elegans*	Protected
Aves	Eastern Rosella	*Platycercus eximius*	Protected
Mammalia	European Rabbit	*Oryctolagus cuniculus*	-

Appendix C. Likelihood of Occurrence Assessment

Key for below table

EPBC Act:	**BC Act:**
CE - critically endangered	CE1 - critically endangered species (Schedule 1, Part 1)
E - endangered	E1 - endangered species (Schedule 1, Part 2)
V - vulnerable	E2 - endangered population (Schedule 1, Part 2, Division 4)
CD - conservation dependent	E4 - presumed extinct (Schedule 3, Part 1)
	V1 - vulnerable species (Schedule 2, Part 3)

Note: The brief species distribution and habitat descriptions provided in the below table are sourced / appropriated from the threatened species online profiles, listing determinations and/or recovery plans prepared for the species by the Commonwealth Government and NSW Government. These resources and associated references are provided on the relevant government websites.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Birds				
Anthochaera phrygia Regent Honeyeater	CE	CE1	A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises a number of other eucalypt species. Nectar and fruit from the mistletoes *Amyema miquelii*, *A. pendula*, and *A. cambagei* are also eaten during the breeding season. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and sheoaks as well as within mistletoe haustoria (section of the root which connects with the host tree). An open cup-shaped nest is constructed by the female of bark, grass, twigs and wool.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Artamus cyanopterus cyanopterus Dusky Woodswallow	-	**V1**	The Dusky Woodswallow has two separate populations. The eastern population is found from Atherton Tableland, Queensland south to Tasmania and west to Eyre Peninsula, South Australia. The other population is found in south-west Western Australia. The Dusky Woodswallow is found in open forests and woodlands and may be seen along roadsides and on golf courses. The south-eastern population migrates north in autumn.	Negligible The study area does not contain potential habitat for the species.
Calidris ferruginea Curlew Sandpiper	CE	E	The Curlew Sandpiper is distributed around most of the Australian coastline. Inland records are probably mainly of birds pausing for a few days during migration. The Curlew Sandpiper breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving in Australia between August and November, and departing between March and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	Negligible The study area does not contain potential habitat for the species.
Callocephalon fimbriatum Gang-gang Cockatoo	-	V1	In summer the Gang-gang Cockatoo occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest. In winter, the species occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. The Gang-gang Cockatoo usually breeds in tall forests in the Southern Tablelands region, however they have been observed on occasion to breed in Box-Gum Woodland and other similar lowland habitat around Canberra (R. Speirs pers. obs., M. Mulvaney pers. comm.).	Low This species has been recorded in the locality. It is possible that the species may visit the study area to forage. The study area does not contain nesting resources of potential significance to the species

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Chthonicola sagittata Speckled Warbler	-	V1	The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat includes scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding. The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant.	Negligible The study area does not contain potential habitat for the species.
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	-	V1	In the region, Brown Treecreepers occur in dry woodlands and open forest below 1,000 metres. Brown Treecreepers also frequent paddocks and grasslands where there are sufficient logs, stumps and dead trees nearby. The species prefers relatively undisturbed woodland and dry open forest where the native understorey, especially grasses, has been preserved. The species usually prefers predominantly rough-barked trees such as Stringybarks and rough barked Boxes.	Negligible The study area does not contain potential habitat for the species.
Daphoenositta chrysoptera Varied Sittella	-	V1	The Varied Sittella occurs in a wide variety of woodland and forest habitats, particularly in lowland areas. The species prefers areas with a dominance of rough barked trees, notably Red Stringybark at relatively high density. The species is rarely recorded in sparsely treed areas.	Negligible The study area does not contain potential habitat for the species.
Grantiella picta Painted Honeyeater	-	V1	The Painted Honeyeater is found in Queensland and New South Wales west of the Great Dividing Range, through to northern Victoria. The species displays some migratory movement and is occasionally found in the Northern Territory and is a vagrant to South Australia and the ACT. The species frequents eucalypt forests and woodlands, particularly those that are infested heavily with mistletoes.	Negligible The study area does not contain potential habitat for the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Hieraaetus morphnoides Little Eagle	-	V1	The Little Eagle is distributed throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment, and occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. The species is sensitive to human disturbance.	**Moderate** This species has been recorded in the broader locality. The study area is likely to be part of the large hunting range of a pair of Little Eagles, however no indications of breeding activity (i.e. large stick nests, presence repeatedly observed) were observed in the study area or nearby during the field survey.
Lathamus discolor Swift Parrot	CE	E1	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.
Melanodryas cucullata cucullata Hooded Robin (southeastern form)	-	V1	The Hooded Robin occupies drier eucalypt forest, woodland and scrub, grasses and low shrubs, as well as cleared paddocks with regrowth or stumps. The species uses stumps, posts or fallen timber from which to locate prey on the ground. The species is found in woodland, often with scattered Yellow Box and/or Blakely's Red Gum, with long grass and low shrubs, or fallen logs.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.
Ninox strenua Powerful Owl	-	V1	Widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. They nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Petroica boodang Scarlet Robin	-	V1	The Scarlet Robin is found in south-eastern Australia (extreme south-east Queensland to Tasmania, western Victoria and south-east South Australia) and south-west Western Australia. In NSW it occupies open forests and woodlands from the coast to the inland slopes, breeding in drier eucalypt forests and temperate woodlands.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.
Petroica phoenica Flame Robin	-	V1	The Flame Robin is found in south-eastern Australia, from the Queensland border to Tasmania, western Victoria and south-east South Australia. In NSW it breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. The species migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.
Numenius madagascariensis Eastern Curlew	CE	-	The eastern curlew is Australia's largest shorebird and a long-haul flyer. The eastern curlew takes an annual migratory flight to Russia and north-eastern China to breed, arriving back home to Australia in August to feed on crabs and molluscs in intertidal mudflats. It is extremely shy and will take flight at the first sign of danger.	Negligible The study area does not contain potential habitat for the species.
Polytelis swainsonii Superb Parrot	V	V1	Found mainly in open, tall riparian River Red Gum forest or woodland. Often found in farmland including grazing land with patches of remnant vegetation. Breeds in hollow branches of tall eucalypt trees within nine kilometres of feeding areas.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.
Rostratula australis Australian Painted Snipe	V	E1	Usually found in shallow inland wetlands including farm dams, lakes, rice crops, swamps and waterlogged grassland. The species prefers freshwater wetlands, ephemeral or permanent, although it has been recorded in brackish waters.	Low It is possible that the species may visit the study area, however the study area does not contain nesting resources of potential significance to the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Stagonopleura guttata Diamond Firetail	-	V1	The Diamond Firetail is found in eastern Australia, from Eyre Peninsula, South Australia, to south-eastern Queensland. There has been a decline in density throughout the range, and many remaining populations may now be isolated. The species inhabits a wide range of eucalypt-dominated vegetation communities that have a grassy understorey, including woodland and mallee.	Negligible The study area does not contain potential habitat for the species.
Stictonetta naevosa Freckled Duck	-	V1	The Freckled Duck occurs primarily within south-eastern and south western Australia, within the Lake Eyre and Murray Darling Basin systems. It is known vagrant across widespread areas of NSW, depending on the inland conditions. Prefers permanent bodies of freshwater such as lakes, reservoirs and farm dams.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.
Fish and Crustacea				
Maccullochella peelii Murray Cod	V	-	The Murray Cod's natural distribution extends throughout the Murray-Darling basin ranging west of the divide from south east Queensland, through NSW into Victoria and South Australia. The species is found in the waterways of the Murray– Darling Basin in a wide range of warm water habitats that range from clear, rocky streams to slow flowing turbid rivers, billabongs and large deep holes. Murray Cod is entirely a freshwater species and will not tolerate high salinity levels.	Negligible There is no potential habitat in the study area for the species.
Macquaria australasica Macquarie Perch	E	E1	Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their substantial tributaries.	Negligible There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Frogs				
Litoria aurea Green and Golden Bell Frog	V	E1	The Green and Golden Bell Frog occurs mainly along coastal lowland areas of eastern NSW and Victoria. The furthest inland record of the species is at a recently discovered population near Hoskinstown in the Southern Tablelands (referred to as the Molonglo population). The species was previously known from elsewhere in the Southern Tablelands, but is now considered to have disappeared from the ACT and central slopes around Bathurst. In NSW, the species commonly occupies disturbed habitats, and breeds largely in ephemeral ponds. However, in Victoria, the Green and Golden Bell Frog occupies habitats with little human disturbance and commonly breeds in permanent ponds, as well as ephemeral ponds.	Negligible There is no potential habitat in the study area for the species.
Litoria booroolongensis Booroolong Frog	E	-	The Booroolong Frog is restricted to tablelands and slopes in NSW and north-east Victoria at 200–1300 m above sea level. The species is predominantly found along the western-flowing streams and their headwaters of the Great Dividing Range, and a small number of eastern-flowing streams in the north end of its range. The Booroolong Frog occurs along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins, or near slow-flowing connected or isolated pools that contain suitable rock habitats. Streams range from small slow-flowing creeks to large rivers in dissected mountainous country, tablelands, foothills and lowland plains. Primary habitat requirements for the Booroolong Frog are extensive rock bank structures along permanent rivers. The species can occur in cleared grazing land and pasture.	Negligible There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Litoria castanea Yellow-spotted Tree Frog	E	-	The Yellow-spotted Tree Frog previously had a disjunct distribution, being recorded on the New England Tablelands and on the Southern Tablelands from Lake George to Bombala. The species has only recently (2010) been rediscovered on the Southern Tablelands. Prior to this the species had not been recorded on the Southern Tablelands since the 1970s. Found in large permanent ponds, lakes and dams with an abundance of bulrushes and other emergent vegetation, it shelters during autumn and winter under fallen timber, rocks, other debris or thick vegetation.	Negligible There is no potential habitat in the study area for the species.
Litoria raniformis Growling Grass Frog	V	E1	In NSW, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. Usually found in or around permanent or ephemeral swamps or billabongs with an abundance of bulrushes and other emergent vegetation along floodplains and river valleys. The species has also been found in irrigated rice crops. Outside the breeding season animals disperse away from water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks. The species previously occurred on the Southern Tablelands at a number of sites within the Murrumbidgee River corridor, however it is now widely considered to have become extinct on the Southern Tablelands.	Negligible There is no potential habitat in the study area for the species.
Insects				
Synemon plana Golden Sun Moth	CE	E1	The Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. The species occurs in Natural Temperate Grasslands and Box-Gum Grassy Woodland in which the groundcover is dominated by Wallaby Grasses (*Rytidosperma* spp.). It is believed that the females lay up to 200 eggs at the base of the Wallaby Grass tussocks. After hatching, the larvae tunnel underground where they remain feeding on the roots of Wallaby Grass tussocks. The species is also known to feed on the introduced species (and Weed of National Significance), Chilean Needle Grass *Nassella neesiana*.	Negligible There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Mammals				
Cercartetus nanus Eastern Pygmy-possum	-	V1	The Eastern Pygmy-possum ranges from the Gold Coast to southern NSW. Found in a broad range of habitats from rainforest to sclerophyll forest and woodland. Feeds primarily on nectar and pollen from banksias, eucalypts and bottlebrushes. Shelters in tree hollows and abandoned bird nests.	Low It is possible that the species may visit the study area to forage, however the study area does not contain potential nesting resources or foraging resources of potential significance to the species.
Chalinolobus dwyeri Large-eared Pied Bat	V	V1	The Large-eared Pied Bat appears to exist in a number of small populations throughout its range. Very few maternity sites are known. The species requires a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors which are used for foraging.	Low It is possible that the species may visit the study area to forage, however the study area does not contain potential nesting resources or foraging resources of potential significance to the species.
Dasyurus maculatus maculatus Spot-tailed Quoll (SE mainland population)	E	V1	The Spot-tailed Quoll occurs along the east coast of Australia and the Great Dividing Range. The species uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and birds. Individuals require large areas of relatively intact vegetation through which to forage. The home range of a female is between 180 and 1000ha, while males have larger home ranges of between 2000 and 5000ha. Breeding occurs from May to August.	Low It is possible that the species may pass through the study area during movements through the broader locality, however the study area does not contain habitat of potential significance to the species.
Falsistrellus tasmaniensis Eastern False Pipistrelle	-	V1	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. The species generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. The species prefers moist, tall forest environments. The species is not known to forage or roost in urban or highly modified rural areas.	Low It is possible that the species may visit the study area to forage, however the study area does not contain potential nesting resources or foraging resources of potential significance to the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Miniopterus schreibersii oceanensis Eastern Bent-wing Bat	-	V1	The Eastern Bent-wing Bat is a subspecies of the Common Bent-wing Bat, with a range thought to be from central Victoria to Cape York Peninsula, Queensland. It is a fast flyer, able to travel many kilometres in a night. Caves are the primary roosting habitat for this species however similar man-made structures are also used (culverts, eaves etc.). The species forages above the forest canopy.	Low This species has been recorded in the broader locality. It is possible that the species may visit the study area to forage, however the study area does not contain potential nesting resources or foraging resources of potential significance to the species.
Petauroides Volans Greater Glider	V	-	The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, with an elevational range from sea level to 1200 m above sea level. The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is primarily folivorous, and is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species	Low The species is not known to occur near the study area and was not recorded during the field survey.
Petrogale penicillata Brush-tailed Rock-wallaby	V	E1	In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. They occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. They browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	Negligible There is no potential habitat in the study area for the species.
Phascolarctos cinereus Koala (combined populations of Qld, NSW and the ACT)	V	V1	In NSW, the Koala mainly occurs on the central and north coasts with some populations in the western region. Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. They are solitary with varying home ranges. In high quality habitat home ranges may be 1-2 hectare and overlap, while in semi-arid country they are usually discrete and around 100 ha.	Low Old records exist of the species in the locality to the southwest. It is possible that the species may pass through the study area during movements through the broader locality, however the study area does not contain habitat of potential significance to the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Pteropus poliocephalus Grey-headed Flying Fox	V	-	The Grey-headed Flying Fox occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. Whilst Brisbane, Newcastle, Sydney and Melbourne are occupied continuously, the species is widespread throughout their range during summer. In autumn the species occupies coastal lowlands and is uncommon inland. In winter the species congregates in coastal lowlands north of the Hunter Valley and is occasionally found on the south coast of NSW and on the northwest slopes (associated with flowering eucalypts of these areas). The Grey-headed Flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. The Grey-headed Flying-fox roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast.	Low It is possible that the species may visit the study area to forage, however the study area does not contain potential roosting resources or foraging resources of potential significance to the species.
Reptiles				
Delma impar Striped Legless Lizard	V	V1	The Striped Legless Lizard is patchily distributed in grasslands of south-eastern NSW, the ACT, north-eastern, central and south-western Victoria, and south-eastern South Australia. Most areas where the species persists are thought to have had low to moderate levels of agricultural disturbance in the past and it has been suggested that ploughing in particular may be incompatible with the survival of the species. Until recently, the species was thought to inhabit only native grasslands dominated by species such as Tall Speargrass and Kangaroo Grass. In recent years, surveys have revealed the Striped Legless Lizard in many sites dominated by exotic grasses such as Phalaris, Serrated Tussock and Flatweed. They have also been found in several secondary grassland sites, generally within two kilometres of primary grassland.	Negligible There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Plants				
Amphibromus fluitans River Swamp Wallaby-grass	V	-	River Swamp Wallaby-grass has been recorded along the Lachlan River at sites at Laggan near Crookwell and the headwaters of the Wollondilly River. The species grows mostly in permanent swamps, as well as lagoons, billabongs, dams and roadside ditches. The species requires moderately fertile soils with some bare ground, such conditions being caused by seasonally-fluctuating water levels.	**Moderate** This species is known to occur in the locality. The riparian habitat in the study area is potential habitat for this species. However, the species was not detected during the field survey.
Eucalyptus aggregata Black Gum	V	V1	Black Gum occurs on the central and southern tablelands of NSW, and in a small disjunct population in Victoria. In NSW, it occurs predominantly in the South Eastern Highlands Bioregion. The species is a small to medium-sized woodland tree which grows in grassy woodlands on alluvial soils in moist sites along creeks on broad, cold and poorly-drained flats and hollows. It commonly occurs with Candlebark *Eucalyptus rubida*, Ribbon Gum *E. viminalis*, and Snow Gum *E. pauciflora*, with a grassy understorey of River Tussock *Poa labillardieri*. Most populations are located on private land or road verges and travelling stock routes.	**Confirmed** This species is present in the study area.
Eucalyptus macarthurii Camden Woollybutt / Paddys River Box	E	E1	The species is currently recorded from the Moss Vale District to Kanangra Boyd National Park. In the Southern Highlands it occurs mainly on private land, often as isolated individuals in, or on the edges, of paddocks. Isolated stands occur in the north west part of the range on the Boyd Plateau. The only known record in the conservation estate is within Kanangra Boyd National Park. The species occurs on grassy woodland on relatively fertile soils on broad cold flats.	Negligible This species is not present in the study area.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Lepidium hyssopifolium Basalt Peppercress	E	E	This species is known from a few populations in NSW, Victoria and Tasmania. The Basalt Pepper-cress is known to establish on open, bare ground with limited competition from other plants. It was previously recorded from Eucalypt woodland with a grassy ground cover, low open Casuarina woodland with a grassy ground cover and tussock grassland. Recently recorded localities have predominantly been in weed-infested areas of heavy modification, high degradation and high soil disturbance such as road and rail verges, on the fringes of developed agricultural land or within small reserves in agricultural land. Many populations are now generally found amongst exotic pasture grasses and beneath exotic trees.	Low The species is not known to occur in the locality and was not recorded during the field survey.
Leucochrysum albicans var. *tricolor* Hoary Sunray	E	-	The Hoary Sunray occurs from Queensland to Victoria and in Tasmania. In the ACT the species can be seen in spring in abundance on the roadside along Fairbairn Avenue and into Mt Ainslie Nature Reserve, on the western slopes of Mt Majura and adjacent to the Federal Highway road easement. In NSW it is distributed on the inland slopes and plains including grasslands and woodlands on the Monaro and is quite a common species along in less modified areas. The species is usually found in ungrazed and lightly grazed areas, along roadsides in particular. It appears to be very sensitive to grazing, but responds to disturbance as a coloniser and appears to tolerate mowing. Flowers spring to summer.	Negligible There is no potential habitat in the study area for the species
Pelargonium sp. Striatellum Omeo Stork's-bill	E	E1	An undescribed species of Pelargonium, Omeo Stork's Bill is a tufted perennial herb threatened by grazing, recreational activities, and exotic species. It is known to occur just above the high-water level of ephemeral lakes in NSW and Victoria.	Negligible There is no potential habitat in the study area for the species

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Pomaderris pallida Pale Pomaderris	V	V1	Pale Pomaderris has been recorded from near Kydra Trig, north-west of Nimmitabel, Tinderry Nature Reserve, and the Queanbeyan River. A record from Byadbo in Kosciuszko National Park has not been relocated. The main distribution is along the Murrumbidgee in the ACT. It was recorded recently in eastern Victoria. This species usually grows in shrub communities surrounded by Brittle Gum *Eucalyptus mannifera* and Red Stringybark *E. macrorhynca* or Black Cypress *Callitris endlicheri* woodland.	Negligible The species is quite conspicuous when present and was not recorded during the field survey.
Prasophyllum petilum Tarengo Leek Orchid	E	E1	When first described in 1991, the Tarengo Leek Orchid was known only from the Hall Cemetery in the ACT. It has since been found at four sites in New South Wales: Captains Flat Cemetery, Ilford Cemetery, Steves Travelling Stock Route (TSR) at Delegate and the Tarengo TSR near Boorowa. The Tarengo Leek Orchid occurs on relatively fertile soils in grassy woodland or natural grassland. The three cemetery sites originally contained grassy woodland, dominated by Snow Gum *Eucalyptus pauciflora* and Black Gum *E. aggregata* at Captains Flat, and Blakely's Red Gum *E. blakelyi* and Yellow Box *E. melliodora* at Hall and Ilford. Both Tarengo TSR and Steves TSR are natural grasslands. The species is intolerant of grazing and this is considered to be the key reason it has been found only within cemeteries and TSRs, land from which grazing has been restricted.	Negligible There is no potential habitat in the study area for the species.
Rutidosis Leptorrhynchoides Button Wrinklewort	E	E1	In the ACT and NSW, Button Wrinklewort occurs in box-gum woodland, secondary grassland derived from box-gum woodland or in natural temperate grassland. It prefers open spaces where it does not have to compete for light. It is known from several sites in the ACT, NSW and Victoria, where it is threatened by habitat loss, grazing and weed encroachment.	Negligible There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Swainsona recta Small Purple-pea	E	E1	The Small Purple-pea occurs in the grassy understorey of woodlands and open forests dominated by Blakely's Red Gum, Yellow Box, Candlebark and Bundy. The species grows in association with understorey dominants that include Kangaroo Grass, Poa tussocks and spear-grasses. Plants die back in summer, surviving as rootstocks until they shoot again in autumn. The species is intolerant of grazing but generally tolerant of fire, which also enhances germination by breaking the seed coat and reducing competition from other species.	Negligible The study area is unlikely to provide potential habitat to the species due to land use history and the degraded nature of the groundstorey vegetation within the study area. The species is also not known to occur in the locality.
Swainsona sericea Silky Swainson-pea	-	V1	Silky Swainson-pea is a low growing perennial, found from the Northern Tablelands to the Southern Tablelands and Monaro region as well as further inland on the slopes and plains. The species is found in Natural Temperate Grassland and Snow Gum Woodland on the Monaro, and in Box-Gum Woodland in the Southern Tablelands and South West Slopes.	Negligible The study area is unlikely to provide potential habitat to the species due to land use history and the degraded nature of the groundstorey vegetation within the study area. The species is also not known to occur in the locality.
Thesium australe Austral Toadflax	V	V1	Found in very small to large populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. Austral Toadflax is a root parasite that takes water and some nutrients from other plants, especially Kangaroo Grass. It is often found in damp sites in association with Kangaroo Grass but it is also found on other grass species at inland sites. Occurs on clay soils in grassy woodlands or coastal headlands.	Negligible There is no potential habitat in the study area for the species.

SEEC

Strategic Environmental & Engineering Consulting

Preliminary Flood Assessment

For Proposed Subdivision at
Lot 2 DP1233492, Lot 1 DP239858, Lots 21-24 DP 1697
Peelwood Road,
Laggan

Prepared for:

Lateral Planning

Prepared by:
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SEEC

SEEC Reference 19000339-FS-01 REVD

22 July 2020

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Document Certification

This report has been developed based on agreed requirements as understood by SEEC at the time of investigation. It applies only to a specific task on the nominated lands. Other interpretations should not be made, including changes in scale or application to other projects.
Any recommendations contained in this report are based on an honest appraisal of the opportunities and constraints that existed at the site at the time of investigation, subject to the limited scope and resources available. Within the confines of the above statements and to the best of my knowledge, this report does not contain any incomplete or misleading information.

Jason Armstrong (AMIEAust)
SEEC
22 July 2020

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Version Register

Document Number	Revision	Author	Issue Details	Reviewed	Date
19000339-FS-01 REVA	A	J.A	Draft Issue	-	12/05/20
19000339-FS-01 REVB	B	J.A	Draft Issue	-	22/05/20
19000339-FS-01 REVC	C	J.A	Draft Issue	B.J	17/07/20
19000339-FS-01 REVD	C	J.A	Final Issue	B.J	22/07/20

TABLE OF CONTENTS

1 Introduction

Strategic Environmental and Engineering Consulting (SEEC) have been commissioned by Lateral Planning on behalf of Sutton Park Pty Ltd (the property owner) to prepare this Flood Assessment. This report is to be provided to Upper Lachlan Council as part of a planning proposal to subdivide the land into twenty six (26) RU4 -W allotments, five RU4 – Z allotments, four RU5 – Y allotments and two RU5 – AA allotments (Figure 2 and 3).

This report will describe the expected hydraulic conditions by estimating the watercourse levels relative to the proposed lots for the 5 year Average Recurrence Interval (ARI), (20% AEP) and 100 year ARI (1% AEP) flood flows and the expected extent of inundation.

This report has been prepared in accordance with the following guidelines and recommendations:

- ***Australian Rainfall & Runoff – A Guide to Flood Estimation 1987 & 2016;***
- ***Upper Lachlan Council Local Environmental Plan 2010;***
- ***Upper Lachlan Council Council's Development Control Plan 2010;***
- ***NSW Government Flood Plain Management Manual: The Management of Flood Liable Land.***

This flood study includes:

(i) A general description of the site and the surrounding catchment area;

(ii) Catchment flow calculations for 20% (5 year ARI) and 1% (100 year ARI) Annual Exceedance Probability (AEP) events;

(iii) Flood calculations and results using HEC-RAS 5.0.3, a one dimensional, Quasi- 2D modelling package that calculates the velocity of peakflows and the 20% (5 year ARI) and 1% (100 year ARI) AEP flood levels and extents.

(iv) Conclusions and recommendations based on the flood results.

This flood study is based on a desktop study that involved a visual interpretation of the upstream catchment area and a detailed ground survey of the watercourse and subdivision location. The ground survey was provided by Laterals Planning and can be found in **Appendix C**. In preparing this report, SEEC has relied upon, and presumed accurate, certain information (or absence thereof) provided by our client and other sources. Except as otherwise stated in the report, SEEC has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

2 Proposed Development

It is proposed to subdivide Lot 2 DP 1233492 into 26 x RU4 -W allotments, five RU4 – Z allotments, four RU5 – Y allotments and two RU5 – AA allotments (Figure 2 and 3). Lots range from a minimum of 4,000 m^2 to a maximum of 5 ha in size.

Figures 1 and 2 show the site location and proposed development layout respectively.

Concept stormwater drainage plans for the development have also been prepared by SEEC. Refer to drawings 19000339_P01_STW00 REVA to 19000339_P01_STW03 REVA in **Appendix E**.

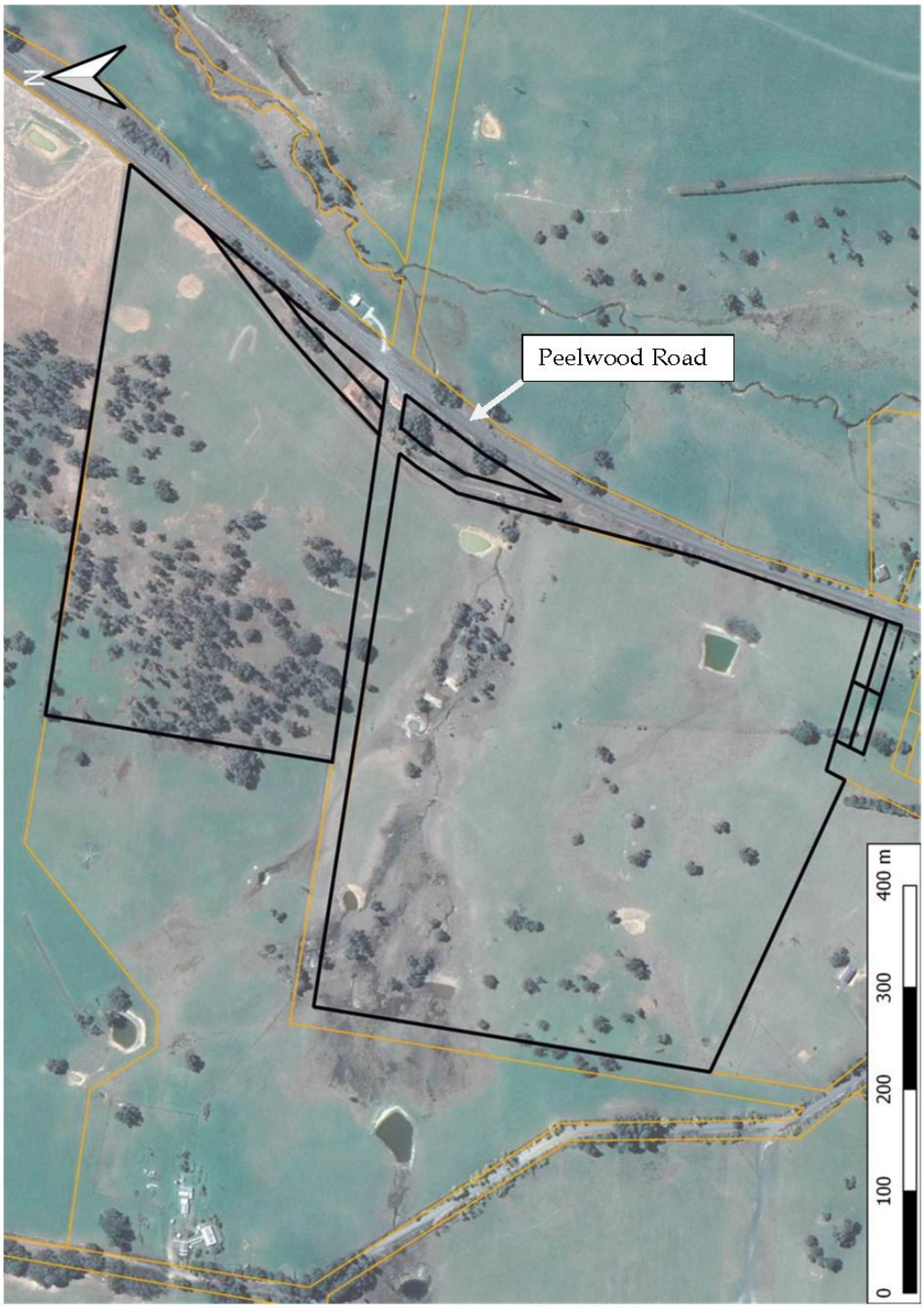


Figure 1 - Location of Proposed Subdivision

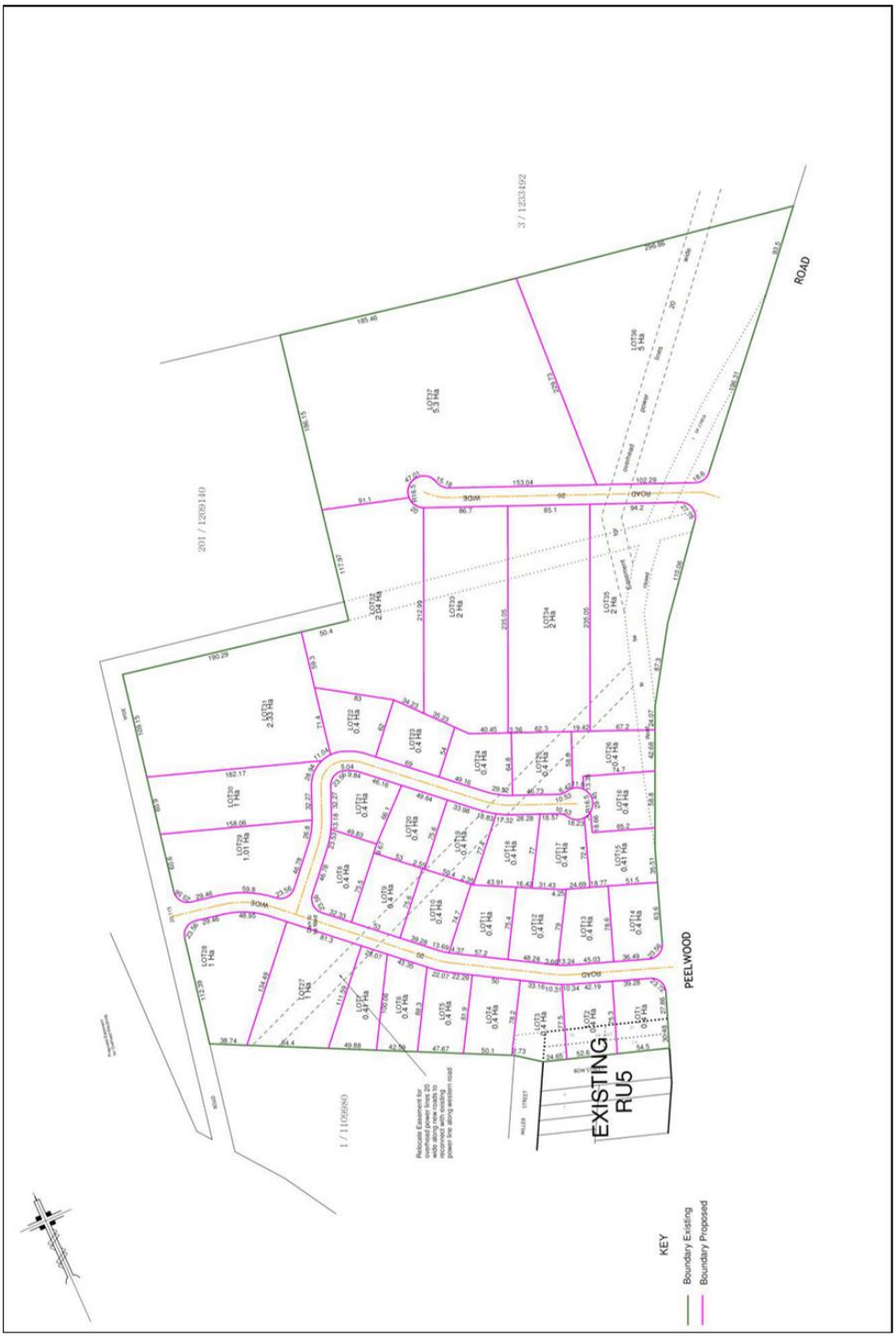


Figure 2- Proposed Subdivision Development Plan

3 Site Description

3.1 General Location

Lot 2 DP 1233492 is a 26 ha (approx.) rural lot located on the western side of Peelwood Road, Laggan. Lots 21 - 24 DP 1697 are located on the south-eastern extent of Lot 2 DP 1233492 and will be dissolved for the purpose of this subdivision. The property is bound by similar rural properties to the north, east and west and by Laggan village to the south. It is located approximately 500m south of the main centre of Laggan.

3.2 Topography and Drainage

The existing topography consists of long foot slopes and undulating low rises with gradients of 5% over the southern parts of the site. The northern portion of the site consists of stepper slopes grades at approx. 20% to the south-east towards an intermittent watercourse (**Figure** 3).

There are three intermittent watercourses that flow through the development site. These are identified as Reaches 1, 2 and 3 on **Figure** 3. This report includes an assessment of Reaches 1 & 2 only as Reach 3 has a relatively small catchment and is located within the proposed RU5 allotments that are larger is size (2 – 5 ha). These larger lots therefore offer larger areas for building envelopes well away from potential flooding from this waterway.

The three watercourses flow to the east towards Peelwood Road and into existing pipe culverts under the road. They then continue down to Reedy Creek that runs parallel to Peelwood Road approximately 200m to the east.

3.3 Catchment Area

The catchment areas upstream of the subject watercourses have been determined by the use of topographical maps sourced from the Department of Lands. Refer to the catchment plan shown in **Figure** 4.

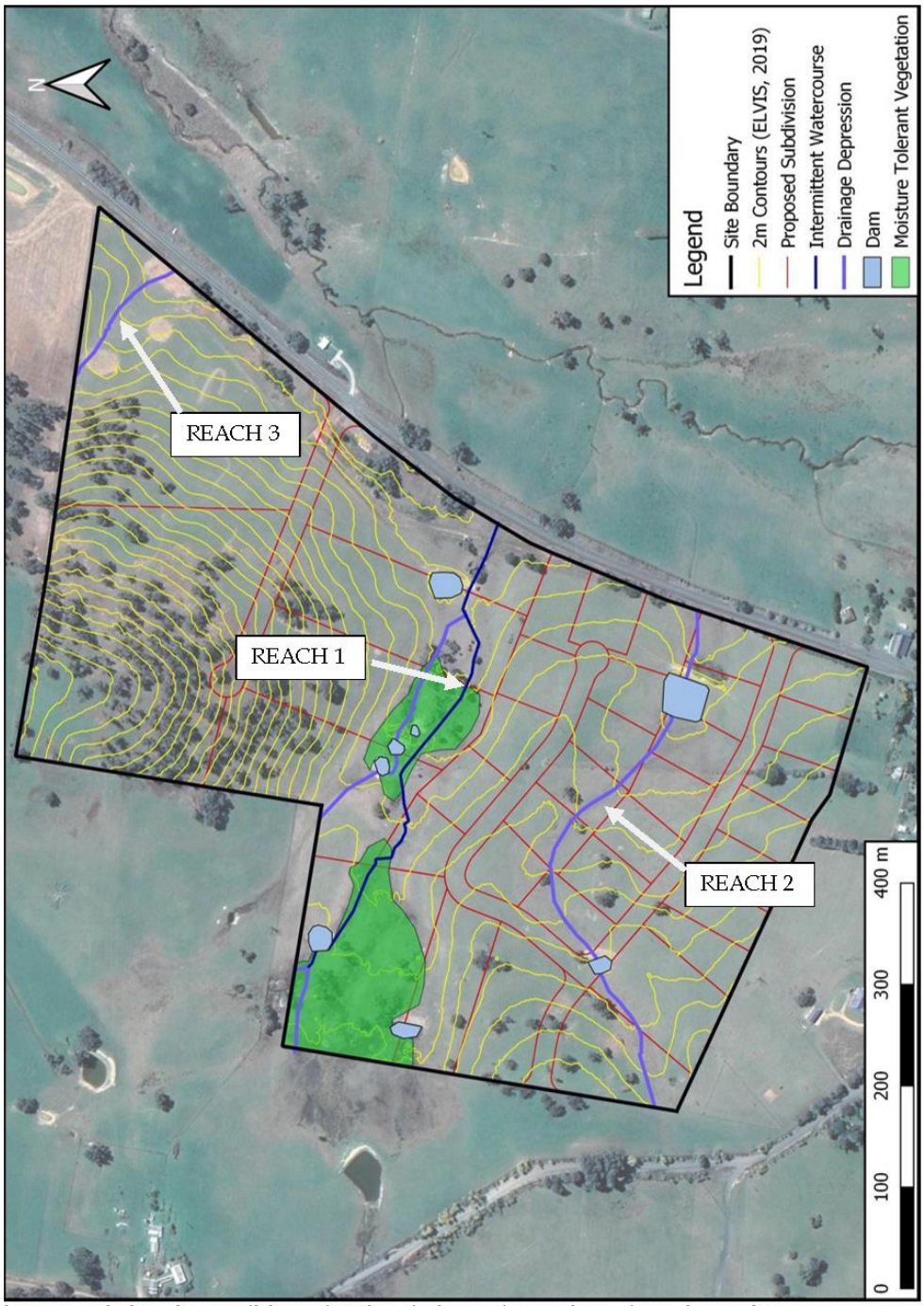


Figure 3: Existing site conditions showing drainage depressions, dams, intermittent watercourse, moisture tolerant vegetation and 2m contours (NSW Spatial Services, 2019 and ELVIS, 2019).

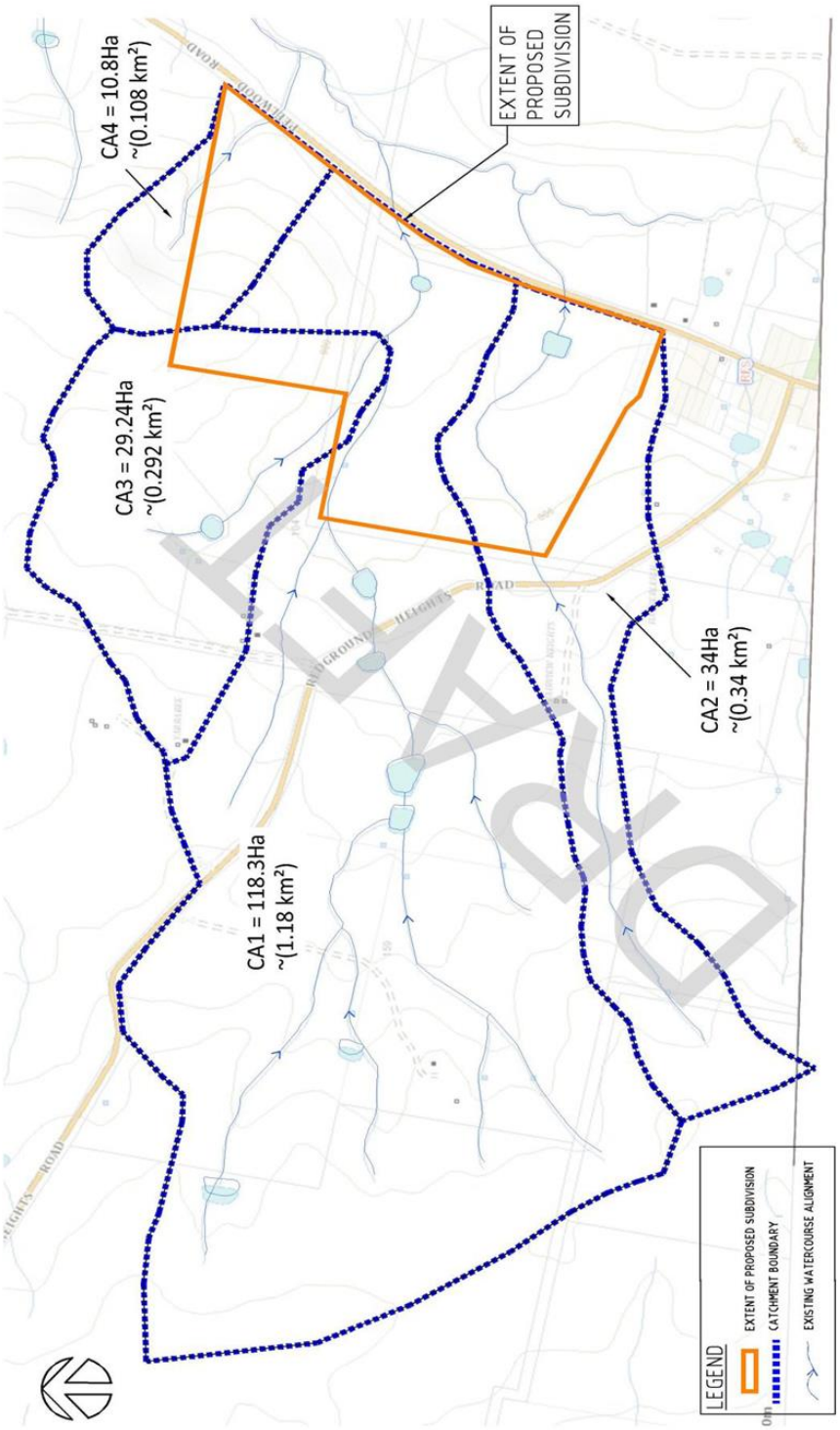


Figure 4 - Catchment Plan

4 Peak Flow Calculations

4.1 Calculation Method

Flood flow calculations for the catchments are based on the Rational Method.

As used in the calculations, the formula of the Rational Method is:

$$Q_y = 0.278 \times C_Y \times I_{tc,y} \times A \quad (1)$$

Where: Q_y = peak flow rate (m^3/s) of average recurrence interval (ARI) of Y years

C_Y = runoff co-efficient, (dimensionless) for ARI of Y years

$I_{tc,y}$ = Average Rainfall Intensity, (mm/hr) for the design duration of t_c hours and ARI of Y years

A = area of catchment (km^2)

Time of concentration (tc) was calculated using AR&R 1987 formula:

$$tc = 0.76A^{0.38} \times A \quad (2)$$

Runoff co-efficient (C_Y) was calculated using:

$$C_Y = C_{10} x FF_Y$$

Where: C_{10} = runoff co-efficient, (dimensionless) for ARI of 10 years

FF_y = flood frequency factor for Y years, Table 5.1 of ARR 1987 Volume 2.

The design calculation summary sheets are attached in **Appendix B** of this report.

4.2 Rainfall Data

The Intensity Frequency Duration (IFD) rainfall data for the site has been based on data presented in Australian Rainfall and Runoff (AR&R) and site specific calculations for Laggan. IFD's from both AR&R 1987 and AR&R 2016 were compared and the AR&R 1987 charts showed higher rainfall intensities than the 2016 storms. The AR&R 1987 IFD's were therefore adopted for the peak flow calculations. A copy of the AR&R 1987 chart and table for the site is attached at **Appendix A.**

4.3 Peak Flow Results

A summary of the 20% AEP (5 year ARI) and the 1% AEP (100 year ARI) flood flow calculations for all sub-catchments are shown in Table 1 for both the 1987 AR&R and 2016 AR&R and compared to the Regional Flood Frequency Estimation (RFFE) model for catchment CA1 and CA3 combined:

Table 1 - Peak Flow Summary (Based on 1987 AR&R IFD Data)

AEP/ARI %/Year	CA1 Peak Flows (m^3/s)	CA2 Peak Flows (m^3/s)	CA3 Peak Flows (m^3/s)	CA4 Peak Flows (m^3/s)	CA1 & CA3 Combined Flow (m^3/s)	RFFE Flow (m^3/s)
20%, 5 Year	2.59	0.99	0.88	0.4	3.47	2.59
1%, 100 Year	9.66	3.85	3.35	1.52	13.01	11.1

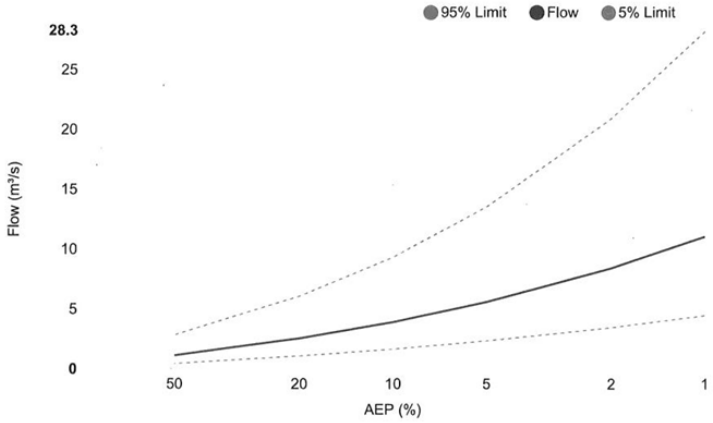
Table 2 - Peak Flow Summary (Based on 2016 AR&R IFD Data)

AEP/ARI %/Year	CA1 Peak Flows (m^3/s)	CA2 Peak Flows (m^3/s)	CA3 Peak Flows (m^3/s)	CA4 Peak Flows (m^3/s)	CA1 & CA3 Combined Flow (m^3/s)	RFFE Flow (m^3/s)
20%, 5 Year	2.087	0.823	1.209	0.334	3.30	2.59
1%, 100 Year	6.57	3.02	4.43	1.23	11.0	11.1

The calculated peak flows were compared against the Regional Flood Frequency Estimation (RFFE) Model developed as part of the 4th Edition of Australian Rainfall and Runoff (**Figure 5**). The method involved the interpolation of historical data from over 850 gauged catchments throughout Australia. The RFFE predicted flows are provided below and highlight that the Rational Method flows based on the 1987 AR&R may be conservative.

The Rational Method peaks flows were also checked against a Post Development DRAINS Ilsax routing model that included preliminary post development design of the catchments within the development area. The 1987 AR&R peak flows were still higher than the post development model as the Rational Method doesn't take into account peak flow losses due to flood storage and run-off routing etc.

Therefore the 1987 AR&R peak flows were adopted for this assessment as a conservative estimation.



AEP (%)	Discharge (m^3/s)	Lower Confidence Limit (5%) (m^3/s)	Upper Confidence Limit (95%) (m^3/s)
50	1.16	0.480	2.87
20	2.59	1.12	6.11
10	3.96	1.70	9.37
5	5.65	2.40	13.6
2	8.48	3.52	21.0
1	11.1	4.52	28.3

Figure 5 – RFFE peak flow and confidence limit table and graph

5 Flood Modelling

5.1 HEC-RAS

The computer modelling program HEC-RAS (Hydrologic Engineering Centers River Analysis System) has been used to analyse the flood level, velocity and extents for the pre to post construction scenarios.

From the survey data a 3D digital terrain model was produced using *Autodesk Civil 3D*. This model included a design reach along the watercourse so that a series of cross sections could be extracted and exported into HEC-RAS. Refer to drawing 19000339_P02 _FS02 (**Appendix D**) for the location of the reach alignment and cross sections.

5.2 Model parameters

5.2.1 Existing site conditions

A pre-development model was prepared to analyse watercourse conditions for Reaches 1 and 2. The site survey in **Appendix C** was used to produce the geometry of the creek in HEC-RAS.

A Manning Roughness (n) of 0.07 was adopted for the watercourse and 0.05 was adopted for the over bank areas. The site survey and site specific inspection showed that the existing watercourses are wide with some shallow erosional type gullying in Reach 1. Reach 1 has an approximate base grade ranging approximately 3 to 7% and drains to 3 x 1050mm diameter pipe culverts under Peelwood Road. These pipes were not included in the model and were assumed to be totally blocked for this assessment as the crest in Peelwood Road in this location did not have a high embankment to inhibit flows.

Reach 2 has an approximate base grade ranging approximately 5 to 6% and drains to a single 1050mm diameter pipe culvert under Peelwood Road. This pipe was included in the model with a blockage factor of 30% as the crest of Peelwood Road in this location forms a high wide embankment that would cause backing up of flood waters.

The calculated peak flows were entered into the *HEC-RAS* Model and a Mixed Flow Regime was adopted to determine the flow extents within the watercourse's for the worst case 1% AEP (100 year ARI) and minor 20% AEP (5 year ARI) storm event. This was then exported back into *Civil 3d* to produce a flood plan for Reaches 1 and 2, refer to drawing 19000339_P02 _FS02 **(Appendix D).**

6 Results

6.1 Pre-development

The flood extents across the site for the 1% AEP (100 year ARI) storm event have been determined and are displayed on Drawing 19000339_P02 _FS02 (**Appendix D**).

A summary of the modelling results including water levels for Reaches 1A to 1C are shown in **Tables 3 and 4** below for the 1% AEP (100 Year ARI) 20% AEP (5 Year ARI) storm events and **Tables 5 and 6** for Reach 2.

Table 3 – Reaches 1A – 1C , 1% AEP (100 Year ARI)

River	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
HEC_R1C	353.229	2.59	896.4	896.47	896.47	896.5	0.057268	0.36	3.38	53.74	0.62
HEC_R1C	350	2.59	896.16	896.28	896.26	896.3	0.022313	0.23	3.97	47.73	0.39
HEC_R1C	300	2.59	895.16	895.42	895.32	895.43	0.013843	0.52	5.02	30.56	0.4
HEC_R1C	250	2.59	893.82	893.98	893.98	894.01	0.087724	0.76	3.62	63.76	0.88
HEC_R1C	200	2.59	892.04	892.31	892.2	892.32	0.008231	0.39	6.71	42.33	0.31
HEC_R1C	155.358	2.59	892	892.3		892.3	0.001838	0.23	11.19	49.36	0.15
HEC_R1C	150	2.59	891.92	892.02	892.02	892.04	0.08534	0.66	4.19	55.54	0.84
HEC_R1C	100	2.59	889.98	890.12	890.06	890.13	0.017609	0.48	5.42	42.85	0.43
HEC_R1C	50	2.59	888.09	888.33	888.33	888.4	0.097013	1.12	2.31	18.29	1.01
HEC_R1C	0	2.59	887.12	887.44	887.22	887.44	0.000789	0.15	15.01	63.73	0.1
HEC_R1B	199.979	0.88	893.04	893.2	893.15	893.2	0.009833	0.29	2.94	32.33	0.3
HEC_R1B	150	0.88	891.99	892.04	892.04	892.05	0.104991	0.51	1.69	46.91	0.85
HEC_R1B	100	0.88	889.99	890.15	890.05	890.15	0.003123	0.2	4.46	39.03	0.18
HEC_R1B	85.086	0.88	889.97	890.05		890.05	0.023023	0.34	2.61	42.58	0.43
HEC_R1B	50	0.88	888.37	888.47	888.47	888.51	0.114683	0.87	1.02	13.46	1
HEC_R1B	0	0.88	887.08	887.47	887.2	887.47	0.000256	0.08	10.57	49.94	0.06
HEC_R1A	219.467	3.47	887.1	887.22	887.22	887.27	0.074142	0.79	3.74	39.86	0.83
HEC_R1A	200	3.47	886.41	886.66	886.58	886.68	0.013955	0.4	6.62	50.65	0.37
HEC_R1A	150	3.47	885.06	885.33	885.33	885.41	0.059562	0.93	3.05	21.72	0.8
HEC_R1A	100	3.47	884	884.14	884.07	884.15	0.008646	0.36	8.54	60.54	0.31
HEC_R1A	50	3.47	883.04	883.3	883.28	883.32	0.044019	0.65	5.38	53.83	0.65
HEC_R1A	0	3.47	881.38	881.47	881.45	881.52	0.030013	0.33	3.63	27.55	0.48

Note that these predicted flood levels do not consider climate change, blockage of the waterway (e.g vegetation, debris, logs etc.) or any physical changes to the waterway shape. Any amendments to the models assumptions will alter the predicted flood levels, area of inundation and adopted minimum floor levels.

Table 4 – Reaches 1A – 1C, 20% AEP (5 Year ARI)

River	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
HEC_R1C	353.229	9.66	896.4	896.57	896.57	896.63	0.040136	0.48	9.9	85.16	0.58
HEC_R1C	350	9.66	896.16	896.41	896.37	896.45	0.015953	0.38	13.23	89.19	0.39
HEC_R1C	300	9.66	895.16	895.6	895.48	895.62	0.0169	0.68	14.67	81.9	0.46
HEC_R1C	250	9.66	893.82	894.06	894.06	894.1	0.070359	0.91	10.52	118.79	0.85
HEC_R1C	200	9.66	892.04	892.53	892.32	892.54	0.006869	0.58	16.87	52.52	0.32
HEC_R1C	195.358	9.66	892	892.51		892.52	0.003037	0.42	23.06	61.93	0.22
HEC_R1C	150	9.66	891.92	892.08	892.08	892.13	0.084944	1	9.6	96.68	0.93
HEC_R1C	100	9.66	889.98	890.28	890.17	890.31	0.017755	0.77	12.51	48.39	0.49
HEC_R1C	50	9.66	888.09	888.5	888.5	888.6	0.089745	1.36	7.1	39.58	1.03
HEC_R1C	0	9.66	887.12	887.67	887.33	887.67	0.001192	0.28	31.3	75.99	0.14
HEC_R1B	199.979	3.35	893.04	893.31	893.21	893.32	0.010499	0.48	6.62	35.12	0.35
HEC_R1B	150	3.35	891.99	892.08	892.08	892.12	0.100255	0.85	3.82	47.27	0.95
HEC_R1B	100	3.35	889.99	890.27	890.12	890.27	0.004766	0.34	9.87	50.94	0.24
HEC_R1B	85.086	3.35	889.97	890.12		890.14	0.02405	0.54	6.25	54.63	0.5
HEC_R1B	50	3.35	888.37	888.57	888.57	888.64	0.095566	1.12	2.98	23.22	1
HEC_R1B	0	3.35	887.08	887.7	887.3	887.7	0.000367	0.14	22.99	61.16	0.07
HEC_R1A	219.467	13.01	887.1	887.35	887.35	887.44	0.054532	1.04	10.64	59.02	0.8
HEC_R1A	200	13.01	886.41	886.83	886.73	886.87	0.01422	0.7	15.97	58.55	0.44
HEC_R1A	150	13.01	885.06	885.53	885.53	885.66	0.04906	1.22	8.72	35.52	0.8
HEC_R1A	100	13.01	884	884.31	884.18	884.34	0.008985	0.61	19.07	64.03	0.35
HEC_R1A	50	13.01	883.04	883.42	883.38	883.48	0.044732	1.05	12.45	63.41	0.74
HEC_R1A	0	13.01	881.38	881.64	881.64	881.73	0.027954	0.44	11.02	64.15	0.5

Table 5 – Reach 2, 1% AEP (100 Year ARI)

River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
	(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
572.221	3.85	905.19	905.47	905.45	905.53	0.060564	1.06	3.63	21.91	0.83
550	3.85	903.62	903.86	903.86	903.92	0.087759	1.08	3.56	27.5	0.96
500	3.85	901.78	902.03	901.96	902.05	0.020513	0.6	6.44	41.37	0.48
450	3.85	899.92	900.05	900.05	900.09	0.102011	0.92	4.14	47.97	0.98
400	3.85	897.16	896.99	896.81	897.03	0.008296		3.98	10.18	0
350	3.85	896.86	896.13	896.13	896.19	0.051653		3.56	30.64	0
303.81	3.85	893.09	892.74	892.74	892.81	0.049961		3.39	26.43	0
300	3.85	892.85	892.56	892.56	892.62	0.049526		3.39	26.3	0
250	3.85	890.06	890.36	890.29	890.38	0.01438	0.5	6.26	36.89	0.4
200	3.85	888.6	888.81	888.81	888.86	0.101031	1.02	3.79	35.78	1
150	3.85	888	888.16	888.07	888.17	0.004973	0.29	11.97	76.77	0.24
100	3.85	887.13	887.42	887.42	887.52	0.084405	1.38	2.78	14.4	1.01
50	3.85	884	885.99	884.19	885.99	0.000006	0.04	89.1	81.24	0.01
43.83	3.85	884	885.99	884.14	885.99	0.000006	0.04	94.86	86.62	0.01
36	Culvert									
21.594	3.85	883.96	884.08	884.08	884.12	0.060608	0.7	4.46	46.95	0.75
0	3.85	882.58	882.79	882.75	882.82	0.028012	0.7	5.11	34.22	0.56

Table 6 – Reach 2, 20%AEP (5 Year ARI)

River Sta	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
572.221	0.99	905.19	905.36	905.33	905.38	0.049637	0.66	1.5	15.71	0.69
550	0.99	903.62	903.76	903.76	903.8	0.110714	0.8	1.24	17.9	0.97
500	0.99	901.78	901.93	901.88	901.94	0.018302	0.37	2.67	31.54	0.41
450	0.99	899.92	899.99	899.99	900.01	0.126713	0.6	1.68	45.44	0.95
400	0.99	897.16	896.75	896.62	896.76	0.00577		1.8	8.17	0
350	0.99	896.86	896.05	896.05	896.08	0.064975		1.39	26.59	0
303.81	0.99	893.09	892.64	892.63	892.67	0.039075		1.28	14.58	0
300	0.99	892.85	892.45	892.45	892.49	0.059205		1.15	15.24	0
250	0.99	890.06	890.23	890.18	890.24	0.015639	0.38	2.23	22.7	0.39
200	0.99	888.6	888.74	888.73	888.76	0.07542	0.61	1.62	26.17	0.79
150	0.99	888	888.07		888.07	0.005535	0.18	5.05	72.95	0.22
100	0.99	887.13	887.29	887.29	887.33	0.106962	0.94	1.06	11.76	1
50	0.99	884	885.23	884.09	885.23	0.000003	0.02	42.56	50.81	0.01
43.83	0.99	884	885.23	884.06	885.23	0.000002	0.02	47.44	52.55	0.01
36	Culvert									
21.594	0.99	883.96	884.02	884.02	884.04	0.062343	0.36	1.83	45.11	0.64
0	0.99	882.58	882.7	882.67	882.71	0.028015	0.44	2.16	29.68	0.5

6.2 Post Development

It is proposed to divert the upstream catchment contributing to Reach 2 away from the proposed lots 8 to 21 and redirect flows down the proposed new Road 1 via a combination of a piped drainage system and grassed drainage channels. A typical cross-section of Road 1 and the drainage channel is shown on drawing 19000339_P02 _STW02 in **Appendix E.** The post development flows were modelled using 'DRAINS' Ilsax routing model (**Figure 6)** as a preliminary assessment to determine the sizing of the drainage system required to achieved this.

Figure 6 – Post –Development DRAINS model layout

A Concept Stormwater Drainage Plan showing the preliminary location and sizing of the post development drainage system 19000339_P01_STW00 to 19000339_P01_STW03 are attached in **Appendix E.**

It is recommended that the floor level of any future dwellings adjacent to Reach 1 and any of the proposed drainage channels shown on the concept stormwater drainage plans are to be set 0.5m above the predicated 1% AEP flood level and not cut into the existing natural surface.

7 Conclusion

Section 6 and the plan in **Appendix D** of this report detail the predicated flood assessment results. They illustrate the flood extents within the site and critical flow details for the pre and post development, 1% and 20%AEP (100 and 5 Year ARI) flood events.

It is proposed to retain the existing watercourse identified as Reach 1 and it is proposed to divert the upstream catchment contributing to Reach 2 away from the proposed lots 8 to 21 and redirect flows down the proposed new Road 1 via a combination of piped drainage system and grassed drainage channels. Preliminary post development modelling shows that this is achievable.

It is recommended that the floor level of any future dwellings adjacent to Reach 1 and any of the proposed drainage channels shown on the concept stormwater drainage plans are to be set 0.5m above the predicated 1% AEP flood level and not cut into the existing natural surface.

8 References

Southern Cross Consulting Surveyors: *Detailed Survey Plan of Lot 41, DP 1112491 Dorsett Road, Marulan.*

The Institution of Engineers Australia (1987): *Australian Rainfall and Runoff, A Guide to Flood Estimation, Volume 1 and Volume 2;*

U.S Army Corps of Engineers: *HEC-RAS River Analysis System Version 5.0.3;*

Upper Lachlan Shire Council (2010): *Local Environmental Plan;*

Upper Lachlan Shire Council (2010): *Upper Lachlan Shire Development Control Plan 2009*

9 Appendices

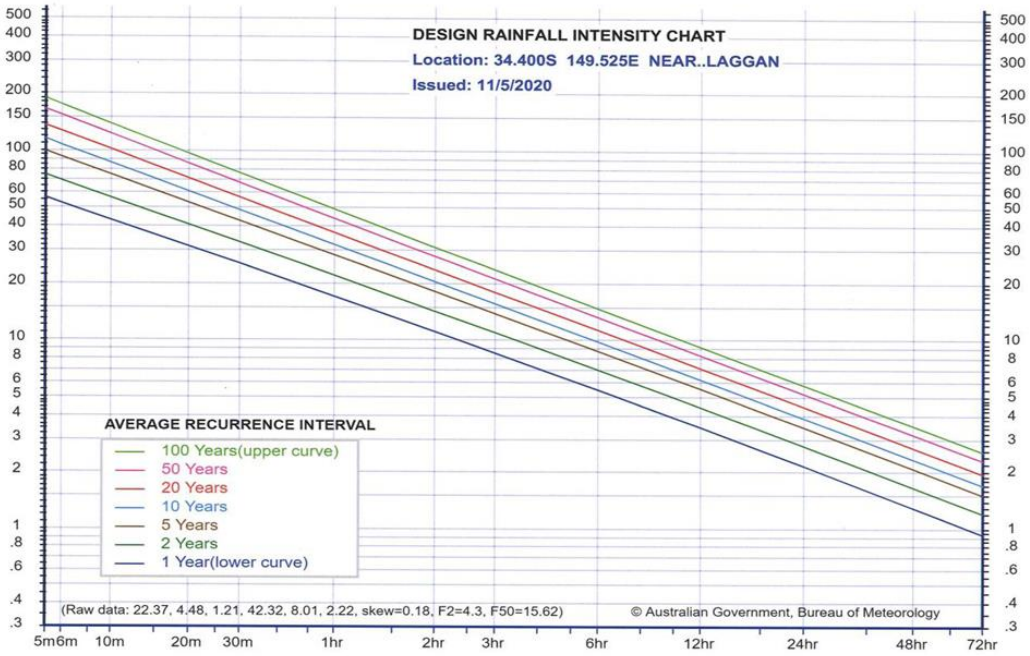
9.1 Appendix A – Intensity Frequency Duration (IFD) Table and Chart

Location: 34.400S 149.525E NEAR.. LAGGAN Issued: 11/5/2020

Rainfall intensity in mm/h for various durations and Average Recurrence Interval

	Average Recurrence Interval						
Duration	1 YEAR	2 YEARS	5 YEARS	10 YEARS	20 YEARS	50 YEARS	100 YEARS
5Mins	56.6	74.4	99.5	116	136	165	189
6Mins	52.8	69.4	92.7	107	127	154	175
10Mins	43.1	56.5	74.8	86.3	102	123	139
20Mins	31.4	40.8	53.3	61.1	71.5	85.6	96.7
30Mins	25.4	33.0	42.7	48.7	56.8	67.6	76.2
1Hr	17.0	22.0	28.2	32.0	37.0	43.9	49.3
2Hrs	11.1	14.2	18.1	20.4	23.5	27.7	31.0
3Hrs	8.54	11.0	13.8	15.6	17.9	21.1	23.6
6Hrs	5.45	6.97	8.75	9.81	11.3	13.2	14.7
12Hrs	3.45	4.41	5.52	6.18	7.08	8.28	9.21
24Hrs	2.15	2.75	3.45	3.86	4.43	5.18	5.77
48Hrs	1.29	1.66	2.09	2.34	2.69	3.16	3.52
72Hrs	.930	1.20	1.51	1.70	1.95	2.30	2.56

ıw data: 22.37, 4.48, 1.21, 42.32, 8.01, 2.22, skew=0.18, F2=4.3, F50=15.62)



Location

Label: LAGGAN

Latitude: -34.3989 [Nearest grid cell: 34.3875 (S)]

Longitude: 149.5242 [Nearest grid cell: 149.5125 (E)]

IFD Design Rainfall Intensity (mm/h)

Issued: 11 May 2020

Rainfall intensity for Durations, Exceedance per Year (EY), and Annual Exceedance Probabilities (AEP).
FAQ for New ARR probability terminology

	Annual Exceedance Probability (AEP)						
Duration	**63.2%**	**50%#**	**20%***	**10%**	**5%**	**2%**	**1%**
1 min	81.8	91.1	120	140	160	187	207
2 min	68.9	76.1	98.5	114	128	147	161
3 min	63.4	70.1	91.1	105	119	137	151
4 min	59.1	65.5	85.7	99.3	113	130	144
5 min	55.4	61.6	80.9	94.0	107	124	137
10 min	42.6	47.6	63.1	73.8	84.4	98.5	109
15 min	35.0	39.1	51.9	60.8	69.5	81.2	90.3
20 min	29.9	33.4	44.3	51.8	59.3	69.2	76.9
25 min	26.3	29.3	38.8	45.4	51.8	60.5	67.2
30 min	23.6	26.3	34.7	40.5	46.2	53.9	59.8
41 min	19.4	21.6	28.4	33.1	37.7	43.8	48.5
45 min	18.3	20.4	26.7	31.1	35.4	41.1	45.5
1 hour	15.3	16.9	22.1	25.7	29.2	33.8	37.4
1.5 hour	11.8	13.0	16.9	19.6	22.2	25.7	28.4
2 hour	9.83	10.8	14.1	16.2	18.4	21.3	23.4
3 hour	7.64	8.43	10.9	12.6	14.2	16.5	18.2
4.5 hour	5.98	6.59	8.54	9.87	11.2	13.0	14.3
6 hour	5.04	5.56	7.22	8.37	9.50	11.0	12.2
9 hour	3.96	4.38	5.74	6.67	7.60	8.86	9.84
12 hour	3.33	3.70	4.88	5.69	6.51	7.61	8.47
18 hour	2.60	2.90	3.86	4.54	5.21	6.13	6.83
24 hour	2.16	2.42	3.25	3.83	4.43	5.21	5.82
30 hour	1.86	2.09	2.83	3.35	3.87	4.56	5.10
36 hour	1.64	1.85	2.51	2.98	3.46	4.07	4.55
48 hour	1.34	1.51	2.06	2.45	2.85	3.36	3.76
72 hour	0.985	1.11	1.53	1.82	2.13	2.50	2.79
96 hour	0.786	0.888	1.22	1.46	1.69	1.99	2.21
120 hour	0.659	0.744	1.02	1.21	1.41	1.65	1.84
144 hour	0.571	0.644	0.878	1.04	1.21	1.41	1.57
168 hour	0.507	0.571	0.774	0.916	1.06	1.24	1.38

Note:
The 50% AEP IFD **does not** correspond to the 2 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 1.44 ARI.
* The 20% AEP IFD **does not** correspond to the 5 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 4.48 ARI.

9.2 Appendix B – Catchment Flow Calculations Summary Sheets

1987 AR&R Flow Calculations Summary

Flow Calculations

Peak flow is given by the Rational Formula: $Qy = 0.00278 \times C_{10} \times F_Y \times I_{y,tc} \times A$

where:
- Q_y is peak flow rate (m^3/sec) of average recurrence interval (ARI) of "Y" years
- C_{10} is the runoff coefficient (dimensionless) for ARI of 10 years.
- F_y is a frequency factor for "Y" years.
- A is the catchment area in hectares (ha)
- $I_{y,tc}$ is the average rainfall intensity (mm/hr) for an ARI of "Y" years and a design duration of "tc" (minutes or hours)

Time of concentration (t_c) = $0.76 \times (A/100)^{0.38}$ hrs

Note: For urban catchments the time of concentration should be determined by more precise calculations or reduced by a factor of 50 per cent. Place an x in the appropriate row below to automatically halve the time of concentration for that sub-catchment.

Structure Details

									Notes
Name	CA1	CA2	CA3	CA4					
Catchment Area (ha)	118.3	34	29.29	10.8					
Place an x here to halve tc									Place an x if disturbed catchment
Time of concentration (tc)	49	30	29	20					minutes

Rainfall Intensities

1-year, tc									Enter the relevant rainfall intensities (in mm/hr) for each of the nominated rainfall events. The time of concentration (tc) determines the duration of the event to be used
2-year, tc									
5-year, tc	32	42.7	44	54					
10-year, tc									
20-year, tc									
50-year, tc									
100-year, tc	55	76.2	77	95					
C10 runoff coefficient	0.3	0.3	0.3	0.3					Use AR&R or Table F3, pg F-6

Frequency Factors

FF, 1-year	0.52	0.52	0.52	0.52					Can use 0.8 for a construction site
FF, 2-year	0.64	0.64	0.64	0.64					Can use 0.85 for a construction site
FF, 5-year	0.82	0.82	0.82	0.82					Can use 0.95 for a construction site
FF, 10-year	1	1	1	1					Generally always 1
FF, 20-year	1.21	1.21	1.21	1.21					Can use 1.05 for a construction site
FF, 50-year	1.52	1.52	1.52	1.52					Can use 1.15 for a construction site
FF, 100-year	1.78	1.78	1.78	1.78					Can use 1.2 for a construction site

Flow Calculations

									Notes
1-year, tc (m^3/s)									
2-year, tc (m^3/s)									
5-year, tc (m^3/s)	2.589	0.993	0.881	0.399					
10-year, tc (m^3/s)									
20-year, tc (m^3/s)									
50-year, tc (m^3/s)									
100-year, tc (m^3/s)	9.659	3.846	3.348	1.523					

NB for flow calculations on sediment basin spillways, see Worksheet 3 (if required).

2016 AR&R Flow Calculations Summary

Flow Calculations

Peak flow is given by the Rational Formula: $Qy = 0.00278 \times C_{10} \times F_Y \times I_{y,tc} \times A$

where:
- Q_y is peak flow rate (m^3/sec) of average recurrence interval (ARI) of "Y" years
- C_{10} is the runoff coefficient (dimensionless) for ARI of 10 years.
- F_y is a frequency factor for "Y" years.
- A is the catchment area in hectares (ha)
- $I_{y,tc}$ is the average rainfall intensity (mm/hr) for an ARI of "Y" years and a design duration of "tc" (minutes or hours)

Time of concentration (t_c) = $0.76 \times (A/100)^{0.38}$ hrs

Note: For urban catchments the time of concentration should be determined by more precise calculations or reduced by a factor of 50 per cent. Place an x in the appropriate row below to automatically halve the time of concentration for that sub-catchment.

Structure Details

Name	CA1	CA2	CA3	CA4					Notes
Catchment Area (ha)	118.3	34	29.29	10.8					
Place an x here to halve tc									Place an x if disturbed catchment
Time of concentration (tc)	49	30	29	20					minutes

Rainfall Intensities

1-year, tc									Enter the relevant rainfall intensities (in mm/hr) for each of the nominated rainfall events. The time of concentration (tc) determines the duration of the event to be used
2-year, tc									
5-year, tc	25.8	35.4	36.2	45.2					
10-year, tc									
20-year, tc									
50-year, tc									
100-year, tc	37.4	59.8	61.1	76.9					
C10 runoff coefficient	0.3	0.3	0.5	0.3					Use AR&R or Table F3, pg F-6

Frequency Factors

FF, 1-year	0.52	0.52	0.52	0.52					Can use 0.8 for a construction site
FF, 2-year	0.64	0.64	0.64	0.64					Can use 0.85 for a construction site
FF, 5-year	0.82	0.82	0.82	0.82					Can use 0.95 for a construction site
FF, 10-year	1	1	1	1					Generally always 1
FF, 20-year	1.21	1.21	1.21	1.21					Can use 1.05 for a construction site
FF, 50-year	1.52	1.52	1.52	1.52					Can use 1.15 for a construction site
FF, 100-year	1.78	1.78	1.78	1.78					Can use 1.2 for a construction site

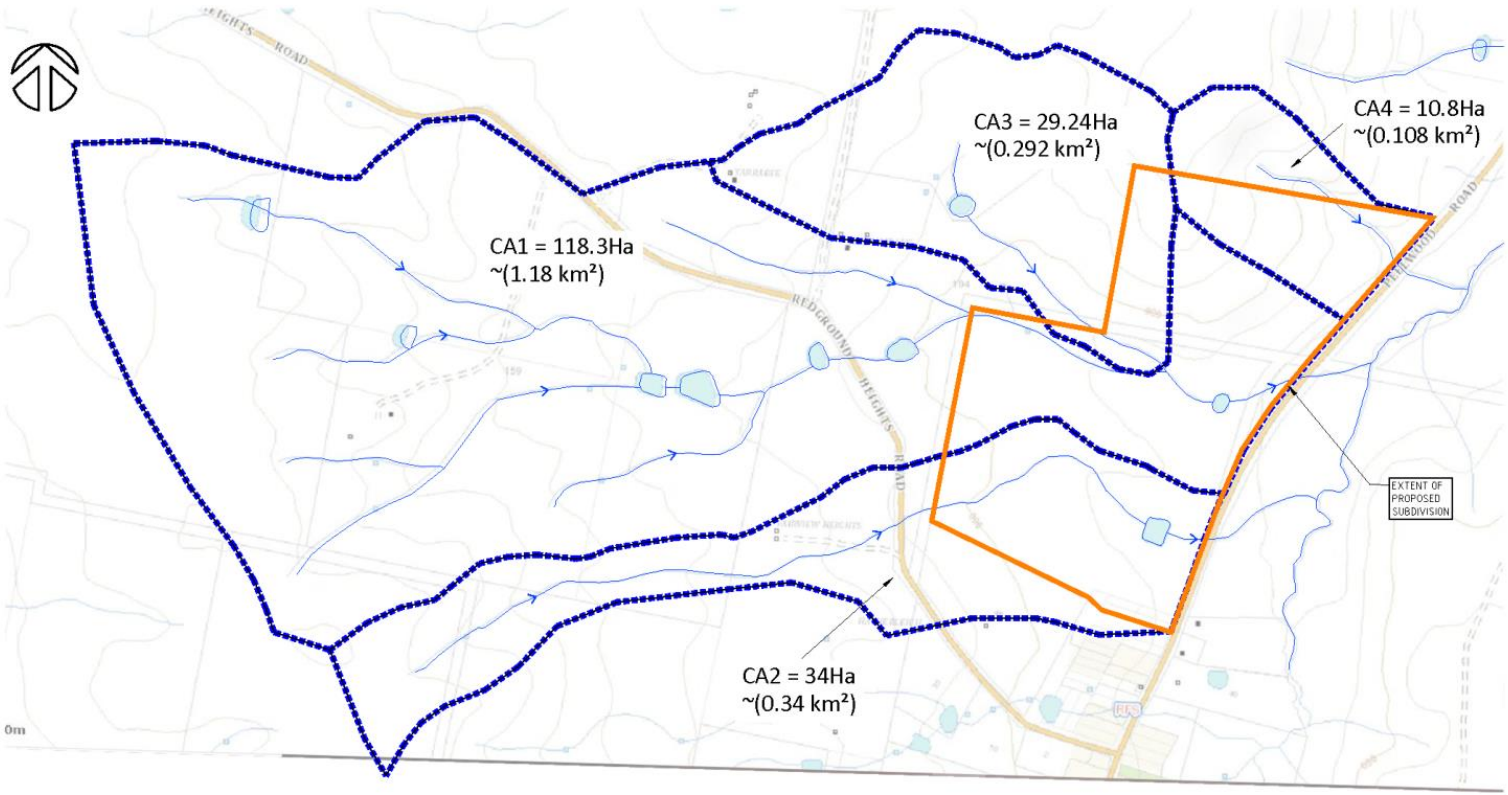
Flow Calculations

									Notes
1-year, tc (m^3/s)									
2-year, tc (m^3/s)									
5-year, tc (m^3/s)	2.087	0.823	1.209	0.334					
10-year, tc (m^3/s)									
20-year, tc (m^3/s)									
50-year, tc (m^3/s)									
100-year, tc (m^3/s)	6.568	3.018	4.428	1.233					

NB for flow calculations on sediment basin spillways, see Worksheet 3 (if required).

9.3 Appendix C - Site Survey Plan

9.4 Appendix D – Flood Assessment Plans



LEGEND

- EXTENT OF PROPOSED SUBDIVISION
- CATCHMENT BOUNDARY
- EXISTING WATERCOURSE ALIGNMENT

REV	DATE	DES.	DRN	APP.	REVISION DETAILS
00	22/07/20	J.M.A.	L.O.	J.A.	FINAL ISSUE
C	17/07/20	J.M.A.	L.O.	J.A.	DRAFT ISSUE – FOR DISCUSSION
B	22/05/20	J.M.A.	L.O.	J.A.	DRAFT ISSUE – FOR DISCUSSION
A	12/05/20	J.M.A.	L.O.	J.A.	PRELIMINARY ISSUE

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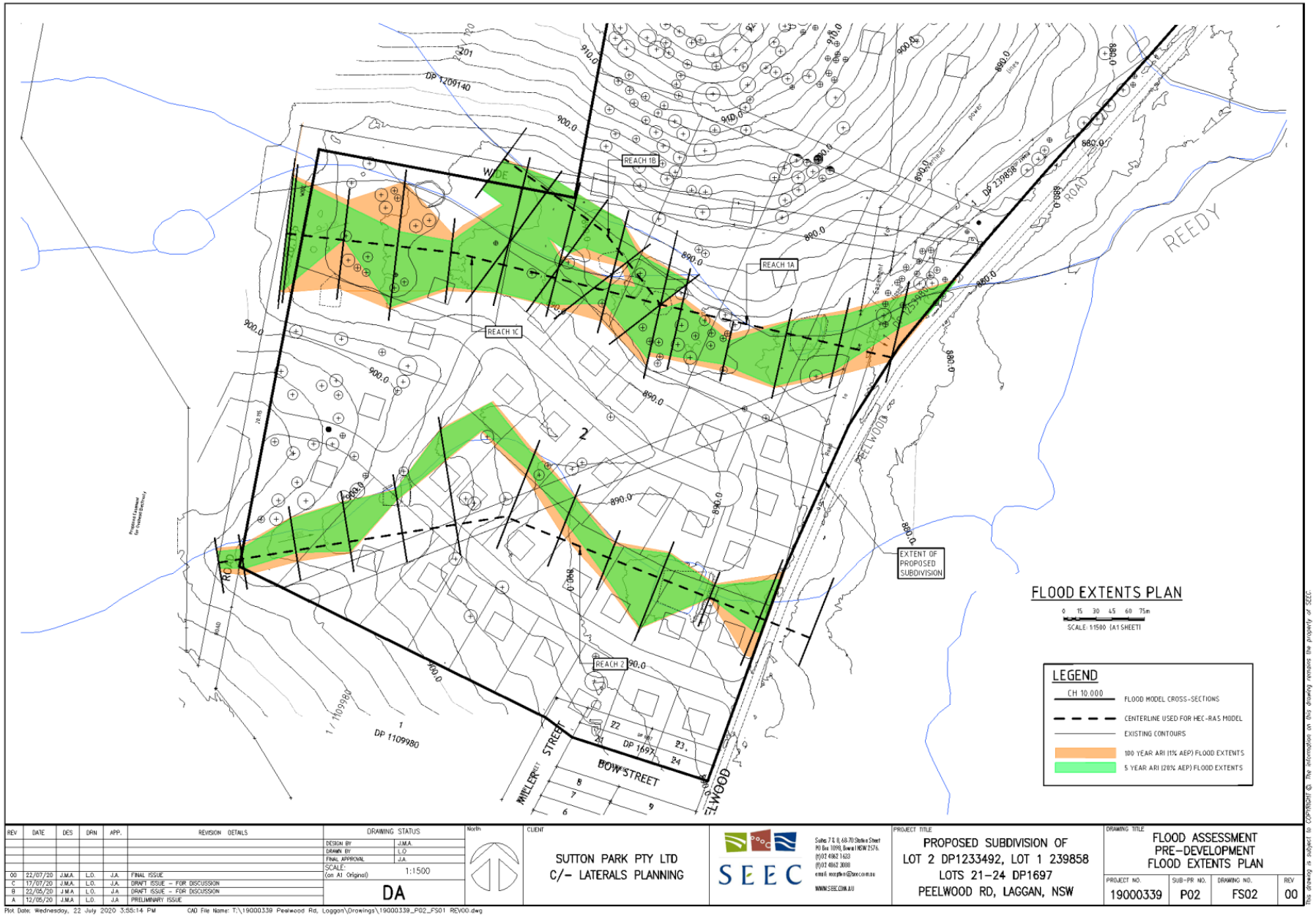
PROJECT TITLE: PROPOSED SUBDIVISION OF LOT 2 DP1233492, LOT 1 239858 LOTS 21–24 DP1697 PEELWOOD RD, LAGGAN, NSW

DRAWING TITLE: FLOOD ASSESSMENT CATCHMENT PLAN

PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
19000339	P02	FS01	00

Plot Date: Wednesday, 22 July 2020 3:55:09 PM CAD File Name: T:\19000339 Peelwood Rd, Laggan\Drawings\19000339_P02_FS01 REV00.dwg



REV	DATE	DES	DRN	APP.	REVISION DETAILS
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C	17/07/20	J.M.A.	L.O.	J.A.	DRAFT ISSUE – FOR DISCUSSION
B	22/05/20	J.M.A.	L.O.	J.A.	DRAFT ISSUE – FOR DISCUSSION
A	12/05/20	J.M.A.	L.O.	J.A.	PRELIMINARY ISSUE

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DESIGN BY: J.M.A.
DRAWN BY: L.O.
FINAL APPROVAL: J.A.
SCALE: 1:1500 (on A1 Original)

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PROJECT TITLE: PROPOSED SUBDIVISION OF LOT 2 DP1233492, LOT 1 239858 LOTS 21–24 DP1697 PEELWOOD RD, LAGGAN, NSW

DRAWING TITLE: FLOOD ASSESSMENT PRE–DEVELOPMENT FLOOD EXTENTS PLAN

PROJECT NO.	SUB–PR NO.	DRAWING NO.	REV
19000339	P02	FS02	00

Plot Date: Wednesday, 22 July 2020 3:55:14 PM CAD File Name: T:\19000339 Peelwood Rd, Laggan\Drawings\19000339_P02_FS01 REV00.dwg

REACH 1A - 1C 5YR ARI FLOOD RESULTS (PRE DEVELOPMENT)

River	River Sta	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
HEC_R1C	353.229	9.66	896.4	896.57	896.57	896.63	0.040136	0.48	9.9	85.16	0.58
HEC_R1C	350	9.66	896.16	896.41	896.37	896.45	0.015953	0.38	13.23	89.19	0.39
HEC_R1C	300	9.66	895.16	895.6	895.48	895.62	0.0169	0.68	14.67	81.9	0.46
HEC_R1C	250	9.66	893.82	894.06	894.06	894.1	0.070359	0.91	10.52	118.79	0.85
HEC_R1C	200	9.66	892.04	892.53	892.32	892.54	0.006869	0.58	16.87	52.52	0.32
HEC_R1C	195.358	9.66	892	892.51		892.52	0.003037	0.42	23.06	61.93	0.22
HEC_R1C	150	9.66	891.92	892.08	892.08	892.13	0.084944	1	9.6	96.68	0.93
HEC_R1C	100	9.66	889.98	890.28	890.17	890.31	0.017755	0.77	12.51	48.39	0.49
HEC_R1C	50	9.66	888.09	888.5	888.5	888.6	0.089745	1.36	7.1	39.58	1.03
HEC_R1C	0	9.66	887.12	887.67	887.33	887.67	0.001192	0.28	31.3	75.99	0.14
HEC_R1B	199.979	3.35	893.04	893.31	893.21	893.32	0.010499	0.48	6.62	35.12	0.35
HEC_R1B	150	3.35	891.99	892.08	892.08	892.12	0.100255	0.85	3.82	47.27	0.95
HEC_R1B	100	3.35	889.99	890.27	890.12	890.27	0.004766	0.34	9.87	50.94	0.24
HEC_R1B	85.086	3.35	889.97	890.12		890.14	0.02405	0.54	6.25	54.63	0.5
HEC_R1B	50	3.35	888.37	888.57	888.57	888.64	0.095566	1.12	2.98	23.22	1
HEC_R1B	0	3.35	887.08	887.7	887.3	887.7	0.000367	0.14	22.99	61.16	0.07
HEC_R1A	219.467	13.01	887.1	887.35	887.35	887.44	0.054532	1.04	10.64	59.02	0.8
HEC_R1A	200	13.01	886.41	886.83	886.73	886.87	0.01422	0.7	15.97	58.55	0.44
HEC_R1A	150	13.01	885.06	885.53	885.53	885.66	0.04906	1.22	8.72	35.52	0.8
HEC_R1A	100	13.01	884	884.31	884.18	884.34	0.008985	0.61	19.07	64.03	0.35
HEC_R1A	50	13.01	883.04	883.42	883.38	883.48	0.044732	1.05	12.45	63.41	0.74
HEC_R1A	0	13.01	881.38	881.64	881.64	881.73	0.027954	0.44	11.02	64.15	0.5

REACH 1A - 1C 100YR ARI FLOOD RESULTS (PRE DEVELOPMENT)

River	River Sta	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
HEC_R1C	353.229	2.59	896.4	896.47	896.47	896.5	0.057268	0.36	3.38	53.74	0.62
HEC_R1C	350	2.59	896.16	896.28	896.26	896.3	0.022313	0.23	3.97	47.73	0.39
HEC_R1C	300	2.59	895.16	895.42	895.32	895.43	0.013843	0.52	5.02	30.56	0.4
HEC_R1C	250	2.59	893.82	893.98	893.98	894.01	0.087724	0.76	3.62	63.76	0.88
HEC_R1C	200	2.59	892.04	892.31	892.2	892.32	0.008231	0.39	6.71	42.33	0.31
HEC_R1C	195.358	2.59	892	892.3		892.3	0.001838	0.23	11.19	49.36	0.15
HEC_R1C	150	2.59	891.92	892.02	892.02	892.04	0.08534	0.66	4.19	95.54	0.84
HEC_R1C	100	2.59	889.98	890.12	890.06	890.13	0.017609	0.48	5.42	42.85	0.43
HEC_R1C	50	2.59	888.09	888.33	888.33	888.4	0.097013	1.12	2.31	18.29	1.01
HEC_R1C	0	2.59	887.12	887.44	887.22	887.44	0.000789	0.15	15.01	63.73	0.1
HEC_R1B	199.979	0.88	893.04	893.2	893.15	893.2	0.009833	0.29	2.94	32.33	0.3
HEC_R1B	150	0.88	891.99	892.04	892.04	892.05	0.104991	0.51	1.69	46.91	0.85
HEC_R1B	100	0.88	889.99	890.15	890.05	890.15	0.003123	0.2	4.46	39.03	0.18
HEC_R1B	85.086	0.88	889.97	890.05		890.05	0.023023	0.34	2.61	42.58	0.43
HEC_R1B	50	0.88	888.37	888.47	888.47	888.51	0.114683	0.87	1.02	13.46	1
HEC_R1B	0	0.88	887.08	887.47	887.2	887.47	0.000256	0.08	10.57	49.94	0.06
HEC_R1A	219.467	3.47	887.1	887.22	887.22	887.27	0.074142	0.79	3.74	39.86	0.83
HEC_R1A	200	3.47	886.41	886.66	886.58	886.68	0.013955	0.4	6.62	50.65	0.37
HEC_R1A	150	3.47	885.06	885.33	885.33	885.41	0.059562	0.93	3.05	21.72	0.8
HEC_R1A	100	3.47	884	884.14	884.07	884.15	0.008646	0.36	8.54	60.54	0.31
HEC_R1A	50	3.47	883.04	883.3	883.28	883.32	0.044019	0.65	5.38	53.83	0.65
HEC_R1A	0	3.47	881.38	881.47	881.45	881.52	0.030013	0.33	3.63	27.95	0.48

REACH 2 - 5YR ARI FLOOD RESULTS (PRE DEVELOPMENT)

River Sta	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
572.221	0.99	905.19	905.36	905.33	905.38	0.049637	0.66	1.5	15.71	0.69
550	0.99	903.62	903.76	903.76	903.8	0.110714	0.8	1.24	17.9	0.97
500	0.99	901.78	901.93	901.88	901.94	0.018302	0.37	2.67	31.54	0.41
450	0.99	899.92	899.99	899.99	900.01	0.126713	0.6	1.68	45.44	0.95
400	0.99	897.16	896.75	896.62	896.76	0.00577		1.8	8.17	0
350	0.99	896.86	896.05	896.05	896.08	0.064975		1.39	26.59	0
303.81	0.99	893.09	892.64	892.63	892.67	0.039075		1.28	14.58	0
300	0.99	892.85	892.45	892.45	892.49	0.059205		1.15	15.24	0
250	0.99	890.06	890.23	890.18	890.24	0.015639	0.38	2.23	22.7	0.39
200	0.99	888.6	888.74	888.73	888.76	0.07542	0.61	1.62	26.17	0.79
150	0.99	888	888.07		888.07	0.005535	0.18	5.05	72.95	0.22
100	0.99	887.13	887.29	887.29	887.33	0.106962	0.94	1.06	11.76	1
50	0.99	884	885.23	884.09	885.23	0.000003	0.02	42.56	50.81	0.01
43.83	0.99	884	885.23	884.06	885.23	0.000002	0.02	47.44	52.55	0.01
36	Culvert									
21.594	0.99	883.96	884.02	884.02	884.04	0.062343	0.36	1.83	45.11	0.64
0	0.99	882.58	882.7	882.67	882.71	0.028015	0.44	2.16	29.68	0.5

REACH 2 - 100YR ARI FLOOD RESULTS (PRE DEVELOPMENT)

River Sta	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
572.221	3.85	905.19	905.47	905.45	905.53	0.060564	1.06	3.63	21.91	0.83
550	3.85	903.62	903.86	903.86	903.92	0.087759	1.08	3.56	27.5	0.96
500	3.85	901.78	902.03	901.96	902.05	0.020513	0.6	6.44	41.37	0.48
450	3.85	899.92	900.05	900.05	900.09	0.102011	0.92	4.14	47.97	0.98
400	3.85	897.16	896.99	896.81	897.03	0.008296		3.98	10.18	0
350	3.85	896.86	896.13	896.13	896.19	0.051653		3.56	30.64	0
303.81	3.85	893.09	892.74	892.74	892.81	0.049961		3.39	26.43	0
300	3.85	892.85	892.56	892.56	892.62	0.049526		3.39	26.3	0
250	3.85	890.06	890.36	890.29	890.38	0.01438	0.5	6.26	36.89	0.4
200	3.85	888.6	888.81	888.81	888.86	0.101031	1.02	3.79	35.78	1
150	3.85	888	888.16	888.07	888.17	0.004973	0.29	11.97	76.77	0.24
100	3.85	887.13	887.42	887.42	887.52	0.084405	1.38	2.78	14.4	1.01
50	3.85	884	885.99	884.19	885.99	0.000006	0.04	89.1	81.24	0.01
43.83	3.85	884	885.99	884.14	885.99	0.000006	0.04	94.86	86.62	0.01
36	Culvert									
21.594	3.85	883.96	884.08	884.08	884.12	0.060608	0.7	4.46	46.95	0.75
0	3.85	882.58	882.79	882.75	882.82	0.028012	0.7	5.11	34.22	0.56

REV	DATE	DES	DRN	APP.	REVISION DETAILS
00	22/07/20	J.M.A.	L.O.	J.A.	FINAL ISSUE
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B	22/05/20	J.M.A.	L.O.	J.A.	DRAFT ISSUE – FOR DISCUSSION
A	12/05/20	J.M.A.	L.O.	J.A.	PRELIMINARY ISSUE

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DRAWN BY L.O.
FINAL APPROVAL J.A.
SCALE (on A1 Original) AS SHOWN
DA

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PROJECT TITLE
PROPOSED SUBDIVISION OF
LOT 2 DP1233492, LOT 1 239858
LOTS 21–24 DP1697
PEELWOOD RD, LAGGAN, NSW

DRAWING TITLE
FLOOD ASSESSMENT
PRE DEVELOPMENT
FLOOD RESULTS (5YR & 100YR)

PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
19000339	P02	FS03	00

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9.5 Appendix E – Concept Stormwater Drainage Plans

PROPOSED SUBDIVISION AT PEELWOOD ROAD LAGGAN, NSW, 2583

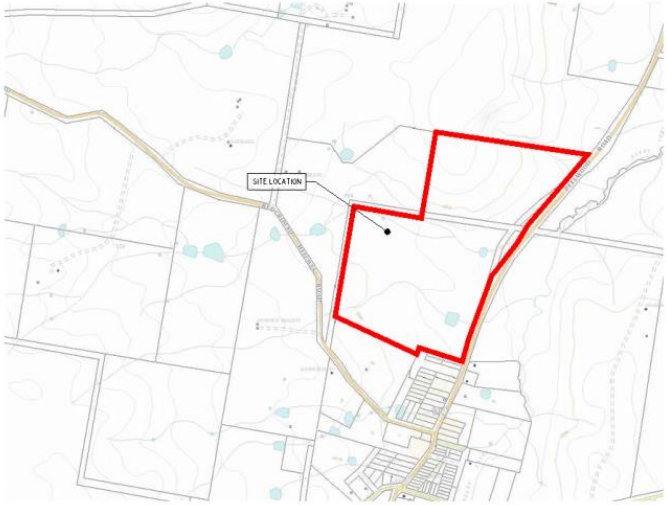
CONCEPT STORMWATER DRAINAGE

DEVELOPMENT APPLICATION

NOT FOR CONSTRUCTION

DRAWING SCHEDULE

DRG. No.	DRAWING TITLE
STW00	CONCEPT STORMWATER DRAINAGE - TITLE SHEET, LOCALITY PLAN AND DRAWING SCHEDULE
STW01	CONCEPT STORMWATER DRAINAGE GENERAL ARRANGEMENT PLAN
STW02	CONCEPT STOMRWATER DRAINAGE SECTIONS AND DETAILS
STW03	CONCEPT STORMWATER DRAINAGE - 'DRAINS' MODEL LAYOUT AND TYPICAL DETAIL



LOCALITY PLAN

NOT TO SCALE

REV	DATE	DES.	DRN.	APP.	REVISION DETAILS
00	22/07/20	J.M.A.	L.O.	J.A.	FINAL ISSUE
C	17/07/20	J.M.A.	L.O.	J.A.	DRAFT ISSUE – FOR REVIEW
B	22/05/20	J.M.A.	L.O	B.J	DRAFT ISSUE – FOR REVIEW
A	12/05/20	J.M.A.	L.O	J.A.	DRAFT ISSUE – FOR REVIEW

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PROJECT TITLE: PROPOSED SUBDIVISION OF LOT 2 DP1233492, LOT 1 239858 LOTS 21–24 DP1697 PEELWOOD RD, LAGGAN, NSW

DRAWING TITLE: CONCEPT STORMWATER DRAINAGE TITLE SHEET, LOCALITY PLAN AND DRAWING SCHEDULE

PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
19000339	P01	STW00	00

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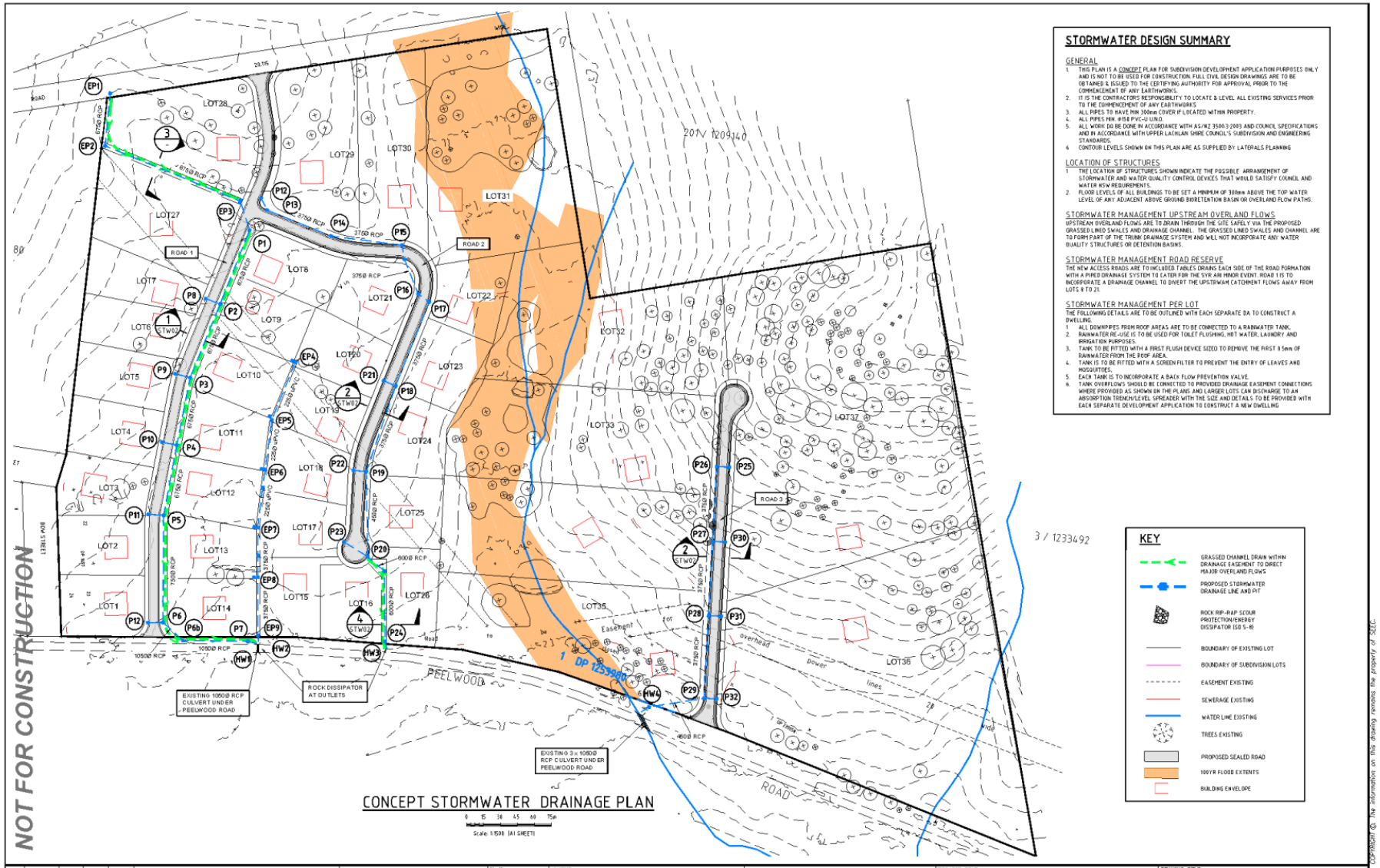

REV	DATE	DES.	DRN.	APP.	REVISION DETAILS
Q0	22/07/20	J.M.A.	L.O.	J.A.	FINAL ISSUE
C	17/07/20	J.M.A.	L.O.	J.A.	DRAFT ISSUE – FOR REVIEW
B	22/05/20	J.M.A.	L.O.	B.J.	DRAFT ISSUE – FOR REVIEW
A	12/05/20	J.M.A.	L.O.	J.A.	DRAFT ISSUE – FOR REVIEW

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PROJECT TITLE: PROPOSED SUBDIVISION OF LOT 2 DP1233492, LOT 1 239858 LOTS 21–24 DP1697 PEELWOOD RD, LAGGAN, NSW

DRAWING TITLE: CONCEPT STORMWATER DRAINAGE GENERAL ARRANGEMENT PLAN

PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
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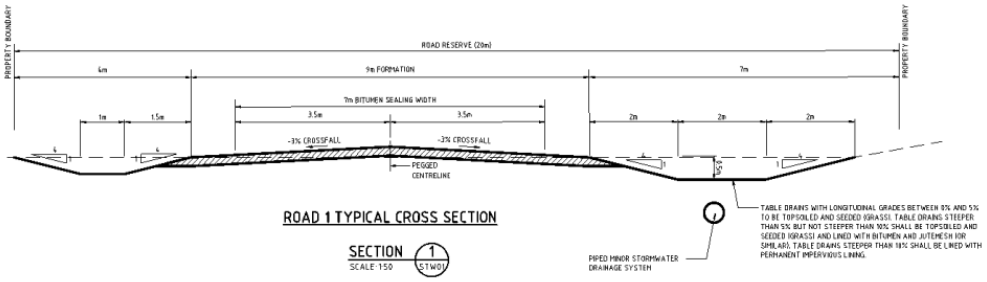

ROAD 1 TYPICAL CROSS SECTION

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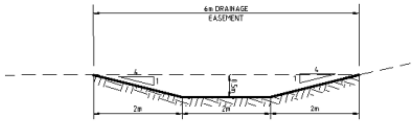

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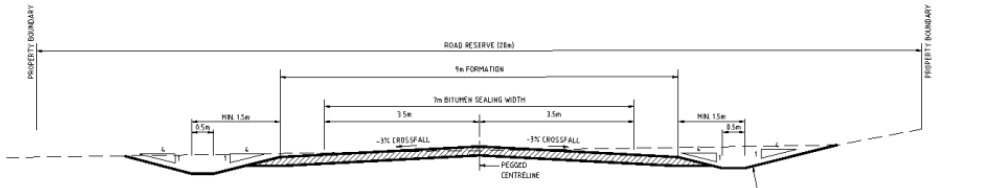

ROADS 2 & 3 TYPICAL CROSS SECTION

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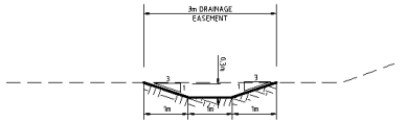

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NOT FOR CONSTRUCTION

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00	22/07/20	J.M.A.	L.O.	J.A.	FINAL ISSUE
C	17/07/20	J.M.A.	L.O.	J.A.	DRAFT ISSUE – FOR REVIEW
B	22/05/20	J.M.A.	L.O	B.J	DRAFT ISSUE – FOR REVIEW
A	12/05/20	J.M.A.	L.O	J.A	DRAFT ISSUE – FOR REVIEW

DRAWING STATUS
DESIGN BY J.M.A.
DRAWN BY L.O
FINAL APPROVAL J.A.
SCALE (on A1 Original) AS SHOWN
DA

North

CLIENT
SUTTON PARK PTY LTD
C/– LATERALS PLANNING

SEEC
Suite 7 & 8, 68-70 Station Street
PO Box 1099, Bowral NSW 2576.
(0)02 4862 1633
(F)02 4862 2088
email: mail@seec.com.au
WWW.SEEC.COM.AU

PROJECT TITLE
PROPOSED SUBDIVISION OF
LOT 2 DP1233492, LOT 1 239858
LOTS 21–24 DP1697
PEELWOOD RD, LAGGAN, NSW

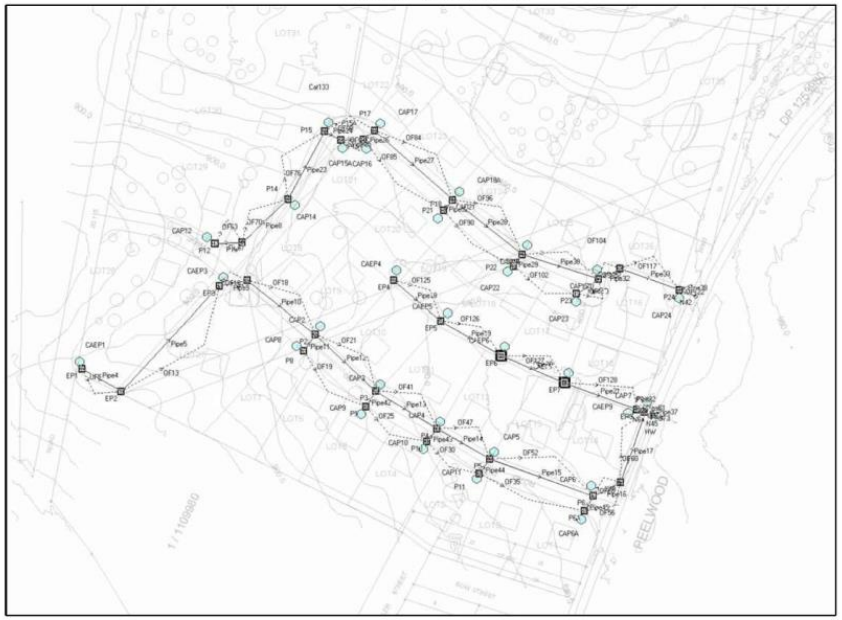
DRAWING TITLE
CONCEPT STORMWATER DRAINAGE SECTIONS & DETAILS

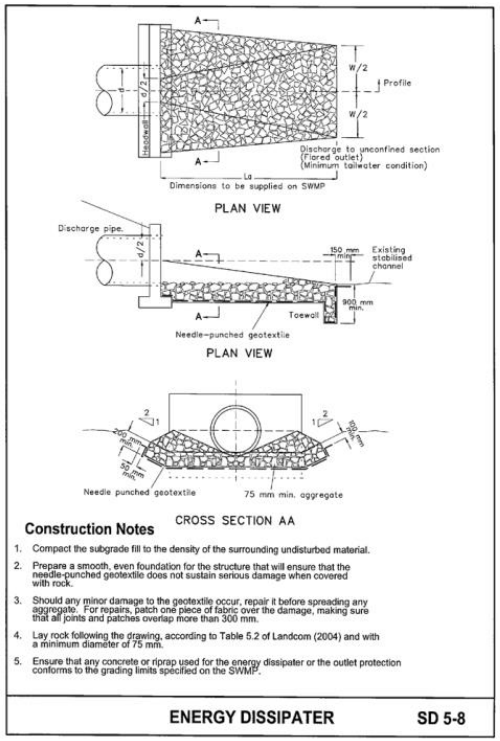
PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
19000339	P01	STW02	00

Plot Date: Wednesday, 22 July 2020 4:11:04 PM CAD File Name: T:\19000339 Peelwood Rd, Laggan\Drawings\19000339_P01_STW_REV00.dwg

NOT FOR CONSTRUCTION

'DRAINS' MODEL LAYOUT





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REV	DATE	DES.	DRN.	APP.	REVISION DETAILS
QD	22/07/20	J.M.A.	L.O.	J.A.	FINAL ISSUE
C	17/07/20	J.M.A.	L.O.	J.A.	DRAFT ISSUE – FOR REVIEW
B	22/05/20	J.M.A.	L.O	B.J	DRAFT ISSUE – FOR REVIEW
A	12/05/20	J.M.A.	L.O	J.A.	DRAFT ISSUE – FOR REVIEW

DRAWING STATUS: DESIGN BY J.M.A. / DRAWN BY L.O / FINAL APPROVAL J.A. / SCALE (on A1 Original) AS SHOWN / DA

North

CLIENT: SUTTON PARK PTY LTD C/– LATERALS PLANNING

SEEC — Suite 7 & 8, 68-70 Station Street, PO Box 1099, Bowral NSW 2576. (H)07 4862 1633 (F)07 4862 3088 email: mail@seec.com.au WWW.SEEC.COM.AU

PROJECT TITLE: PROPOSED SUBDIVISION OF LOT 2 DP1233492, LOT 1 239858 LOTS 21–24 DP1697 PEELWOOD RD, LAGGAN, NSW

DRAWING TITLE: CONCEPT STORMWATER DRAINAGE 'DRAINS' MODEL LAYOUT AND TYPICAL DETAIL

PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
19000339	P01	STW03	00

Plot Date: Wednesday, 22 July 2020 4:11:09 PM CAD File Name: T:\19000339 Peelwood Rd, Laggan\Drawings\19000339_P01_STW_REV00.dwg

AustralianBushfireSolutions

BUSHFIRE ASSESSMENT REPORT

PROPOSED REZONING & SUBSEQUENT SUBDIVISION OF LAND WITH CLOSURE OF ROADS

Lot 2 DP 1233492, Lot 1 DP 239858 & Lots 21-24 DP 1697

PEELWOOD ROAD

LAGGAN NSW 2583

Site Visit: 19 Nov 2019 Date: 10 June 2020

Prepared by Deborah Dawson and Reviewed by Jane Brandon Director Australian Bushfire Solutions

Jane Brandon
Grad Dip in Bushfire Protection
BPAD Accredited Practitioner L3 - BPD-23617

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

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DISCLAIMER

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Executive Summary

This report has been prepared for Ian Miller by Australian Bushfire Solutions, PO Box 498, Bowral NSW 2576. It has been prepared as a bushfire assessment for a proposed rezoning and subsequent subdivision of land and closure of roads in the Upper Lachlan Shire Council.

The land is identified as being within a designated bush fire prone area and hence as outlined in Planning for Bushfire Protection – PBP 2019 (NSW RFS 2019) is subject to consideration under Section 4.14 of the Environmental Planning and Assessment Act 1979 (EP&A Act). As the development application is for subdivision subsequent to rezoning the proposal is subject to consideration under Section 4.46 of the Environmental Planning and Assessment Act 1979 (EP&A Act) in combination with 100B of the Rural Fires Act, and must be submitted to the NSW RFS for a Bushfire Safety Authority.

Laggan is a village developed on both sides of Peelwood Road in a north/south line. Located on the northern side of the settlement of Laggan the subject site includes four lots zoned RU5 – Village as well as adjoining RU2 – Rural Landscape zoned land. The site occupies an area of land between Redground Heights Road and Peelwood Road and is well suited topographically to extend the residential potential of this village.

The northern portion of the site has a parcel of vegetation mapped as a Category 1 Bush Fire Hazard but the whole site is now deemed to be a grassland hazard as a result of the release of Planning for Bushfire Protection – PBP 2019. The vegetation mapped as a hazard has been identified as Tableland Grassy Box-Gum Woodland which equates to Woodland.

This proposal is for rezoning of the subject site with a subsequent subdivision of large lots or lifestyle properties. As such, this report addresses the rezoning considerations as well as the anticipated residential subdivision that will be the proposed future land use for this site.

Most of the site is currently zoned RU2 – Rural Landscape, with lots 21-24 DP 1697 being zoned RU5 – Village just within the northern extent of Laggan. All other land surrounding Laggan is also zoned RU2 – Rural Landscape. There are two paper roads included within the development footprint which will be closed and become residential land as part of this proposal.

The site is in an established rural precinct and the land is primarily cleared for grazing use with established hedges, paddock trees, dams and some small stands of remnant vegetation. Farm houses and ancillary structures are well dispersed throughout the area. The subject site contains no structures but has existing dams and Peelwood Road travels along the eastern property boundary.

The performance criteria and acceptable solutions required as per PBP 2019 have been assessed and the performance criteria and acceptable solutions to be satisfied have been outlined in Section 4 of this report.

Subject to rezoning and pending acceptance and compliance with the recommendations following (also in Section 4) this report does not find justification for the proposal to be rejected due to any bushfire considerations.

Pending compliance with the below conditions, the performance criteria and acceptable solutions outlined in Section 5 of PBP 2019 are found to be satisfied.

BAL, APZ and Landscaping Recommendations

- It is recommended that the grasslands within the site are slashed or grazed to maintain a height of less than 100mm throughout the fire season, of October to April.

Access

- Perimeter roads are two-way sealed roads, minimum 8m carriageway width kerb to kerb;
- Parking is provided outside of the carriageway width, minimum 5.5m carriageway width kerb to kerb;
- Property access roads are two-wheel drive, all-weather roads;
- 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;
- 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.
- 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.

Services Recommendations

Water:

- All above ground water service pipes are metal, including and up to any taps.

Electricity:

- Where overhead, electrical transmission lines are proposed as follows:
  - lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas;
  - no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guidelines for Managing Vegetation Near Power Lines.

Jane Brandon
Grad Dip in Bushfire Protection
BPAD Accredited Practitioner L3 - BPD-23617

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

1 Introduction

This Bush Fire Assessment Report has been compiled regarding the proposed rezoning including road closures at Lot 2 DP 1233492 and Lot 1 DP 239858 and subsequent subdivision of this land including Lots 21-24 DP 1697 within Laggan as part of a Rezoning and Development Application to be submitted to Upper Lachlan Shire Council. The site is generally known as 297 Peelwood Road Laggan.

As of this report date, *Planning for Bushfire Protection 2019 (PBP 2019)* is the legislated document to be complied with.

This report has been prepared in accordance with the submission requirements of *Appendix 2 of PBP 2019* and identifies if the proposal can meet the appropriate objectives and performance criteria of Section 5 *PBP 2019*.

2 Site Description

2.1 Location

The subject land is in the northern portion of Laggan which is located north west of the township of Crookwell.

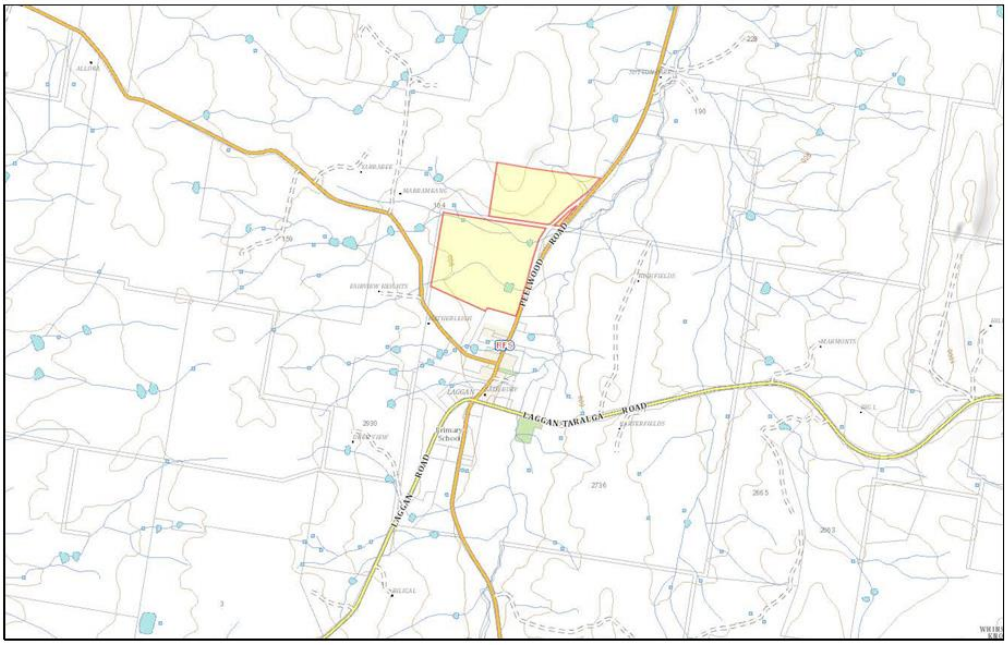


Figure 2-1 Street Map of subject land in the RU2 zone © SIX Maps

2.2 Description

Cadastre of the subject land can be found in Appendix 1 and proposed rezoning and development plans in Appendix 2.

The subject land proposal is to rezone the RU2 – Rural Landscape land and two paper roads and subsequently subdivide all lots to create a rural residential or rural lifestyle settlement. The subject land is currently developed with dams and fencing.

Size: approximately 37 ha

Aspect: Easterly (Peelwood Road)

Altitude: Approximately 880m

Slope: High point in the most north-west corner of the land falling between 5-10 degrees to the eastern property boundary and 0-5 degrees to the southern property boundary.

Existing: Dams

Water: On site water storage/supply

Electricity: Aboveground as is usual in the Shire

Gas: Bottled

Access: Directly from Peelwood Road

FDI: 100

Figure 2-2 Aerial photo of subject land © Nearmap

Figure 2-3 Aerial photo of precinct © ePlanning Spatial Viewer

2.3 Zoning

The subject site includes four lots zoned RU5 – Village as well as adjoining RU2 – Rural Landscape zoned land. All adjoining lots to the village are also RU2 – Rural Landscape.

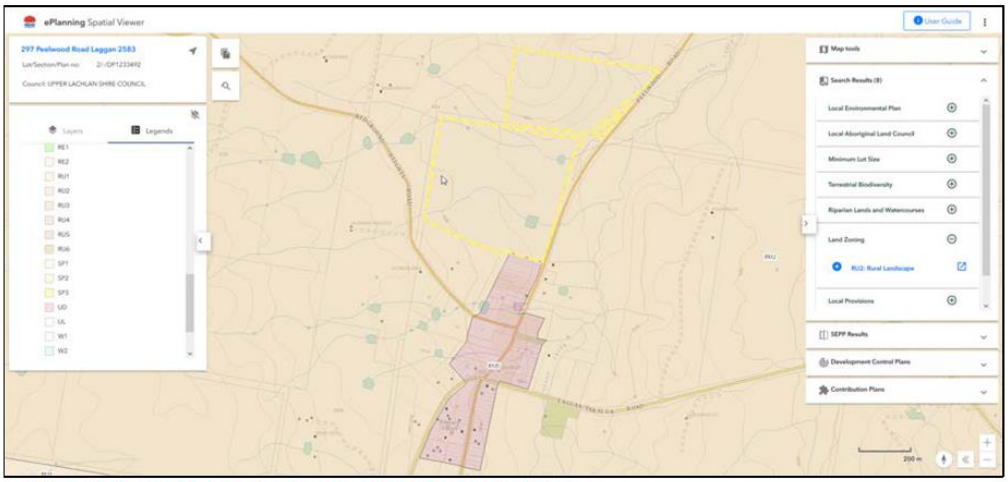


Figure 2-4 - Zoning of subject land – ePlanning Spatial Viewer

2.4 Proposal

The proposal is for the rezoning of the RU2 – Rural Landscape land and two paper roads with the subsequent subdivision of the rezoned land and four existing RU5 – Village lots. As such, with regard to bushfire it must comply the performance criteria and acceptable solutions as outlined in *Planning for Bushfire Protection 2019 Chapters 4 and 5.*

3 Bushfire Hazard and Risk Assessment

3.1 Bushfire Prone Land

The subject land is overlaid with a mapped Category 1 bushfire hazard and buffer from that hazard on the northern boundary of the site. The hazard is shown to extend beyond the northern boundary of the land.

Planning for Bush Fire Protection 2019 also deems grasslands to be a hazard and as such the whole site will be deemed Bush Fire Prone Land.

Figure 3-1 Bushfire Prone Land Map © ePlanning Spatial Viewer

3.2 Vegetation

The images that can be found in Appendix 4 show the vegetation present on the subject and surrounding lots during a site inspection. Mapping of the vegetation communities affecting the lot can be found in 0

3.2.1 Vegetation on subject lot and nearby land

The vegetation on most of the subject site is mapped as cleared land. As described above PBP 2019 includes deeming provisions for grassland fire hazards and the rural land is identified as this.

The vegetation shown to be a bush fire hazard is mapped as Tableland Dry Grassy Woodland. As required by *PBP*, this vegetation is required to be aligned with classifications by Keith who identifies this to be **woodland** as per PBP 2019.

3.2.2 Vegetation to 140m & Effective slope under hazard to 100m

The vegetation affecting the proposed development site can be outlined as per the table following.

Proposed lot 1 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Road then grassland	0-5° downslope
East	12m	Grassland	0-5° downslope
West	10m	Grassland	Level/upslope

Proposed lot 2-7 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	12m	Grassland	0-5° downslope
West	10m	Grassland	Level/upslope

Proposed lot 8 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	12m	Grassland	0-5° downslope
West	10m	Grassland	Level/upslope

Proposed lot 9-10 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	10m	Grassland	Level/upslope
West	10m	Grassland	Level/upslope

Proposed lot 11 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	12m	Grassland	0-5° downslope
West	10m	Grassland	Level/upslope

Proposed lot 12 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	10m	Grassland	Level/upslope
East	12m	Grassland	0-5° downslope
West	10m	Grassland	Level/upslope

Proposed lot 13 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	10m	Grassland	Level/upslope
West	10m	Grassland	Level/upslope

Proposed lot 14 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	10m	Grassland	Level/upslope
East	10m	Grassland	Level/upslope
West	10m	Grassland	Level/upslope

Proposed lot 15 -18 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	12m	Grassland	0-5° downslope
West	12m	Grassland	0-5° downslope

Proposed lot 19-21 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	12m	Grassland	0-5° downslope
West	10m	Grassland	Level/upslope

Proposed lot 22-26 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	12m	Grassland	0-5° downslope
West	10m	Grassland	Level/upslope

Proposed lot 27 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	12m	Grassland	0-5° downslope
West	10m	Grassland	Level/upslope

Proposed lot 28 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	12m	Grassland	0-5° downslope
West	10m	Grassland	Level/upslope

Proposed lot 29 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	13m	Grassland	5-10° downslope
West	10m	Grassland	Level/upslope

Proposed lot 30-31 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	12m	Grassland	0-5° downslope
West	10m	Grassland	Level/upslope

Proposed lot 32 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Woodland	Level/upslope
East	12m	Woodland	Level/upslope
West	12m	Grassland	0-5° downslope

Proposed lot 33 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	13m	Grassland	5-10° downslope
East	12m	Woodland	Level/upslope
West	13m	Grassland	5-10° downslope

Proposed lot 34 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	13m	Grassland	5-10° downslope
East	10m	Grassland	Level/upslope
West	13m	Grassland	5-10° downslope

Proposed lot 35 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	10m	Grassland	Level/upslope
South	12m	Grassland	0-5° downslope
East	10m	Grassland	Level/upslope
West	12m	Grassland	0-5° downslope

Proposed lot 36 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	12m	Woodland	Level/upslope
South	13m	Grassland	5-10° downslope
East	12m	Woodland	Level/upslope
West	13m	Grassland	5-10° downslope

Proposed lot 37 - Predominant vegetation; Effective slope and APZ

Aspect	Min APZ for BAL 29	Vegetation up to 140m	Effective Slope under hazard to 100m
North	12m	Woodland	Level/upslope
South	20m	Woodland	5-10° downslope
East	12m	Woodland	Level/upslope
West	13m	Grassland	5-10° downslope

3.2.3 Predominant Vegetation and Closest threat of Bushfire

The closest threat is the deemed grassland hazard and the northern portion of the site is impacted by a mapped woodland hazard.

3.3 Hazard Assessment

3.3.1 Fire and Ember Attack

Ember attack would be possible from the mapped bush fire hazard on the subject land.

3.3.2 Fire History

MyRFS does not show any fires on the subject land and nearby lots. The closest fires mapped on MyRFS are the Laggan Fire of 2011 approximately 4km to the north and the Redground Road Crookwell Fire of 2018 4.8km to the south west.

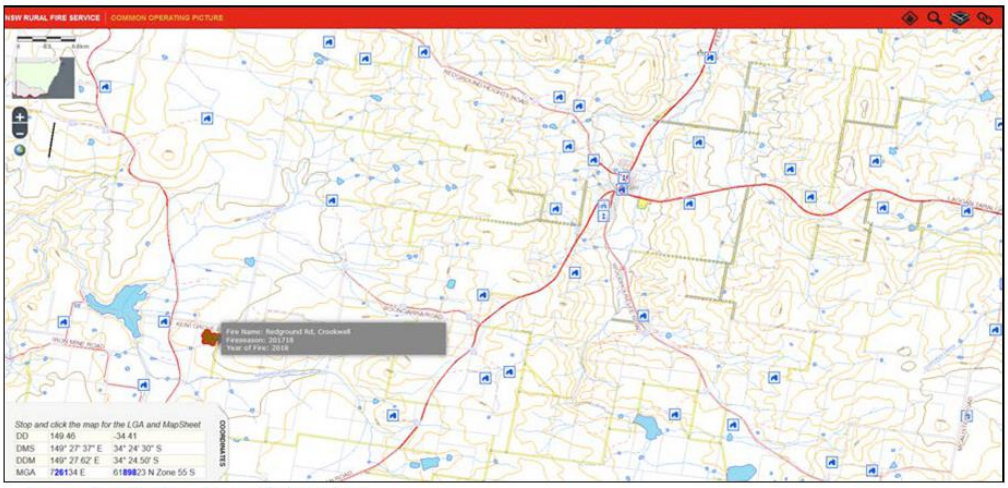


Figure 3-2 Wildfire Map © NSW RFS

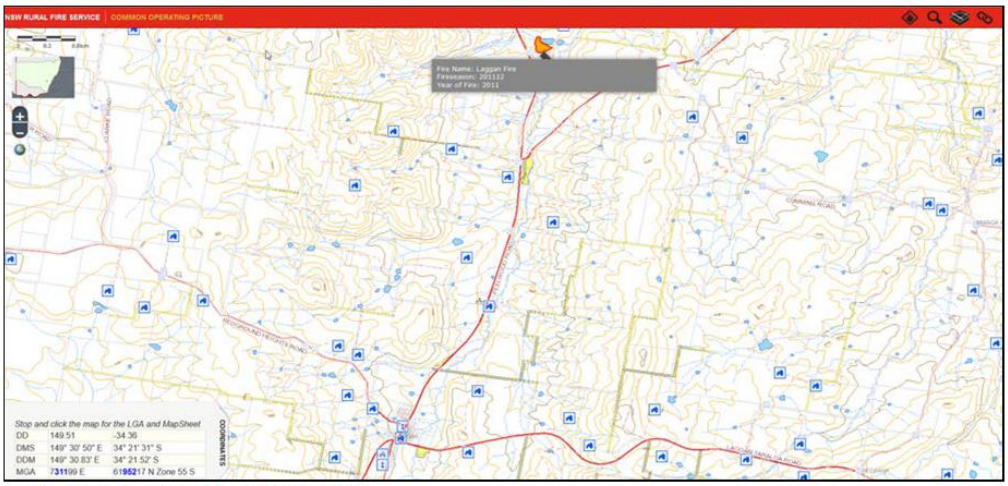


Figure 3-3 Wildfire Map © NSW RFS

3.3.3 Bushfire Attack Level

The BAL's as established in the tables above indicate that as required by PBP 2019, each lot can achieve BAL 29.

3.3.4 Asset Protection Zone - APZ

The lots will need to manage an asset protection zone with the construction of dwellings on the lots created. The APZ distances are identified in the tables above.

3.4 Significant Environmental Features

3.4.1 Heritage

In accordance with the Upper Lachlan Shire Council Heritage map, there are no heritage considerations on the subject land.

3.4.2 Aboriginal Heritage

An AHIMS search did not identify any items of issue on the subject land.

3.4.3 Flora and Fauna

The current land use is for agricultural purposes and the site is already cleared of native vegetation with the remnant being highly modified.

Hence, there are no known significant environmental constraints or considerations on the subject land that would preclude the approval of this proposal.

3.5 Overall Assessment

Pending the satisfaction of section 4.2 below, the level of bushfire hazard risk identified in relation to the subject land and the proposed development is not considered to be such that the proposal should be denied due to bushfire considerations.

4 Bushfire Protection Measures

Chapter 4 of the NSW Rural Fire Services' *Planning for Bushfire Protection 2019* (PBP 2019) addresses Strategic Planning which ensures that future development is not exposed to an unacceptable risk of bush fire. This chapter identifies what should be considered for a Bush Fire Strategic Study.

Chapter 5 Residential and Rural Residential Subdivisions in PBP 2019 provides the performance criteria and acceptable solutions for subdivision of land for the creation of residential or rural residential lots.

The tables below outline the issues, considerations, performance criteria and acceptable solutions specified in these Chapters that must be satisfied for this proposal to be supported and approved.

4.1 Bush Fire Strategic Study

Issue and Detail	Assessment Considerations	Design Response
Bush Fire Landscape Assessment • A bush fire landscape assessment considers the likelihood of a bush fire, its potential impact 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 ○ Weather • The potential fire behaviour that might be generated based on the above; • Any history of bush fire in the area; • Potential fire runs into the site and the intensity of such fire runs; and • The difficulty in accessing and supressing a fire, the continuity of bush fire hazards or the fragmentation of landscape fuels and the complexity of the associated terrain.	• The bush fire hazard in the surrounding area is assessed based on the following: ○ Grassland vegetation throughout the site and a small portion of woodland in the northern portion of the site. ○ The land slopes from the north western boundary of the site between 5 – 10 degrees towards the eastern boundary, or Peelwood Road and falls 0 – 5 degrees from the north western boundary towards the village of Laggan. ○ The FDI for the locale is 100. • The potential fire behaviour is anticipated to be a fire risk travelling from the north west, driven by north westerly or northerly winds travelling towards both Peelwood Road and the village of Laggan. • There have been two small grass fires in the area, both north and south west of Laggan in recent years. • The potential fire run into the site would be deemed to be the intensity of a grassland fire. • Access and suppression to such a fire would be improved by the proposed development. • The proposed development would afford a greater level of protection to both Peelwood Road and Laggan as the woodland and grassland hazards would become managed lands within rural residential properties.

Issue and Detail	Assessment Considerations	Design Response
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; • The proposed land use zones and permitted uses; • 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); and • The impact of the siting of these uses on APZ provision.	• The subject site is deemed to have a consistent risk profile. • The proposed land use zones are; o RU5 – Village same as current zone for four lots within village boundary o RU4 – Primary Production Small Lots o With lot sizes of 4,000m^2, 10,000m^2, 2 ha and 5 ha. • The village of Laggan is zoned RU5 – Village which provides for a range of land uses, services and facilities that are associated with a rural village. It is anticipated that the new lots will be used for residential purposes. • RU4 – Primary Production Small Lots has as its main objective to enable sustainable primary industry and other compatible land uses. • The majority of the land is currently zoned RU2 – Rural Landscape which seeks to encourage sustainable primary industry production by maintaining and enhancing the natural resource base • The rezoning of land to enable a higher density and variety of rural lifestyle or rural living lots in a location that adjoins the village and also has road frontage to Peelwood Road the main road through the village is a logical and reasonable development pattern. • Complying APZs for the residential land use would be able to be achieved within the future lots.
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; • The location of key access routes and direction of travel; and • The potential for development to be isolated in the event of a bush fire.	• Peelwood Road is the main thoroughfare through the village of Laggan. The proposed rezoning will be for land that currently has an existing lot boundary with Peelwood Road. As such the existing road network will continue to be used as the main trafficable routes and can accommodate the anticipate increase in population density. • The current lot layout has been designed as a logical extension of the village zone. There will be through road connectivity to provide for eastern or western egress from the new lots. • The location of the proposed rezoning is making the best use of the trafficable infrastructure in the area.

Issue and Detail	Assessment Considerations	Design Response
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; and • Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency.	• The Laggan Rural Fire Brigade is 167m from the edge of the proposed area for rezoning. • It would be reasonable to anticipate that new residents in the area may volunteer to serve with the Brigade. • The reduction of grassland hazard from the change of agricultural land to lifestyle properties will afford a greater level of protection to the village of Laggan from the north-west, the most likely direction of a bush fire threat. • Given the above it is reasonably to conclude that the emergency services could continue to adequately service the local requirements.
Infrastructure • 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; and • Life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines etc.	• There is no reticulated water or gas in Laggan. • Static water supplies will be installed with any future dwellings. • The existing power lines are installed on managed grazing lands.
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 bush fire protection measures through the implementation of Bush Fire Management Plans.	• The adjoining land most likely to be impacted will be the village land immediately on the southern boundary of the site as well as one rural property development with a dwelling. • It is anticipated that the increase in managed land in the precinct will be an addition of bush fire protection measures rather than an impost.

4.2 Asset Protection Zone – APZ

Intent of measures: to provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and prevent direct flame contact (5.3.1 PBP 2019)

4.2.1 How PBP 2019 APZ and landscaping requirements are satisfied

Performance Criteria The intent may be achieved where:	Acceptable Solutions	Design Response
• potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m2 on each proposed lot	• APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI	• Can comply
• APZs are managed and maintained to prevent the spread of a fire towards the building.	• APZs are managed in accordance with the requirements of Appendix 4	• Can comply

Performance Criteria The intent may be achieved where:	Acceptable Solutions	Design Response
• the APZ is provided in perpetuity	• APZs are wholly within the boundaries of the development site	• Can comply.
• APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised	• APZs are located on lands with a slope less than 18 degrees	• Can comply
• landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignition	• Landscaping is in accordance with Appendix 4; and • Fencing is constructed in accordance with section 7.6.	• Can comply • Can comply.

4.3 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 (5.3.2 PBP 2019).

4.3.1 PBP 2019 (Table 5.3b) – Access (General Requirements)

Performance Criteria The intent may be achieved where:	Acceptable solutions	Design Response
• 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;	• Can comply. • The proposed subdivision has the equivalent of an existing perimeter road along the eastern boundary with Peelwood Road. • The subdivided land immediately adjoining the village has more than one access in and out of the development. The large lot residential development further north of the village is serviced by a cul de sac providing access for six lots. This access is deemed to meet the performance criteria as the main path of travel will be through managed lands following development and this path of travel also leads away from the mapped bush fire hazard in this location. • Can comply • Can comply. • Two dead end roads area proposed • The first dead end road is within the village zone and will be wholly within

Performance Criteria The intent may be achieved where:	**Acceptable solutions**	**Design Response**
	• All roads are through roads. • Dead end roads are not recommended, but if unavoidable dead ends 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; and • 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 3.5m wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.	managed land. Whilst it is more than 200m in length it directly connects with the through road within the new development and as such is deemed to meet the performance criteria. It is proposed to construct a dead end road to service proposed lots 32 to 37. Four of these lots will be 2 ha and two will be 5 ha. The length of the road will be more than 350m. This road will travel through managed lands and is deemed a suitable design response to afford access to six properties particularly as it travels away from the mapped bush fire hazard in this locality. • Not applicable to this development. • Not applicable to this development. • Not applicable to this development
• 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.	• Can comply
• 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	• Not applicable to this development. • Not applicable to this development.

Performance Criteria The intent may be achieved where:	Acceptable solutions	Design Response
	• There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	• Not applicable to this stage of the development but can be achieved with future residential development.

4.3.2 PBP 2019 (Table 5.3b) – Access (Perimeter Roads and Non-Perimeter Roads)

Performance Criteria The intent may be achieved where:	Acceptable solutions	Design Response
• 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; • 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.	• Peelwood Road is an existing perimeter road along the eastern boundary of the site and can comply with the specifications. The newly constructed internal road will connect with a newly formed perimeter road along part of the western property boundary. This is deemed to be a suitable design response within a grassland hazard.
• 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; • 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 road crossfall does not exceed 3 degrees; and • A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided	• Can comply.

4.3.3 PBP 2019 (Table 5.3b) – Access (Property Access)

Performance Criteria The intent may be achieved where:	**Acceptable solutions**	**Design Response**
• Fire fighting 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.	• Not applicable to this development.
	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.	• Can comply

4.4 Services – Water, electricity and gas

Intent of measures: to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building

4.4.1 Services – Water, electricity and gas

Performance Criteria The intent may be achieved where:	**Acceptable Solutions**	**Design Response**
Water Supplies • Adequate water supply is provided for firefighting purposes.	• Reticulated water is to be provided to the development where available • A static water supply is provided for non- reticulated developments or where reticulated water supply cannot be guaranteed; and • Static water supplies shall comply with Table 5.3d..	• Not applicable to this development • Will be installed at dwelling construction stage. • Can comply at infill development
• Water supplies are located at regular intervals; and • The water supply is accessible and reliable for firefighting operations	• Fire hydrant spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1-2005; • Hydrants are not located within any road carriageway; and • Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	• Not applicable to this development.
• Flows and pressures are appropriate	• Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.	• Not applicable to this development.
• The integrity of the water supply is maintained	• 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.	• Can comply

Electricity Services
• location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings
	• Where practicable, electrical transmission lines are underground
	• Where overhead, electrical transmission lines are proposed as follows:
	  • lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas;
	  • no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guidelines for Managing Vegetation Near Power Lines.
		• Not applicable to this development.
		• Can comply

Gas services • Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	• Reticulated gas or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 – *The storage and handling of LP Gas*, the requirements of relevant authorities, and metal piping is used. • All fixed gas cylinders are kept clear of all flammable materials to a	• Can comply • Can comply

Performance Criteria The intent may be achieved where:	Acceptable Solutions	Design Response
	distance of 10m and shielded on the hazard side; • Connections to and from gas cylinders are metal; • Polymer-sheathed flexible gas supply lines are not used; and • Above-ground gas service pipes are metal, including and up to any outlets.	• Can comply • Can comply • Can comply

4.5 Recommendations

4.5.1 APZ and Landscaping Recommendations

- It is recommended that the grasslands within the site are slashed or grazed to maintain a height of less than 100mm throughout the fire season, of October to April.

4.5.2 Access

- Perimeter roads are two-way sealed roads, minimum 8m carriageway width kerb to kerb;
- Parking is provided outside of the carriageway width, minimum 5.5m carriageway width kerb to kerb;
- Property access roads are two-wheel drive, all-weather roads;
- 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;
- 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.
- 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.

4.5.3 Services Recommendations

Water:

- All above ground water service pipes are metal, including and up to any taps.

Electricity:

- Where overhead, electrical transmission lines are proposed as follows:
  - lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas;
  - no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guidelines for Managing Vegetation Near Power Lines.

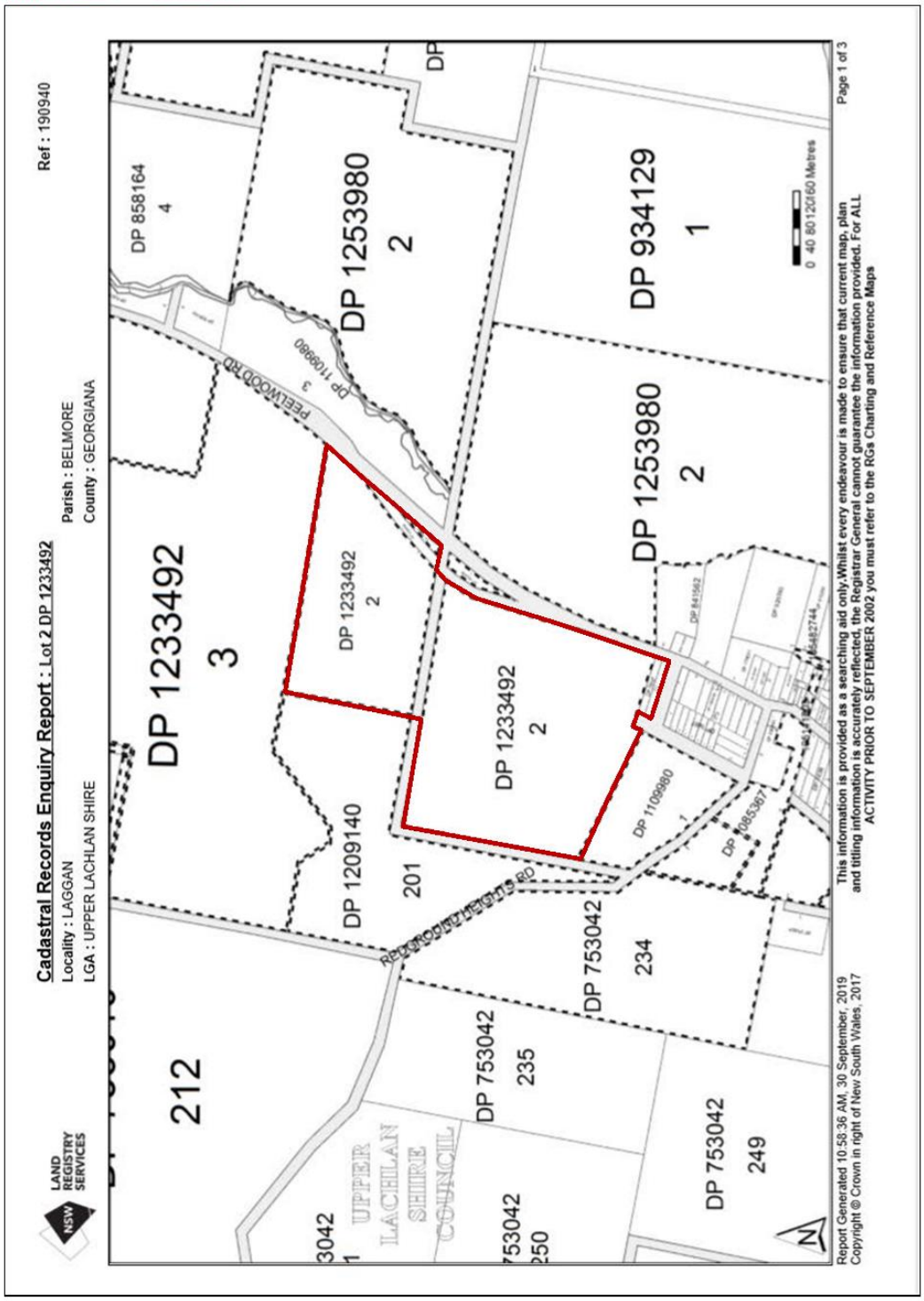
5 Summary of Findings and Recommendations

This report finds that the proposed rezoning and road closures with subsequent subdivision satisfies the requirements identified in PBP 2019 for the creation of lots for residential or rural residential purposes.

If the proposal incorporates the recommendations in Section 4 above, then the proposed design is considered acceptable in satisfying the performance criteria outlined in Chapter 5 of PBP 2019 (detailed in section 4 above). Hence this report does not believe that the proposal should be rejected due to bushfire considerations.

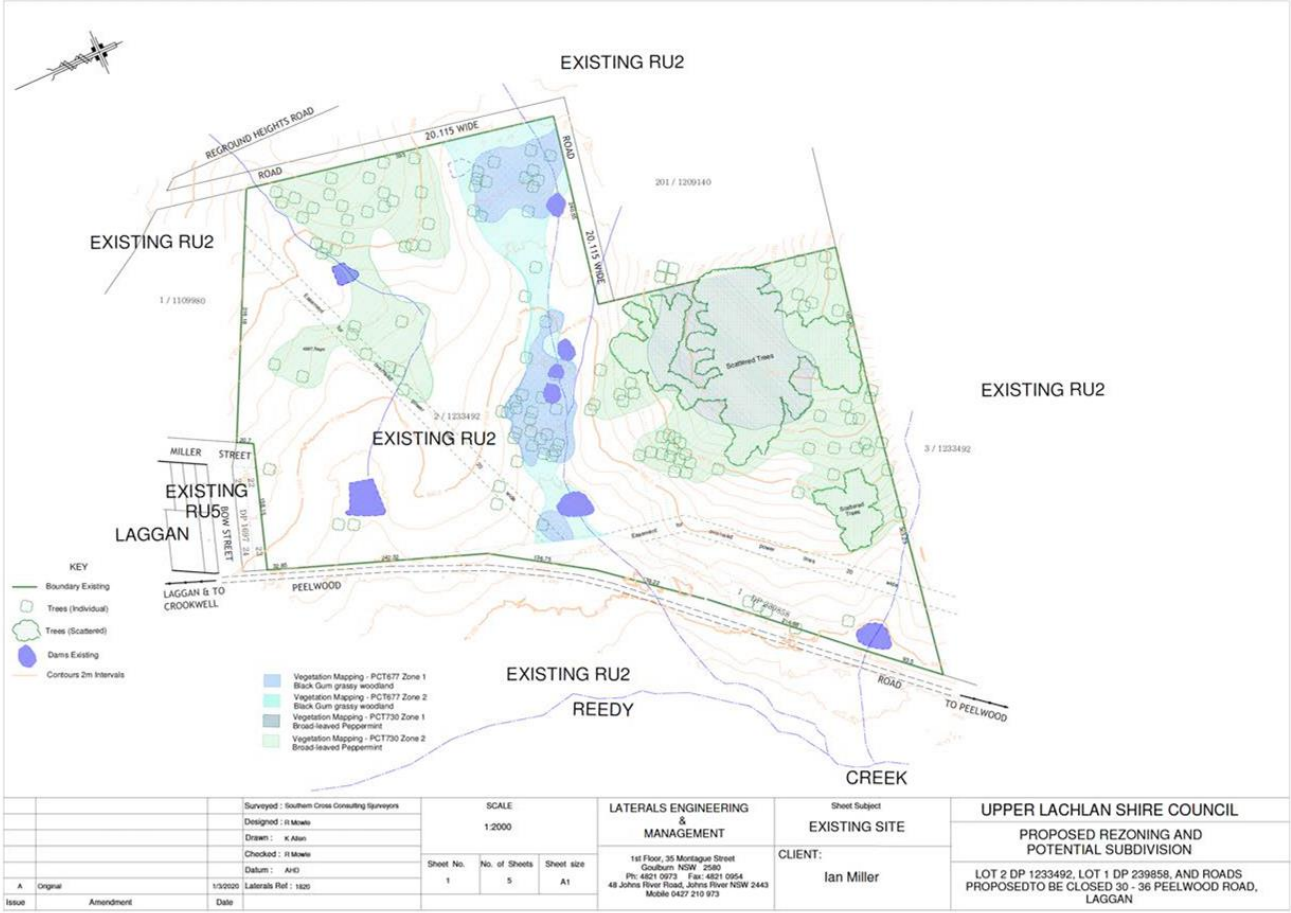
6 Appendices

Appendix 1 Cadastre

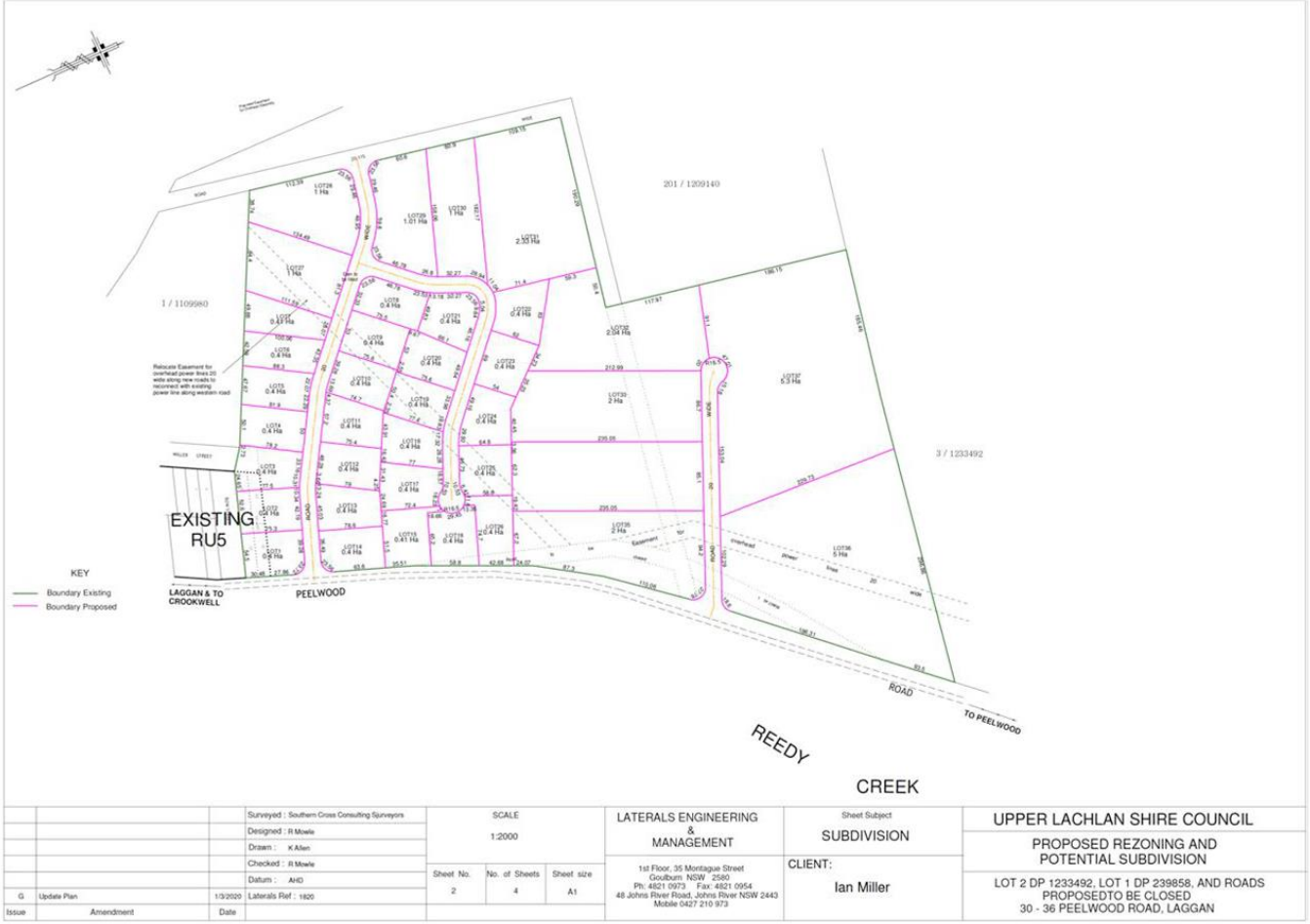


Appendix 2 Proposed Development

Existing Site

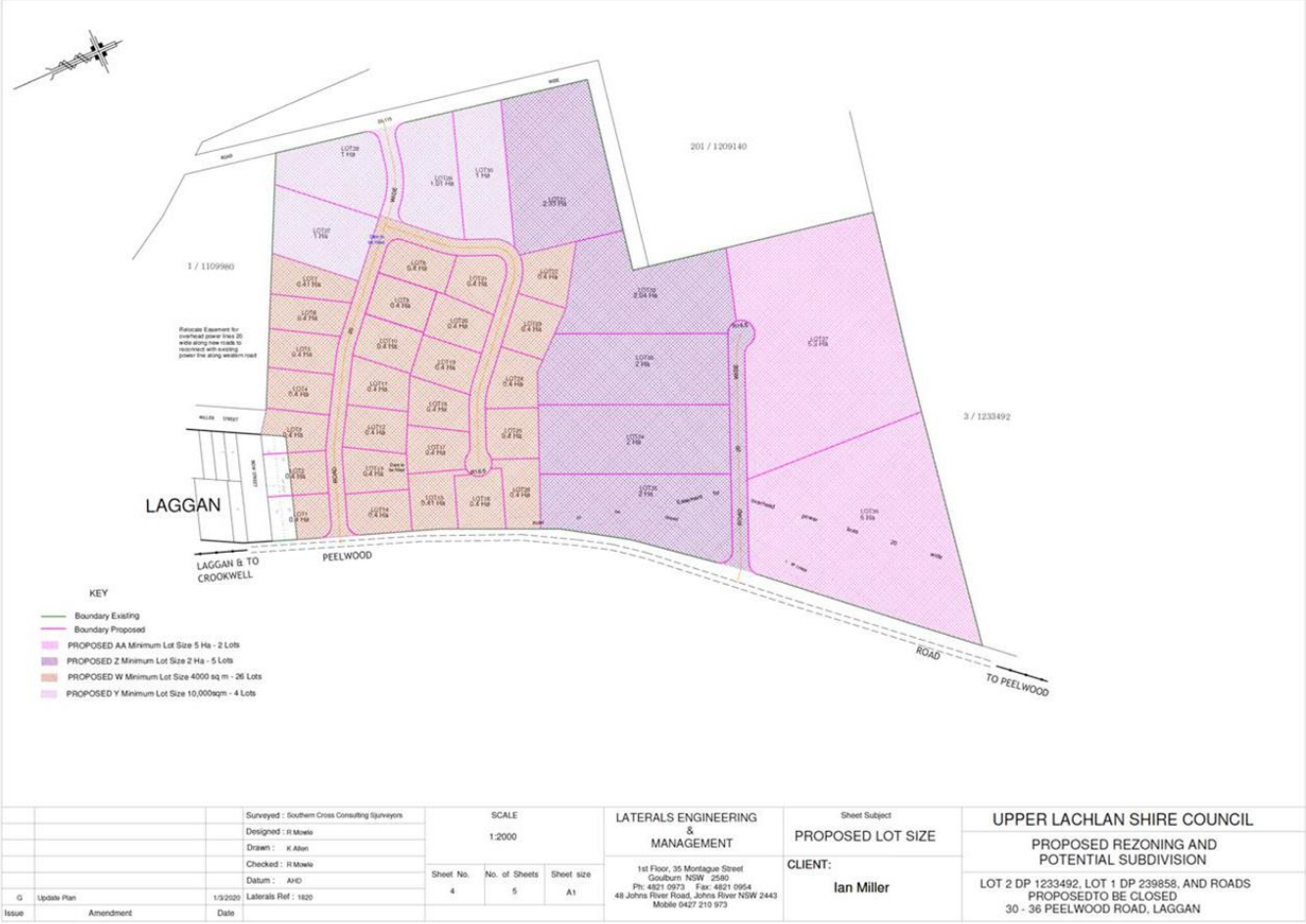


Plan of Proposed Subdivision

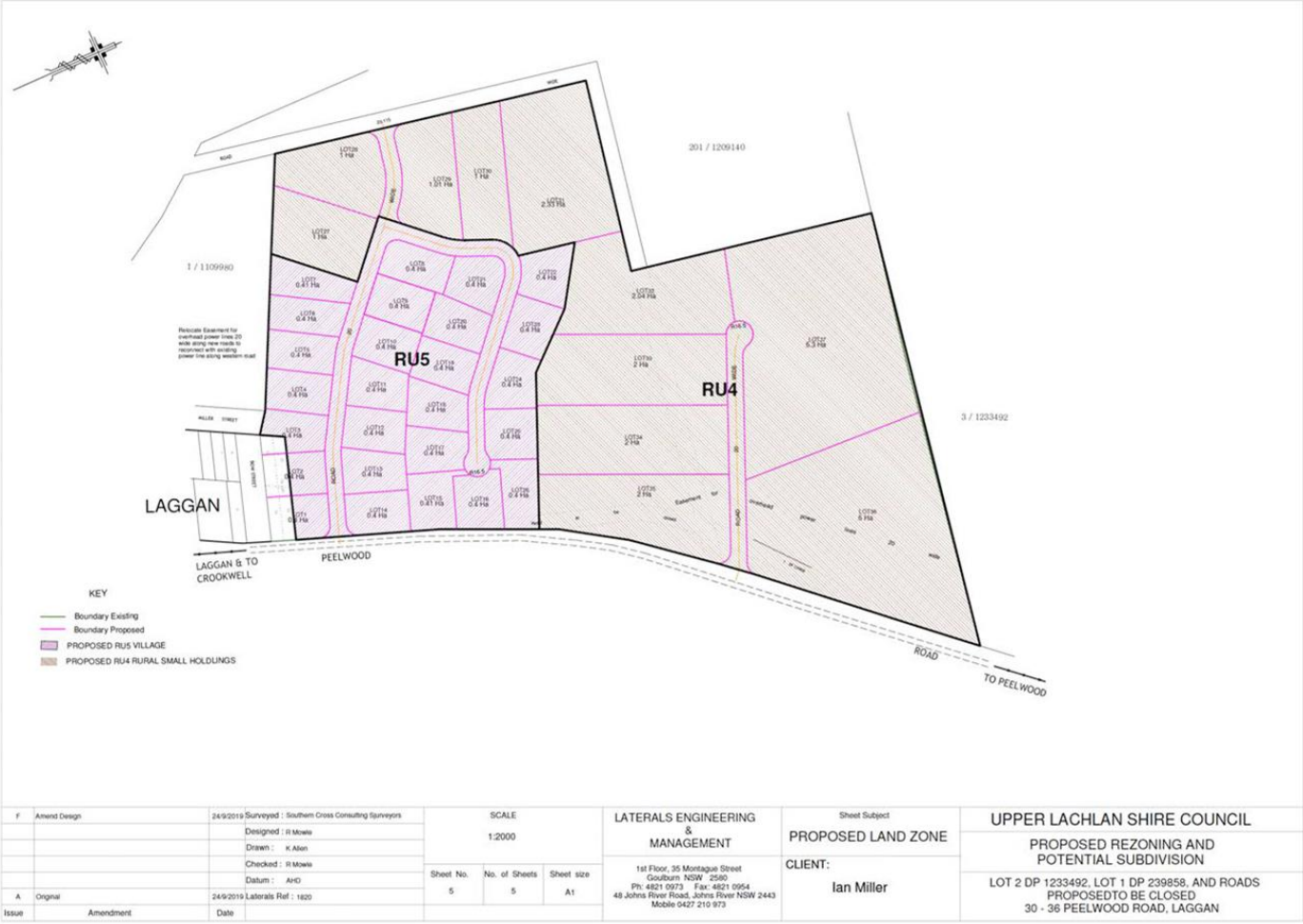


Proposed Plan of Subdivision and Indicative Envelopes with APZ to meet BAL 29 (PBP 2019)

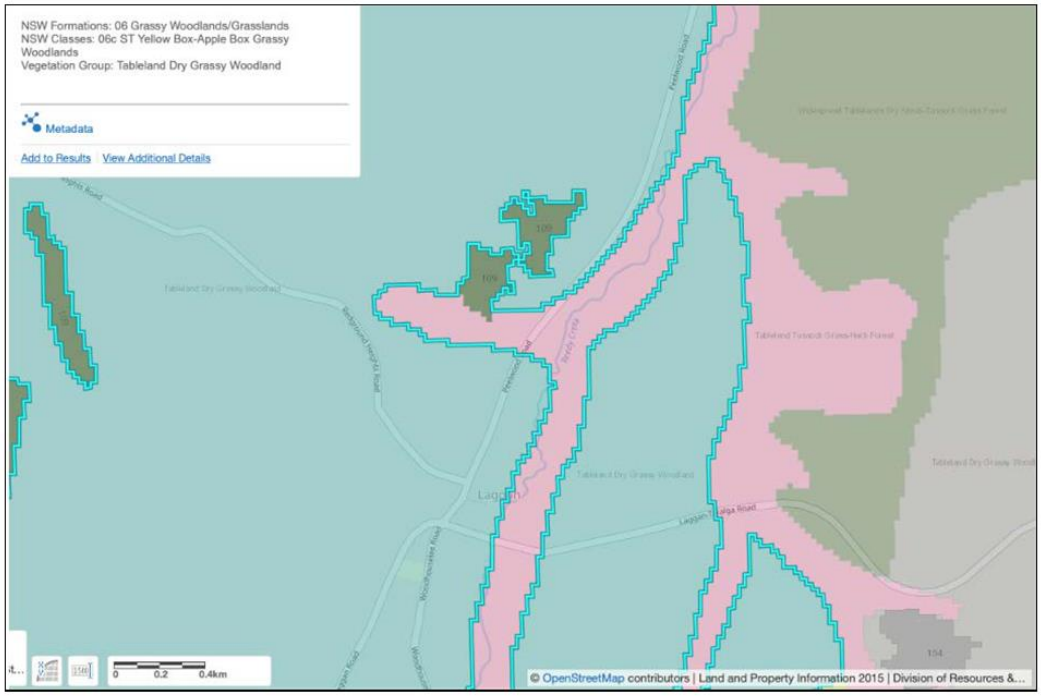
Proposed Lot Size



Proposed Land Zone



Appendix 3 Vegetation Mapping



Appendix 4 Site photos

Figure A-1 - Looking south west along Peelwood Road towards Laggan.

Figure A-2 - Looking north west along Peelwood Road from the same location.

Figure A-3 - Current grassland hazard within the site.

Figure A-4 - Looking north towards the woodland hazard within the site that be contained with the large-lot residential portion of the development

Appendix 5 Appendix 4 of PBP 2019 – Asset Protection Zone Standards

APPENDIX 4

ASSET PROTECTION ZONE REQUIREMENTS

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

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

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

A4.1 Asset Protection Zones

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

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

An APZ provides:

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

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

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

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

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

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

A4.1.1 Inner Protection Areas (IPAs)

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

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

When establishing and maintaining an IPA the following requirements apply:

Trees

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

Shrubs

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

Grass

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

A4.1.2 Outer Protection Areas (OPAs)

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

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

When establishing and maintaining an OPA the following requirements apply:

Trees

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

Shrubs

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

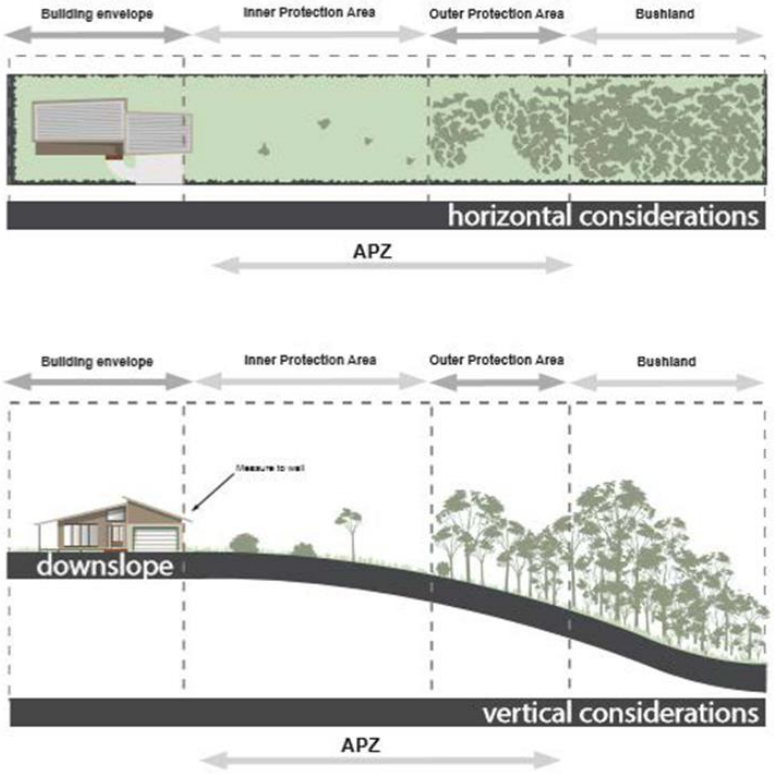
Grass

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

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

Figure A4.1

Typical Inner and Outer Protection Areas.



Appendix 6 AHIMS

Office of Environment & Heritage
NSW GOVERNMENT

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : 190940
Client Service ID : 495404

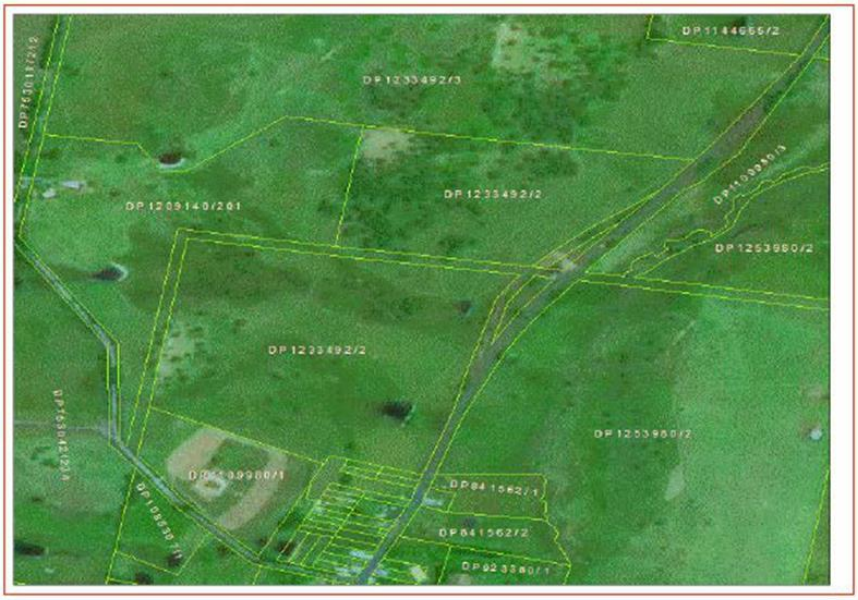
Australian Solutions Pty Ltd
PO Box 498
BOWRAL New South Wales 2576
Attention: Jane Brandon
Email: jane@ausbushfire.com.au

Date: 03 April 2020

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 2, DP:DP1233492 with a Buffer of 200 meters, conducted by Jane Brandon on 03 April 2020.

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 the Office of the Environment and Heritage 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. *

7 References

Google Earth 2019-2020, viewed Oct 2019 – June 2020

Google Maps 2019-2020, http://maps.google.com.au/, viewed Oct 2019 – June 2020

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30 – 36 PEELWOOD ROAD, LAGGAN, NSW

ABORIGINAL DUE DILIGENCE ASSESSMENT

Report to Laterals Engineering and Management

October 2019

APEX ARCHAEOLOGY

PO Box 236, Nowra, NSW 2541 | heritage@apexarchaeology.com.au | www.apexarchaeology.com.au

ABN 56 625 618 993

EXECUTIVE SUMMARY

Apex Archaeology has been engaged to assist Laterals Engineering and Management in the assessment of three parcels of land located at Laggan, NSW, in order to assess the Aboriginal archaeological values of the study area. Apex Archaeology has prepared a Due Diligence assessment in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (the Due Diligence Code of Practice).

The study area is located within Laggan, NSW, at 30 – 36 Peelwood Road (Lot 2 DP 1233492, Lot 1 DP 239858 and Lots 21-24 DP 1697). The study area is located approximately 165km south west of Sydney, NSW. It is located within the Upper Lachlan Shire Council (ULSC) Local Government Area (LGA). The study area comprises approximately 35.4 hectares.

A site visit was conducted on 15 October 2019. No previously recorded archaeological sites were located within the study area. No newly identified archaeological material was identified during the survey. Ground surface visibility (GSV) was low throughout the study area. GSV was rated at 15% overall. Ground disturbance was quite moderate throughout the study area. Evidence of land clearance for agricultural activity and landscape modification for drainage and dam construction was identified.

It is recommended that:

- No further Aboriginal archaeological assessment is required prior to the commencement of upgrade works as described in this report.
- The results of this assessment fulfil the requirement for Due Diligence in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Code of Practice). Works may proceed with caution.
- The proposed works must be contained to the area assessed during this due diligence assessment, as shown on Figure 1. If the proposed location is amended, further archaeological assessment may be necessary to determine if the proposed works will impact any Aboriginal objects or archaeological deposits.
- Should unanticipated archaeological material be encountered during site works, all work must cease and an archaeologist contacted to make an assessment of the find. Further archaeological assessment and Aboriginal community consultation may be required prior to the recommencement of works. Any objects confirmed to be Aboriginal in origin must be reported to the OEH under Division 1, Section 89A of the NPW Act.

Apex Archaeology would like to acknowledge the Aboriginal people who are the traditional custodians of the land in which this project is located. Apex Archaeology would also like to pay respect to Elders both past and present.

Document Control

The following register documents the development and issue of the document entitled '30 - 36 Peelwood Road, Laggan, NSW – Aboriginal Due Diligence Assessment', prepared by Apex Archaeology in accordance with its quality management system.

Revision	Prepared by	Reviewed by	Comment	Issue Date
1 – Draft	Leigh Bate	Jenni Bate	Initial preparation	21 October 2019
2 – Draft	Leigh Bate	Robert Mowle	Client review	23 October 2019
3 - Final	Leigh Bate		Final Report	25 October 2019

Glossary of Terms

Aboriginal Object	An object relating to the Aboriginal habitation of NSW (as defined in the NPW Act), which may comprise a deposit, object or material evidence, including Aboriginal human remains.
AHIMS	Aboriginal Heritage Information Management System maintained by DPIE, detailing known and registered Aboriginal archaeological sites within NSW
AHIP	Aboriginal Heritage Impact Permit
ATER	Aboriginal Test Excavation Report
BP	Before Present, defined as before 1 January 1950.
Code of Practice	The DECCW September 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*
Consultation	Aboriginal community consultation in accordance with the DECCW April 2010 *Aboriginal cultural heritage consultation requirements for proponents 2010.* Consultation is not a required step in a due diligence assessment; however, it is strongly encouraged to consult with the relevant Local Aboriginal Land Council and to determine if there are any Aboriginal owners, registered native title claimants or holders, or any registered Indigenous Land Use Agreements in place for the subject land
DA	Development Application
DECCW	The Department of Environment, Climate Change and Water – now DPIE
Disturbed Land	If land has been subject to previous human activity which has changed the land's surface and are clear and observable, then that land is considered to be disturbed
DPIE	Department of Planning, Industry and Environment (Formerly OEH)
Due Diligence	Taking reasonable and practical steps to determine the potential for an activity to harm Aboriginal objects under the *National Parks and Wildlife Act 1974* and whether an application for an AHIP is required prior to commencement of any site works, and determining the steps to be taken to avoid harm
Due Diligence Code of Practice	The DECCW Sept 2010 *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*
GIS	Geographical Information Systems
GSV	Ground Surface Visibility
Harm	To destroy, deface or damage an Aboriginal object; to move an object from land on which it is situated, or to cause or permit an object to be harmed
LALC	Local Aboriginal Land Council
LGA	Local Government Agency
ULSC	Upper Lachlan Shire Council
NPW Act	NSW *National Parks and Wildlife Act* 1974
OEH	The Office of Environment and Heritage of the NSW Department of Premier and Cabinet
RAPs	Registered Aboriginal Parties

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Figures

Plates

1.0 Introduction

Apex Archaeology has been engaged to assist Laterals Engineering and Management in the assessment of three parcels of land located at Laggan, NSW (Figure 1), in order to assess the Aboriginal archaeological values of the study area. Apex Archaeology has prepared a Due Diligence assessment in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (the Due Diligence Code of Practice).

1.1 Study Area

The study area is located within Laggan, NSW, at 30 – 36 Peelwood Road (Lot 2 DP 1233492, Lot 1 DP 239858 and Lots 21-24 DP 1697). The study area is located approximately 165km south west of Sydney, NSW. It is located within the Upper Lachlan Shire (ULS) Local Government Area (LGA). The study area comprises approximately 35.4 hectares.

1.2 Investigators and Contributors

This report has been prepared by Leigh Bate, Director and Archaeologist with Apex Archaeology, and reviewed by Jenni Bate, Director and Archaeologist with Apex Archaeology. Both have over 11 years of consulting experience within NSW.

Name	Role	Qualifications
Leigh Bate	Project Manager, Primary Report Author, GIS, Field inspection	B. Archaeology; Grad. Dip. Arch; Dip. GIS
Jenni Bate	Review	B. Archaeology; Grad. Dip. CHM

1.3 NSW Heritage Legislation

Protection for Aboriginal heritage in NSW is provided primarily under the *National Parks and Wildlife Act* 1974 (NPW Act). Although cultural heritage is protected by other Acts, the NPW Act is the relevant Act for undertaking due diligence assessments. Protection for Aboriginal sites, places and objects is overseen by the Department of Planning, Industry and Environment (DPIE).

Changes to the NPW Act with the adoption of the *NPW Amendment (Aboriginal Objects and Places) Regulation* 2010 in October 2010 led to the introduction of new offences regarding causing harm to Aboriginal objects or declared Aboriginal places. These new offences include destruction, defacement or movement of an Aboriginal object or place. Other changes to the NPW Act include:

- Increased penalties for offences relating to Aboriginal heritage for individuals and companies who do not comply with the legislation;
- Introduction of the strict liability offences, meaning companies or individuals cannot claim 'no knowledge' if harm is caused to Aboriginal objects or places; and
- Changes to the permitting process for AHIPs – preliminary archaeological excavations can be undertaken without the need for an AHIP, providing the

excavations follow the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales.*

A strict liability offence was introduced, meaning a person who destroys, defaces or moves an Aboriginal object without an Aboriginal Heritage Impact Permit (AHIP) is guilty of an offence, whether they knew it was an Aboriginal object or not. Exercising due diligence (as described in Section 1.4) provides a defence against the strict liability offence.

1.4 NSW Due Diligence Code of Practice

The *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Code of Practice) was introduced in September 2010. It outlines a method to undertake 'reasonable and practical' steps to determine whether a proposed activity has the potential to harm Aboriginal objects within the subject area, and thereby determine whether an application for an Aboriginal Heritage Impact Permit (AHIP) is required. When due diligence has been correctly exercised, it provides a defence against prosecution under the NPW Act under the strict liability clause if Aboriginal objects are unknowingly harmed without an AHIP.

The Code of Practice provides the 'reasonable and practicable' steps to be followed when determining the potential impact of a proposed activity on Aboriginal objects. Due diligence has been defined by DPIE (formerly OEH) as "taking reasonable and practical steps to determine whether a person's actions will harm an Aboriginal object and, if so, what measures can be taken to avoid that harm" (DECCW 2010:18).

These steps include:

- Identification of whether Aboriginal objects are, or are likely to be, present within the subject area, through completing a search of the Aboriginal Heritage Information Management System (AHIMS);
- Determine whether the proposed activity is likely to cause harm to any Aboriginal objects; and
- Determine the requirement for an AHIP.

Should the conclusion of a due diligence assessment be that an AHIP is required, further assessment must be undertaken, with reference to the following guidelines:

- DECCW, April 2010, *Aboriginal cultural heritage consultation requirements for proponents 2010. Part 6 National Parks and Wildlife Act 1974*;
- DECCW, Sept 2010, *Code of Practice for Archaeological Investigation of Aboriginal Objects In New South Wales*;
- OEH, April 2011, *Guide to Investigation, assessing and reporting on Aboriginal cultural heritage in NSW*; and
- OEH, May 2011, *Applying for an Aboriginal Heritage Impact Permit: Guide for Applicants.*

PO Box 236
NOWRA
NEW SOUTH WALES 2541

0 250 500
metres

Projection:
MGA Zone 55 (GDA 94)
Base Map:
Google Earth Pro
FINAL - Version 1

Figure 1: General location of the study area.

N

Figure 2: Proposed layout of the residential sub-division.

2.0 The Due Diligence Code of Practice Process

The Due Diligence Code of Practice provides a specific framework to guide the assessment of Aboriginal cultural heritage. The following section presents the results of this process.

2.1 Step 1: Will the activity disturb the ground surface?

The proposed works will disturb the ground surface. It is proposed that Lot 2 DP 1233492, Lot 1 DP 239858 and Lots 21-24 DP 1697 be sub-divided to form 37 residential lots of between 0.4 and 5.3 hectares (Figure 2).

Earthworks would also include clearing, grubbing, stripping and moving topsoil, levelling of the area, excavation of soil, and backfilling. Services such as electricity and water would be installed. All proposed works would have an impact to some extent on the ground surface.

2.2 Step 2a: AHIMS and Available Literature Search

DPIE is required to maintain a register of Aboriginal sites recorded during archaeological assessments and other activities within NSW. This is known as the Aboriginal Heritage Information Management System (AHIMS). This register provides information about site types, their geographical location, and their current status. It is the requirement for the recorder of a newly identified site to register this site with DPIE to be placed onto the AHIMS register. It is a requirement of the Code of Practice to undertake a search of this register as part of undertaking a due diligence assessment.

DPIE also maintains a register of archaeological reports relating to archaeological investigations throughout NSW. These reports are a valuable source of information regarding investigations previously completed and their findings, and can inform the assessment process regarding the potential for Aboriginal cultural material and archaeological potential within a study area.

2.2.1 AHIMS Results

A search of the study area with a 5km² radius was conducted. No Aboriginal sites were identified within the study area or a 5km² radius. It should be noted the lack of recorded sites within the wider area itself may be due to the area not previously being subject to archaeological assessment, rather than no sites being actually present. A copy of the basic search attached in Appendix A.

2.2.2 LITERATURE REVIEW

A review of previous archaeological work within the surrounding region of the study area was undertaken. A number of reports were identified from background research and the AHIMS database and are detailed below.

Table 1: Previous assessments undertaken by archaeological consultants in the wider region

Consultant	Date	Sites Identified/Salvaged	Region
Koettig, M	1982	6669 artefacts salvaged from two sites (C-AB2 & C-AB1)	Collector, NSW
Koettig, M	1983	650 artefacts salvaged.	Goulburn, NSW
Lance, A	1984	1 isolated find identified	Sooley Dam, Wollondilly River, NSW
Stone, T	1986	2 artefact scatters identified	Yass, NSW
Lance and Koettig	1986	Aboriginal Resources Planning Study	Goulburn Area
Silcox, R	1988	3 artefacts scatters identified	Chatsbury, NSW
Fuller, N	1989	17 artefact scatters & 5 isolated finds identified	Goulburn Area
Patton, R	1990	15,257 artefacts salvaged	Goulburn, NSW
Silcox, R	1991	97 artefacts salvaged	Goulburn, NSW
Williams, D	1992	Relocation of 53 artefacts previously recorded by Koettig in 1983.	Goulburn to Campbelltown, NSW
Silcox, R	1993	4 artefacts salvaged	Breadalbane, NSW
Effenberger, S	1994	2 isolated finds identified	Goulburn Racecourse
Silcox, R	1995	2 artefact scatters	Goulburn, NSW
Stuart, I	1995	2 artefact scatters, 2 isolated finds	Goulburn, NSW
Kuskie, P	1996	1 artefact scatter, 1 isolated find	Goulburn, NSW
JMcDCHM	1998	2154 artefacts salvaged	Crookwell, NSW
NOHC	2000	No Aboriginal sites or areas with PAD recorded	Goulburn. NSW
Dominic Steele	2003	1 scarred tree, 2 possible scarred tree and an Isolated find identified	Goulburn, NSW
NOHC	2003	1 artefact scatter identified	Run O Waters, Goulburn, NSW
Dibden, J	2004	A large amount of artefact scatters identified.	Greenwich Park, Goulburn, NSW
Biosis	2004	7 artefact scatters & 8 isolated finds identified	Tarago, NSW
OzArk E&HM	2004	6 artefact sites and 1 scarred tree identified	Taralga, NSW
Dibden, J	2005	4 artefact sites identified	Cullerin, NSW
Austral Archaeology Pty Ltd	2005	No artefacts recovered from salvage excavations	Gunning, NSW
Saunders, P	2007	12 artefact scatters and 2 isolated finds identified	Parkesbourne, NSW
Austral Archaeology Pty Ltd	2007	2 artefact scatters, 3 isolated finds and 6 PAD areas identified	Capitol Wind Farm, Lake George, NSW
Austral Archaeology Pty Ltd	2007	348 artefacts recovered from salvage excavations	Capitol Wind Farm, Lake George, NSW

Consultant	Date	Sites Identified/Salvaged	Region
Dibden, J	2008	116 artefact scatters identified	Yass Valley Wind Farm, Yass, NSW
Dibden, J	2012	13 artefact scatters identified	Rye Park Wind Farm, Yass, NSW
Dibden, J	2013	14 artefacts scatters identified	Bango Wind Farm, Bango, NSW
Dibden, J	2015	3 artefact scatters identified	Collector Wind Farm, Collector, NSW

2.2.1 Synthesis

Archaeological works within the wider areas have generally been related to development proposals. It appears that artefact evidence generally comprises low density background scatter or discard distributed widely across the locality, with higher densities occurring occasionally in areas of more focused occupation such as camp sites or repeat occupation sites. This generally occurs in favourable environmental contexts such as elevated, well drained spur and ridge crests, flats, terraces and simple slopes in close proximity to watercourses, with a greater focus on higher order water courses. Artefacts tend to comprise raw materials such as quartz, tuff, silcrete and chert. In general, non-specific flaking activities are represented, although microlith and microblade production is also noted.

2.3 Step 2b: Landscape Features

An assessment of landscape features is required to determine whether Aboriginal objects are likely to be present within the proposed activity area. Certain landscape features are more likely to have been utilised by Aboriginal people in the past and therefore are more likely to have retained archaeological evidence of this use. Focal areas of activity for Aboriginal people include rock shelters, sand dunes, water courses, waterholes and wetlands, as well as ridge lines for travel routes.

The presence of specific raw materials for artefact manufacture, as well as soil fertility levels to support vegetation resources, are also factors to be considered in the assessment of the environmental context of a study area. Geomorphological factors, such as erosion and accretion of soils, affect the preservation of potential archaeological deposits and therefore need to be considered when making an assessment of the potential for archaeological material to be present within a study area. This assessment is predominantly a desktop exercise.

2.3.1 Existing Environment

Soils, Geology and Vegetation

The study areas falls wholly within the Blakney Creek soil landscape. The Blakney Creek soil landscape is identified as having shallow topsoil with moderate to severe gullying and moderate sheet erosion to occur extensively. The underlying geology is made up of undifferentiated Ordovician and Silurian sediments. Rocks include silty sandstone, siltstone, greywacke, phyllite, shale, slate and quartzite. Elevations in the area are generally from 600 – 900 m. Slope gradients are usually <10%. Local relief between 20 – 50 m. Vegetation within this area consists of savannah woodland of

yellow box and gum and dry sclerophyll forest dominated by red stringybark. Snow gum is found at higher altitudes and in frost pockets. Extensive clearing has taken place throughout the area and only scattered trees remain.

Hydrology

The nearest major permanent water source is the Bolong River. The Bolong River is a watercourse that is part of the Lachlan catchment within the Murray–Darling basin. The hydrology of the study area consists of a 1st order ephemeral drainage line which drains east and connects to a 2nd order ephemeral watercourse called Reedy Creek according to the Strahler system as used by DPI Water (Figure 4). Watercourse classification ranges from 1st order through to 4th order (and above) with 1st order being the lowest, ie a minor creek or ephemeral watercourse. Reedy Creek connects to the Bolong River ~20km north of the study area.

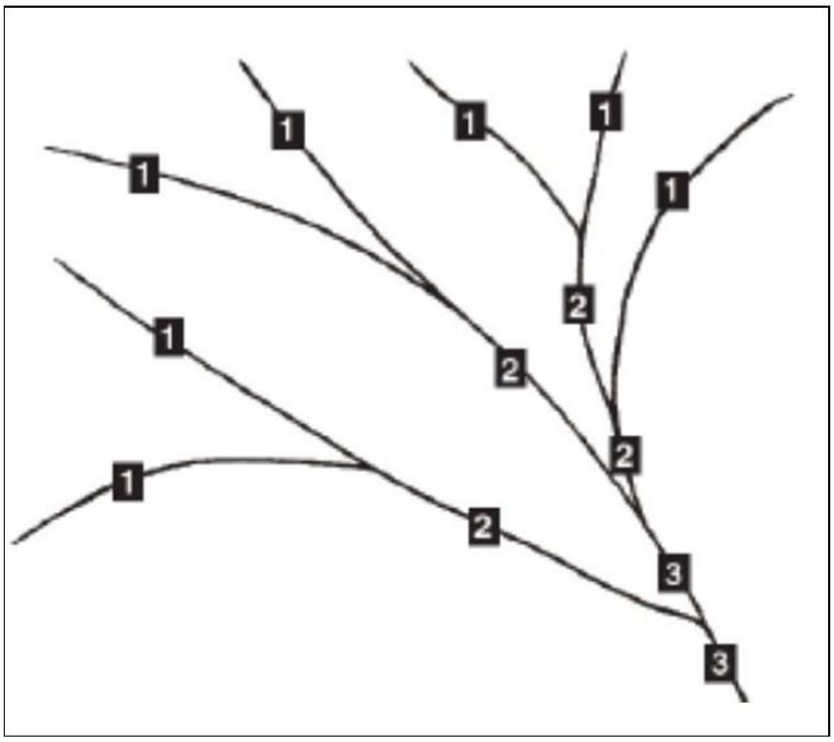

Figure 3: The Strahler system (Source: Department of Planning and Environment 2016).

Although the study area meets the definition of "disturbed land", there is a requirement to proceed to step 3 of the due diligence assessment process as an ephemeral watercourse runs through the study area and a higher order, named creek is within close proximity. Proximity to water is a factor to be considered when assessing Aboriginal archaeological potential.

2.3.2 ETHNOHISTORY

There is a relatively little in the way of information regarding the exact tribal boundaries and locations of ceremonial or domiciliary activities of Aboriginal people pre-contact within the Crookwell area. Phil Boot (202:58) notes:

> *The problem associated with ethnohistoric documents include their tendency to record unusual, rather than everyday events, and their focus on religious behaviour to the exclusion of woman and children (Attenbrow 1976:34; Sullivan 1983:12.4).*

According to Tindale (1974), the study area is located along the border between the Gandangara and Wiradjuri tribal area and linguistic territory. His observations are an attempt to depict Aboriginal occupation at the time of European contact. The Gundangarra tribal area is described by Tindale (1974) as being:

> *....At Goulburn and Berrima; down the Hawkesbury River (Wollondilly) to about Camden.*

Whilst the Wiradjuri tribal area is described by Tindale (1974) as being:

> *...on the Lachlan River and south from Condoblin to Booligal; at Carrathool, Wagga Wagga, Cootamundra, Cowra, Parkes, Trundle; east to Gundagai, Boorowa and Rylstone; at Wellington, Mudgee, Bathurst and Carcoar; west along Billabong Creek to beyond Mosgiel, south west to near Hay and Narranderra, south to Howlong on the upper Murray; at Albury and east to about Tumbarumba (Tindale 1974).*

Aboriginal society was constructed of a hierarchy of social levels and groups, with fluid boundaries (Peterson 1976), with the smallest group comprising a family of a man and his wife/wives, children and some grandparents, referred to as a 'clan (Attenbrow 2010). The next level consists of bands, which were small groups of several families who worked together for hunting and gathering purposes, also known as a 'band' (Attenbrow 2010). The third level comprised regional networks with a number of bands, and these bands generally shared a common language dialect and/or had a belief in a common ancestor.

Networks would come together for specific ceremonial purposes. The highest level is described as a tribe, which is usually described as a linguistic unit with flexible territorial boundaries (Peterson 1976); although Attenbrow (2010) argues that "these groups were not tribes in the current anthropological sense of the word". Various dialects of the Wiradjuri language were identified within the region (Tindale 1974). Tindale also considered the Wiradjuri to be "one of the largest tribal groupings in Australia, with many hordes".

Aboriginal people utilised a wide range of subsistence resources in the past, with ethnohistorical sources recording the diet of Aboriginal people including kangaroo, possum, kangaroo rat, lizards, birds, platypus, wallaby and a range of plants and insects as well as fish and shell fish (Pearson 1981). A wide range of native animals,

including birds and reptiles, have been identified within the wider environment around Laggan, and are likely to have been utilised as food resources by Aboriginal people in the past.

2.3.3 Raw Materials

A wide range of raw materials were selected by Aboriginal people for flaking to create stone implements. Material types ranged from high quality to poor quality for flaking purposes, depending on the geology of the area and readily available material types. The following is a description of a range of raw material types known to have been utilised by Aboriginal people for the creation of stone artefacts.

Breccia

Breccias are coarse, angular volcanic fragments cemented together by a finer grained tuffaceous matrix.

Chalcedony

Chalcedony is a microcrystalline, siliceous rock which is very smooth and can be glossy. Introduction of impurities can produce different coloured versions of chalcedony, including yellow/brown (referred to as carnelian), brown (sard), jasper (red/burgundy) and multicoloured agate. It flakes with a sharp edge and was a prized material type for the creation of stone artefacts in parts of Australia (Kuskie & Kamminga 2000: 186).

Chert

Chert is a highly siliceous sedimentary rock, formed in marine sediments and also found within nodules of limestone. Accumulation of substances such as iron oxide during the formation process often results in banded materials with strong colours. Chert is found in the Illawarra Coal Measures and also as pebbles and colluvial gravels. It flakes with durable, sharp edges and can range in colour from cream to red to brown and grey.

Petrified Wood

Petrified wood is formed following burial of dead wood by sediment and the original wood being replaced by silica. Petrified wood is a type of chert and is a brown and grey banded rock and fractures irregularly along the original grain.

Quartz

Pure quartz is formed of silicon dioxide, and has a glossy texture and is translucent. Introduction of traces of minerals can lead to colouration of the quartz, such as pink, grey or yellow. The crystalline nature of quartz allows for minute vacuoles to fill with gas or liquid, giving the material a milky appearance. Often quartz exhibits internal flaws which can affect the flaking quality of the material, meaning that in general it is a low-quality flaking material (Kuskie & Kamminga 2000: 186). However, quartz is an abundant and widely available material type and therefore is one of the most common raw materials used for artefact manufacture in Australia. Flaking of quartz can produce small, very sharp flakes which can be used for activities such as cutting plant materials, butchering and skinning.

QUARTZITE

Formed from sandstone, quartzite is a metamorphic stone high in silica that has been heated or had silica infiltrate the voids found between the sand grains. Quartzite ranges in colour from grey to yellow and brown.

SILCRETE

Silcrete is a siliceous material formed by the cementing of quartz clasts with a matrix. These clasts may be very fine grained to quite large. It ranges in colour from grey to white, brown, red or yellow. Silcrete flakes with sharp edges and is quite durable, making silcrete suitable for use in heavy duty woodworking activities and also for spear barbs (Kuskie & Kamminga 2000:184).

TUFF/INDURATED MUDSTONE

There is some disagreement relating to the identification of lithic materials as tuff or indurated mudstone. The material is a finely textured, very hard yellow/orange/reddish-brown or grey rock. Kuskie and Kamminga (2000: 6, 180) describe that identification of lithic materials followed the classification developed by Hughes (1984), with indurated mudstone described as a common stone material in the area. However, Kuskie and Kamminga's analysis, which included x-ray diffraction, identified that lithics identified as 'indurated mudstone' was actually rhyolitic tuff, with significant differences in mineral composition and fracture mechanics between the stone types. They define mudstone as rocks formed from more than 50% clay and silt with very fine grain sizes and then hardened.

The lithification of these mudstones results in shale (Kuskie & Kamminga 2000: 181) and thus 'indurated mudstone', in the opinion of Kuskie and Kamminga, do not produce stones with the properties required for lithic manufacture.

In 2011, Hughes, Hiscock and Watchman undertook an assessment of the different types of stones to determine whether tuff or indurated mudstone is the most appropriate terminology for describing this lithic material. The authors undertook thin section studies of a number of rocks and determined that the term 'indurated mudstone' is appropriate, with an acknowledgment that some of this material may have been volcanic in origin. They also acknowledge that precise interpretation of the differences between material types is difficult without detailed petrological examination, and suggest that artefacts produced on this material are labelled as 'IMT' or 'indurated mudstone/tuff'.

2.3.4 PROCUREMENT

Assemblage characteristics are related to and dependent on the distance of the knapping site from raw materials for artefact manufacture, and different material types were better suited for certain tasks than other material types. Considerations such as social or territorial limitations or restrictions on access to raw material sources, movement of groups across the landscape and knowledge of source locations can influence the procurement behaviour of Aboriginal people. Raw

materials may also have been used for trade or special exchange between different tribes.

2.3.5 MANUFACTURE

A range of methodologies were used in the manufacture of stone artefacts and tools, through the reduction of a stone source. Stone may have been sourced from river gravels, rock outcrops, or opportunistic cobble selection. Hiscock (1988:36-40) suggests artefact manufacture comprises six stages, as follows:

1. The initial reduction of a selected stone material may have occurred at the initial source location, or once the stone had been transported to the site.
2. The initial reduction phase produced large flakes which were relatively thick and contained high percentages of cortex. Generally the blows were struck by direct percussion and would often take advantage of prominent natural ridges in the source material.
3. Some of these initial flakes would be selected for further reduction. Generally only larger flakes with a weight greater than 13-15 grams would be selected for further flaking activities.
4. Beginning of 'tranchet reduction', whereby the ventral surface of a larger flake was struck to remove smaller flakes from the dorsal surface, with this retouch applied to the lateral margins to create potential platforms, and to the distal and proximal ends to create ridges and remove any unwanted mass. These steps were alternated during further reduction of the flake.
5. Flakes were selected for further working in the form of backing.
6. Suitable flakes such as microblades were retouched along a thick margin opposite the chord to create a backed blade.

Hiscock (1986) proposed that working of stone materials followed a production line style of working, with initial reduction of cores to produce large flakes, followed by heat treatment of suitable flakes before the commencement of tranchet reduction. These steps did not necessarily have to occur at the same physical location, but instead may have been undertaken as the opportunity presented.

2.3.6 PREDICTIVE MODEL

Predictive models have been developed and refined over the years. Detailed predictive and occupational models for the Aboriginal occupation in the wider region in general identified that:

- Aboriginal occupation focussed predominantly on resource rich zones, particularly along higher order watercourses. Abundant resources for sustenance and water would supply longer stays for family and community base camps, as well as occasional gatherings of larger groups. These areas were considered to be primary resource zones;
- Secondary resource zones were focussed on watercourses, wetlands and/or swamps in close proximity to higher order watercourses and the associated flats and terraces. These areas were seasonally occupied during the course of hunting and gathering activities by small hunting parties and family

groups. Generally level ground was selected for camping, near water sources, and was sporadic rather than continuous occupation;

- Outside of the primary and secondary resource zones, activities included resource gathering and movement across the landscape by small parties, in order to access areas with greater resources;
- Opportunistic reduction of raw materials to create stone artefacts would be quite widespread across the landscape, in order to produce stone tools on an 'as needed' basis;
- Locally available quartz was favoured for knapping activities, along with tuff and chert, depending on their availability;
- Exposed sandstone would be utilised for creating and maintaining ground edge hatchets, creating grinding grooves. This action may have been opportunistic rather than specific, with evidence of long term, repeated use not expected to occur; and
- Aboriginal occupation of the general area is believed to have occurred within the past 5,000 years, although it is possible it may extend as far as 30,000-40,000 years ago (SEA 2013:23).

From these general predictions of how the area was utilised for occupation by Aboriginal people in the past, a predictive model for the location of archaeological sites was developed and this has been summarised below:

- Low spurs within 100m of higher order streams are likely to contain sites with relatively higher numbers of artefacts;
- Very low density artefact scatters may occur throughout valley floor contexts;
- Elevated, level ground adjacent to major, permanent streams has the potential for open sites with higher concentrations of artefacts;
- Stone artefact scatters are likely to increase in number and density relative to the site's proximity to water and raw material sources;
- Suitable rockshelters with relatively level floors, adequate shelter and located in basal slope contexts in association with a drainage line may contain occupation deposit and/or pigment rock art;
- Grinding grooves are likely to occur only where suitable sandstone exposures occur in association with a source of water;
- Burials are rare but may occur in deep, fine grained alluvial or Aeolian sediments, or in the form of stone cairns;
- Scarred trees have the potential to survive in areas of suitable old growth trees;
- Archaeological deposits with high scientific significance are most likely to be found in rockshelters with suitable deposit depth, or on elevated areas with aggrading sediments in close proximity to permanent or reliable water sources, or within rockshelter contexts;
- Outside of these identified areas, stratified deposits or in situ archaeological material is unlikely to survive due to bioturbation and/or natural processes such as water action, erosion etc; and

- Isolated surface and subsurface archaeological material may exist as background scatter in very low densities, but the location of this potential material is impossible to predict.

The hydrology, topography, soils and geology of an area are all important considerations when developing a predictive model for an area.

2.4 Step 3: Avoid harm

Given the proximity to water (Reedy Creek) it was necessary to undertake a visual inspection of the study area to identify any surface objects or landforms with potential archaeological deposits (PAD). This inspection would allow conclusions to be made regarding the probability of archaeological objects occurring within the proposed area of upgrade. This would assist in determining if there was any archaeological potential within the study areas which could potentially be harmed by the proposed works, and in turn, assist in determining if harm to the archaeological resource could be avoided.

The proposed development will impact the majority of the study area, through the subdivision and subsequent residential development of the property.

2.5 Step 4: Visual Inspection

A visual pedestrian inspection of the proposed upgrade areas was undertaken on Tuesday 15 October 2019 by Leigh Bate, archaeologist with Apex Archaeology.

2.5.1 Survey Coverage

The entire area was inspected by pedestrian survey to identify any surface artefacts or any areas with potential for subsurface deposits to be present.

2.5.2 Results

Ground surface visibility (GSV) was generally low throughout the study area. GSV was rated at 10%-15% overall. However, in some sections visibility increased due to erosional scours and ground disturbance to 40%.

No previously recorded archaeological sites were located within the study area.

Plate 1: General view looking south from the north east corner of the study area.

Plate 2: Looking west along the northern boundary of the study area (Telstra cables in the vicinity).

Plate 3: Looking east along the northern boundary.

Plate 4: Looking south east from the highest point of the study area

Plate 5: Looking east along midslope towards the drainage line through the centre of the study area.

Plate 6: Looking east through the dammed area within the centre of the study area.

Plate 7: Looking north north across the central portion of the study area.

Plate 8: Looking north along the eastern boundary of the study area.

2.5.3 Discussion

In accordance with the Due Diligence Code of Practice, land is considered disturbed if human activities within the area have left clear and observable changes on the landscape. The study area met this definition in general, as ground disturbance was high throughout the study area. Evidence of landscape modification in the form of vegetation clearance for farming activities and damming of the drainage line through the centre of the study area have left a clear and visible mark on the landscape, as has the installation of Telstra cables in the southern portion of the site. The majority of the study area is under crop and is also being utilised for cattle agistment.

The level of disturbance and level of slope within the study area means that there is a low chance of intact sub-surface deposits being present within the area. No areas suitable for Aboriginal habitation or short-term camping were identified within the study area, based on the predictive model for the region. No areas of potential were identified and no archaeological material was identified on the ground surface. It is possible that the area may have been utilised by Aboriginal people for resource gathering in the past, but these activities are ephemeral and rarely leave evidence that survives in the archaeological record.

3.0 Conclusions and Recommendations

3.1 Conclusions

- No previously recorded Aboriginal sites are located within the study area.
- No archaeological material was identified on the ground surface within the study area.
- The study area is assessed as having no potential for subsurface archaeological deposits and this is confirmed by the site inspection.
- This assessment was based on identification of landform elements, previous archaeological work undertaken within the wider region, and a visual inspection of the study area.

3.2 Recommendations

- No further Aboriginal archaeological assessment is required prior to the commencement of upgrade works as described in this report.
- The results of this assessment fulfil the requirement for Due Diligence in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Code of Practice). Works may proceed with caution.
- The proposed works must be contained to the area assessed during this due diligence assessment, as shown on Figure 1. If the proposed location is amended, further archaeological assessment may be necessary to determine if the proposed works will impact any Aboriginal objects or archaeological deposits.
- Should unanticipated archaeological material be encountered during site works, all work must cease and an archaeologist contacted to make an assessment of the find. Further archaeological assessment and Aboriginal community consultation may be required prior to the recommencement of works. Any objects confirmed to be Aboriginal in origin must be reported to the OEH under Division 1, Section 89A of the NPW Act.

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Appendix A: AHIMS Basic Search Results

Office of Environment & Heritage NSW GOVERNMENT

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : 1943

Client Service ID : 457073

Apex Archaeology

Date: 16 October 2019

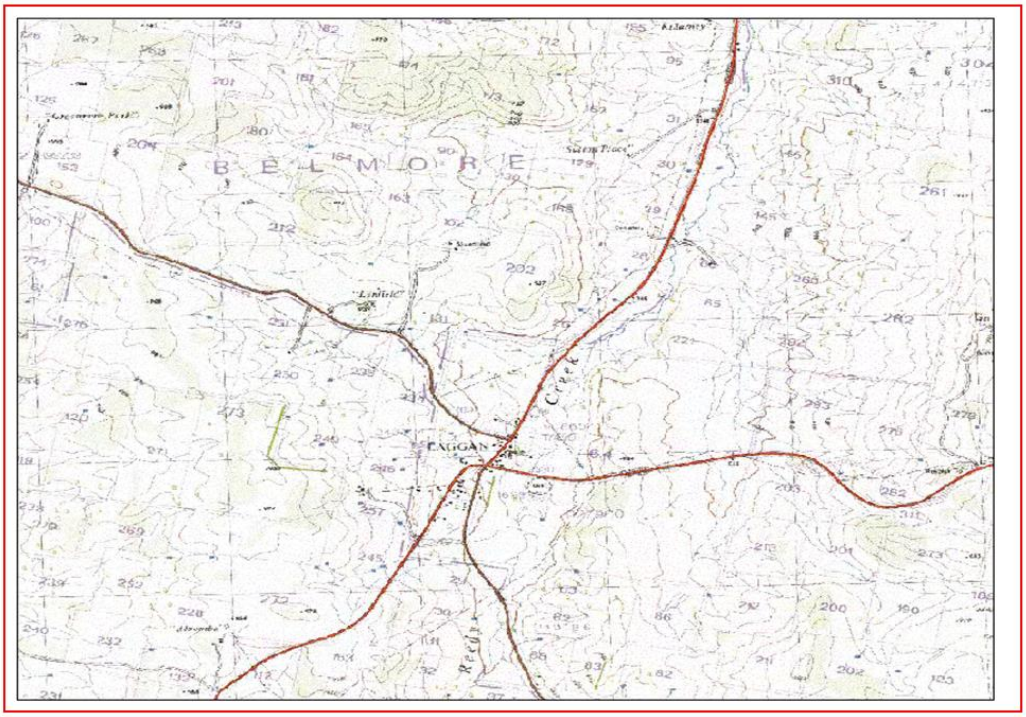
PO Box 291
Macarthur Square New South Wales 2560
Attention: Leigh Bate

Email: leigh@apexarchaeology.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 55, Eastings : 730101 - 735113, Northings : 6188414 - 6193403 with a Buffer of 0 meters, conducted by Leigh Bate on 16 October 2019.

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 the Office of the Environment and Heritage 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 (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit 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 Office of Environment and Heritage 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.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

TRAFFIC AND PARKING IMPACT ASSESSMENT OF A PROPOSED REZONING AND SUBDIVISION

30-36 Peelwood Road in Laggan

Traffic and Parking Impact Report

Prepared for: LATERALS

N1916259A (3b)

November 2019

Motion Traffic Engineers Pty Ltd
Telephone:
940 33588
sydney@motiontraffic.com.au

ACN 600201583

1. INTRODUCTION

Motion Traffic Engineers was commissioned by Laterals to undertake a traffic and parking impact assessment for a proposed Rezoning and Potential Subdivision at 30-36 Peelwood Road, Laggan. The site is located immediately to the north of the Laggan Village. The site is currently a vacant lot with no permanent structures.

The immediate intersections to the proposed sub-division are Peelwood Road with Redground Heights Road and Peelwood Road with Laggan-Taralga Road.

This traffic report focuses on the proposed development and changes in car usage and car park utilisation and additional trips from the proposed development.

In the course of preparing this assessment, the subject site and its environs have been inspected, plans of the development examined, and all relevant traffic and parking data collected and analysed.

2. BACKGROUND AND EXISTING CONDITIONS OF THE PROPOSED LOCATION

2.1 Location and Land Use

The proposed Rezoning and Sub-division is located on vacant land immediately to the north of Laggan Village. The nearby land use is agricultural and currently the site is rural land.

Figures 1 and 2 show the location of the development site from the aerial and street map respectively.

Figure 3 shows a photograph of the site.

Figure 4 shows the location of the two assessed intersections.

Figure 5a shows Peelwood Road adjacent to the development site.

Figure 5b shows the Peelwood Road / Redground Heights Road intersection.

Figure 5c shows the Peelwood Road / Laggan Road intersection.

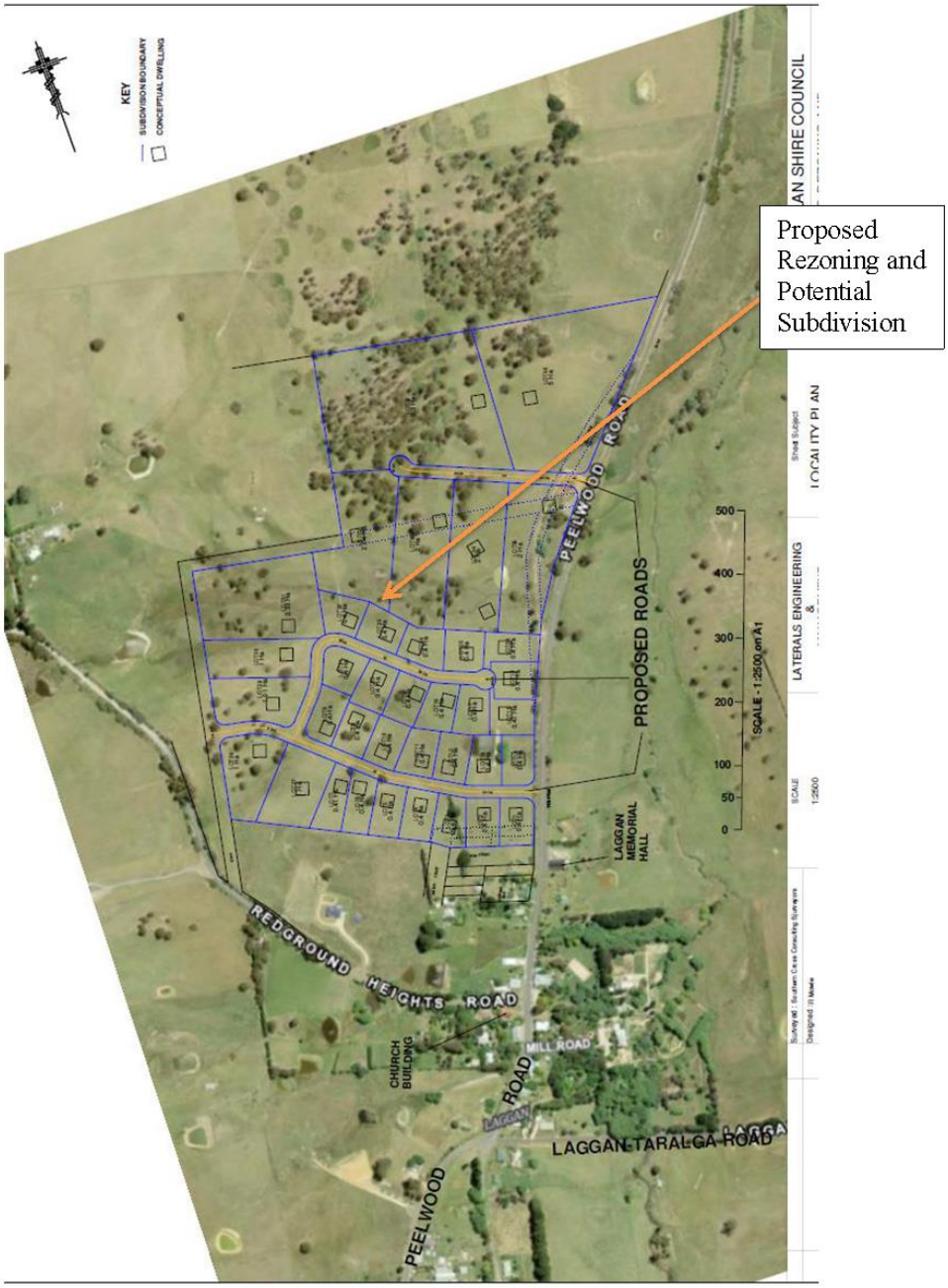


Figure 1: Location of the Subject Site on Aerial

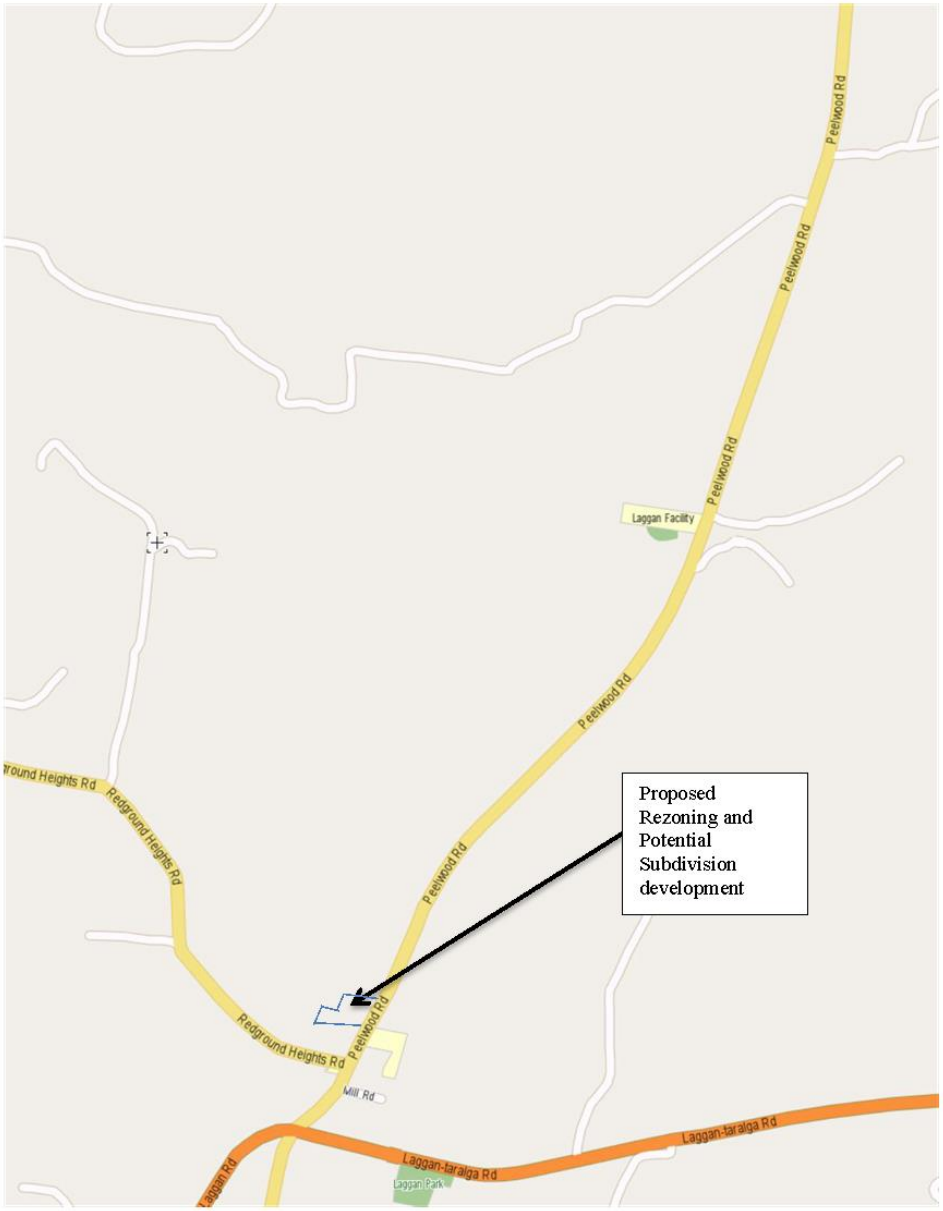


Figure 2: Street Map of the Location of the Development Site

Figure 3: Photo of Proposed Subdivision northern boundary looking towards Laggan Village

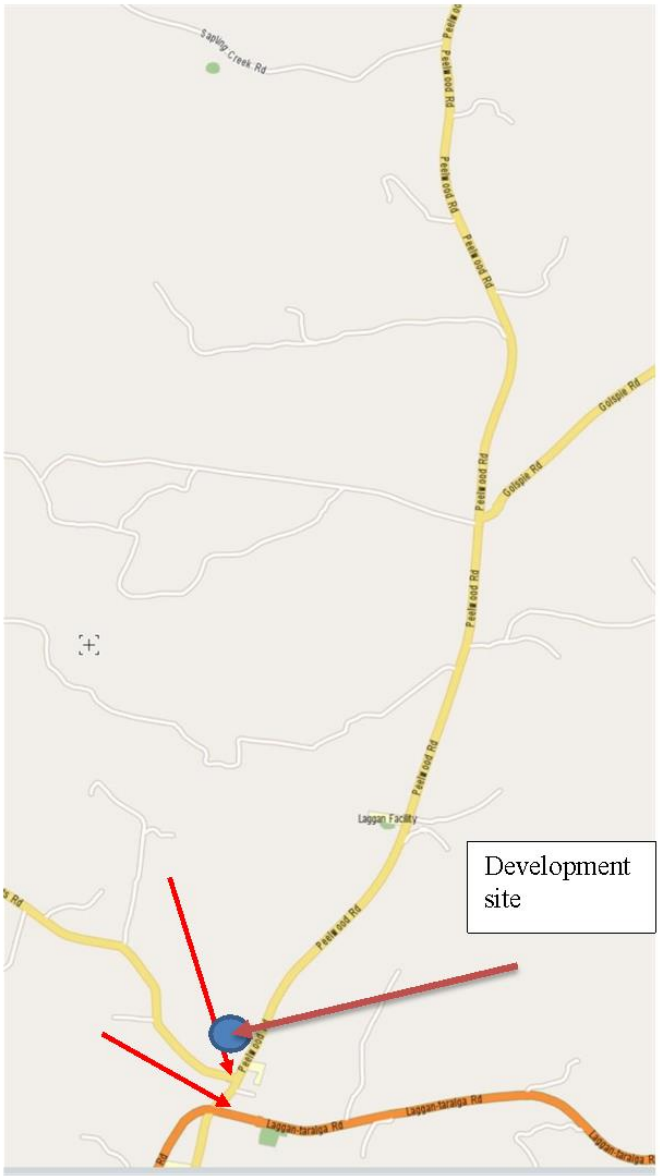


Figure 4: Two assessed intersections

2.2 Road Network

This section describes the roads near the proposed Rezoning and Potential Subdivision site.

Peelwood Road is a rural road and has one lane each way with a road shoulder. The sign posted speed limit is 100km/hr. Figure 5a shows a photograph of Peelwood Road.

Laggan-Taralga Road is classified Regional road (MR 248) and has one lane each way. The sign posted speed limit is 100km/hr.

Redground Heights Road is local rural road with one lane each way with road shoulder. Redground Heights Road is sealed road within Laggan Village and is an unsealed outside of the town centre. The default speed limit for the road is 50km/hr within the town centre and 100km/hr outside of the town centre. Figure 5b shows a photograph of the Peelwood Road/Redground Heights Road intersection.

Figure 5a: Peelwood Road looking to North from north of the development site

Figure 5b: Redground Heights Road looking from Peelwood Road

Figure 5c: Laggan Road looking from Peelwood Road

2.3 Public Parking Opportunities

There is public parking available near the Laggan Memorial Hal and near Laggan Hotel.

2.4 Intersection Description

As part of the traffic assessment, two intersections are assessed:

- The priority intersection of Peelwood Road with Laggan Road and Laggan-Taralga Road
- The priority intersection of Peelwood Road with Redground Heights Road

External traffic travelling to and from the development site will most likely need to travel through the above intersections.

The Priority intersection of Peelwood Road with Laggan Road and Laggan-Taralga Road is a four-leg intersection with all turn movements permitted. Drivers on Laggan Road, Laggan-Taralga and Woodhouselee Road must give way to traffic on Peelwood Road. Figure 6 presents the layout of this intersection using SIDRA (8) – an industry standard intersection software.

The Priority intersection of Peelwood Road with Redground Heights Road is a three-leg intersection with all turn movements permitted. Drivers on Redground Heights Road must give way to traffic on Peelwood Road. Figure 7 presents the layout of this intersection using SIDRA (8) – an industry standard intersection software.

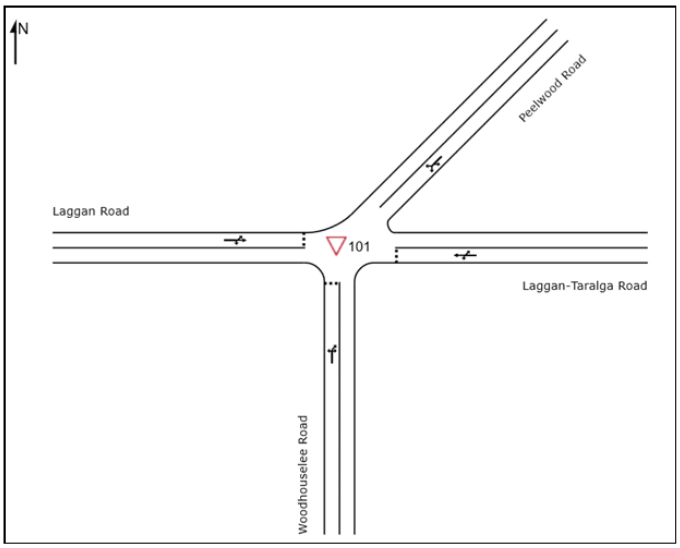


Figure 6: Priority intersection of Peelwood Road with Laggan Road and Laggan-Taralga Road (SIDRA)

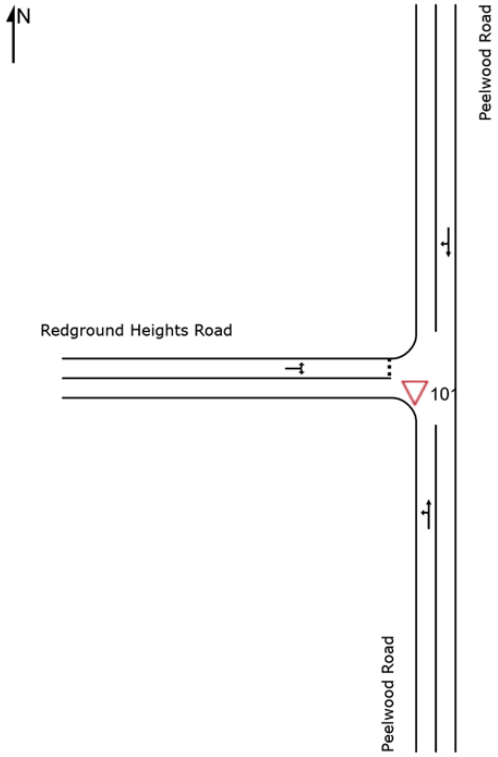


Figure 7: Priority intersection of Peelwood Road with Redground Heights Road (SIDRA)

2.5 Existing Traffic Volumes

As part of the traffic assessment, traffic counts have been undertaken at the intersections for the weekday AM and PM period. The AM and PM peak hour was 8am to 9am and 5pm to 6pm respectively. The traffic surveys were undertaken on a weekday in November 2019.

The following Figures present the traffic volumes in vehicles for the weekday peak hours. This volume is considered to be low.

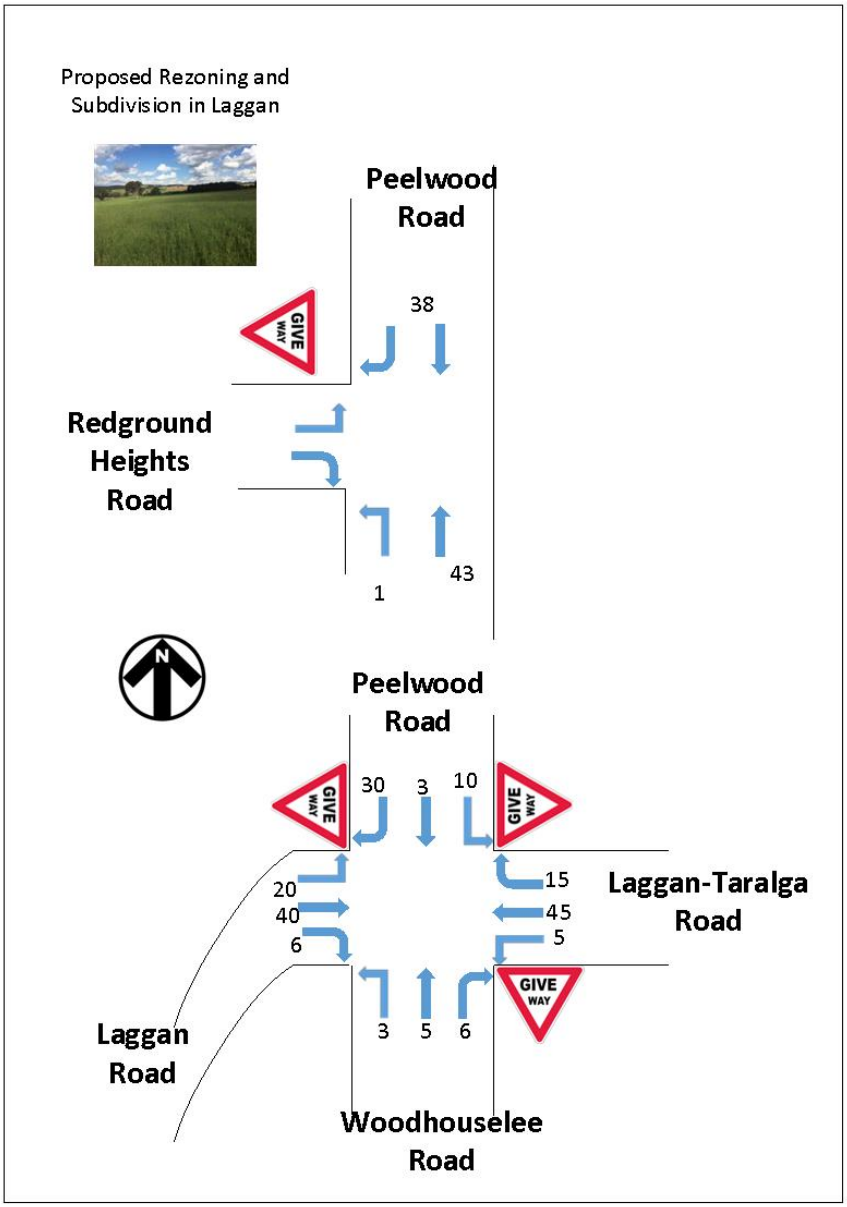


Figure 8: Existing Weekday Traffic Volumes AM Peak Hour

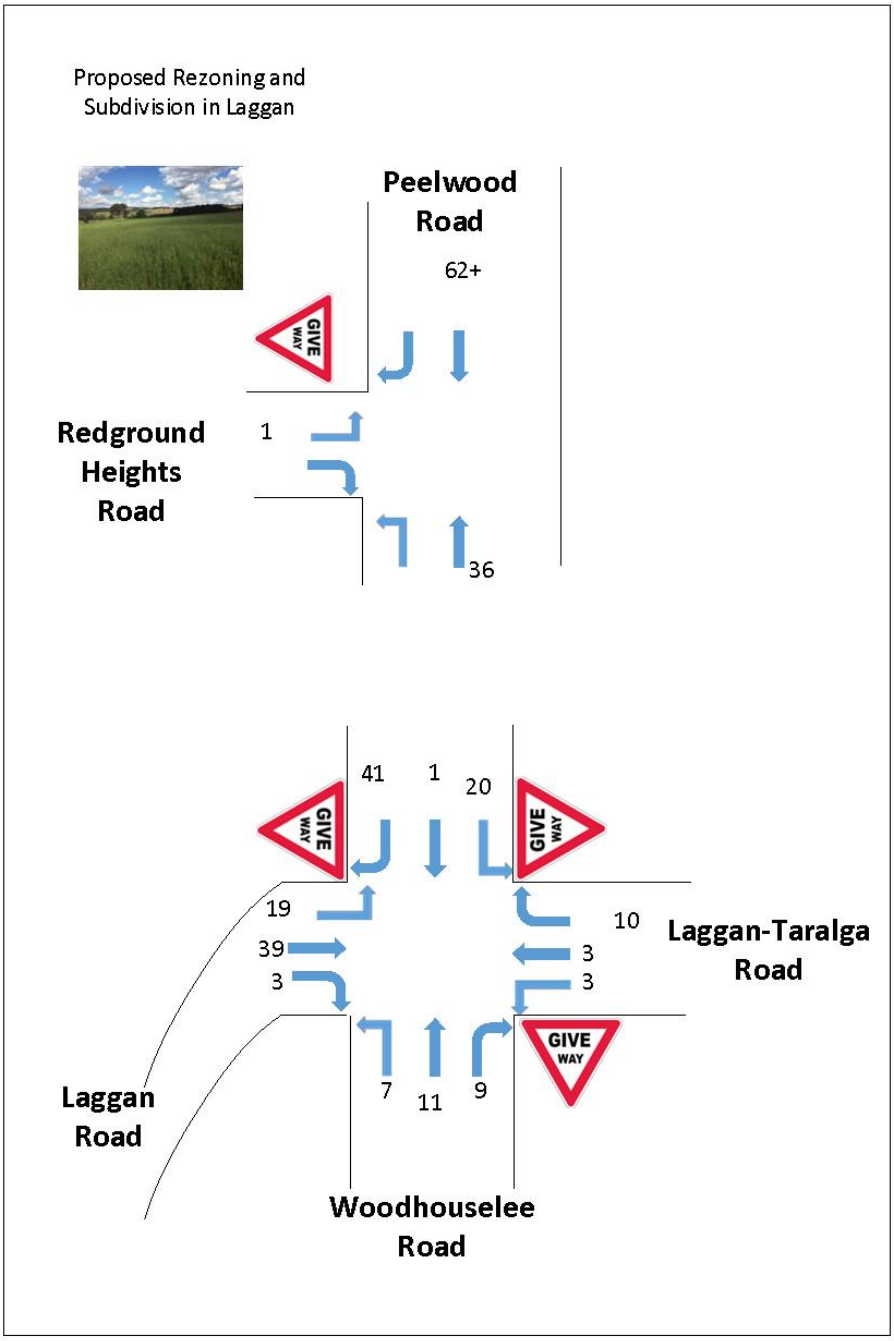


Figure 9: Existing Weekday Traffic Volumes PM Peak Hour

2.6 Intersection Assessment

An intersection assessment has been undertaken for:

- The priority intersection of Peelwood Road with Laggan Road and Laggan-Taralga Road
- The Priority intersection of Peelwood Road with Redground Heights Road

The existing intersection operating performance was assessed using the SIDRA software package (version 8) to determine the Degree of Saturation (DS), Average Delay (AVD in seconds) and Level of Service (LoS) at each intersection. The SIDRA program provides Level of Service Criteria Tables for various intersection types. The key indicator of intersection performance is Level of Service, where results are placed on a continuum from 'A' to 'F', as shown in Table 1.

LoS	Traffic Signal / Roundabout	Give Way / Stop Sign / T-Junction control
A	Good operation	Good operation
B	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	Satisfactory	Satisfactory, but accident study required
D	Operating near capacity	Near capacity & accident study required
E	At capacity, at signals incidents will cause excessive delays.	At capacity, requires other control mode
F	Unsatisfactory and requires additional capacity, Roundabouts require other control mode	At capacity, requires other control mode

Table 1: Intersection Level of Service

The Average Vehicle Delay (AVD) provides a measure of the operational performance of an intersection as indicated below, which relates AVD to LOS. The AVD's should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner-city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route). For traffic signals, the average delay over all movements should be taken. For roundabouts and priority control intersections

(sign control) the critical movement for level of service assessment should be that movement with the highest average delay.

LoS	Average Delay per Vehicles (seconds/vehicle)
A	Less than 14
B	15 to 28
C	29 to 42
D	43 to 56
E	57 to 70
F	>70

Table 2: Intersection Average Delay (AVD)

The degree of saturation (DS) is another measure of the operational performance of individual intersections. For intersections controlled by traffic signals both queue length and delay increase rapidly as DS approaches 1. It is usual to attempt to keep DS to less than 0.9. Degrees of Saturation in the order of 0.7 generally represent satisfactory intersection operation. When DS exceed 0.9 queues can be anticipated.

The results of the intersection analysis are as follows:

The Priority intersection of Peelwood Road with Laggan Road and Laggan-Talagra Road

- All turn movements have a LoS A for the AM and PM peak hours
- There is spare capacity at this intersection

The Priority intersection of Peelwood Road with Redground Heights Road

- All turn movements have a LoS A for the weekday AM and PM peak hours
- There is spare capacity at this intersection

The full Sidra results are presented in Appendix A.

2.7 Public Transport

The proposed Rezoning and Potential Subdivision has no access to public transport. Visitors need to use their own private vehicle to reach to the site.

2.8 Conclusions on the Existing Conditions

The proposed Rezoning and Potential Subdivision is located on vacant land immediately to the north of the Laggan Village

The nearby intersections have spare capacity to accommodate additional traffic.

The site has no access to public transport.

3. PROPOSED REZONING AND POTENTIAL SUBDIVISION

The lot sizes of the proposed Rezoning and Potential Subdivision are as follows:

- two lots of 50,000 (sqm)
- five lots of 20.000 (sqm)
- twenty-six lots of 4,000 (sqm)
- four lots of 10,000 (sqm)

Total of thirty-seven lots and 214000 (sqm).

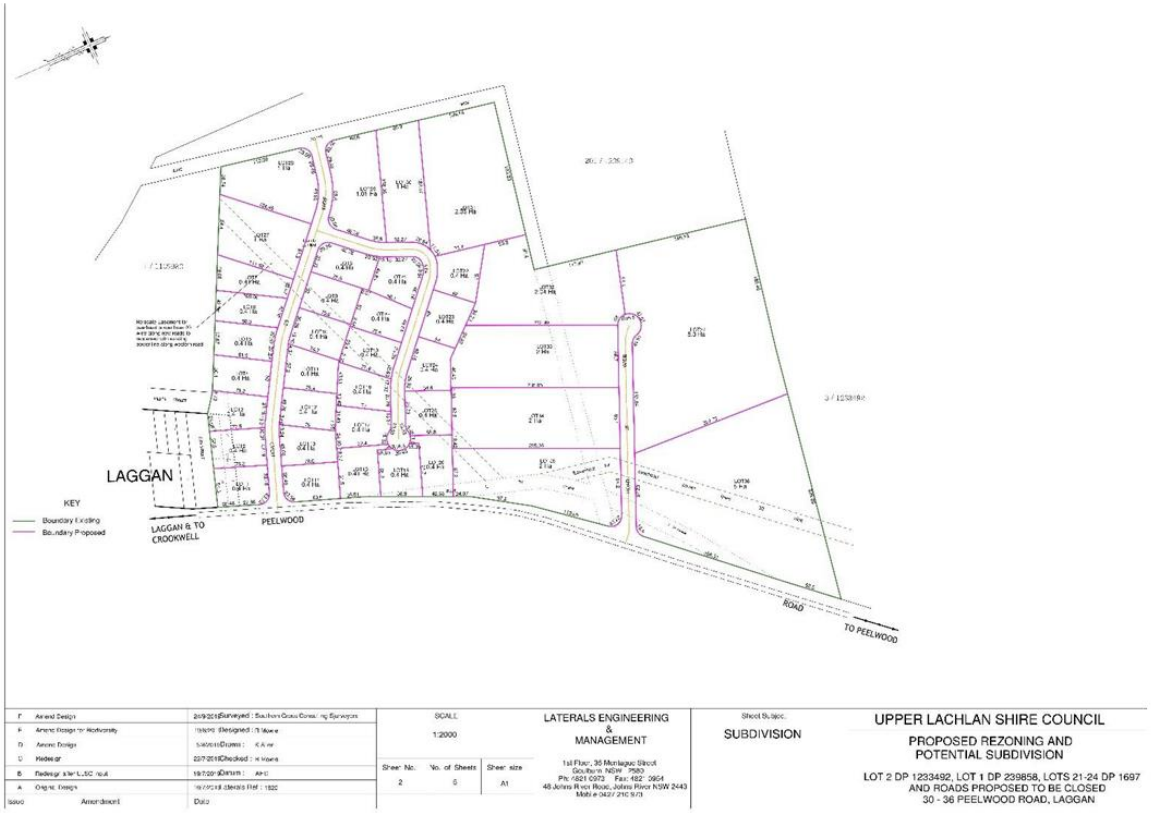
It is likely that there will be pedestrian traffic from the smaller lots to facilities in Laggan. Provision will need to be provided on Peelwood Road for this pedestrian use.

Two new roads will run off Peelwood Road and hence two new give way intersections are proposed. The location of these two roads are shown on the development plan on page 18. There will also be a new road coming off Redground Heights Road.

The internal roads and intersections are subject to Council approval.

The proposed sub-division will in effect extend the Laggan Village and hence it is recommended the 50km/hr speed limit for Laggan Village be moved to the north of the new intersection by 200 metres.

A full scaled plan of the proposed development is provided as part of the Development Application.



Sub-Division Layout showing Two New Intersections on Peelwood Road and one intersection on Redground Heights Road

4. VEHICLE TRAFFIC IMPACT CONSIDERATIONS

4.1 Traffic Generation

The NSW RTA Guide to Traffic Generating Developments updated traffic surveys August 2013 publishes trip generation rates for the residential development as follows:

Low Density Residential dwelling (Regional area):

- 0.85 trip per dwelling for AM peak hour
- 0.90 trip per dwelling for PM peak hour

Table 3 presents the weekday peak hour trip generation for the proposed conditions. The generated trips in the peak hour are low.

Since the existing site is vacant land, those trips are from the proposed subdivision generated trips to obtain the net trips. Table 4 presents the net trip distribution for weekday peak hour.

Proposed				
Peak Hour	**Use**	**Number of Lots**	**Trip Generation Rate**	**Trip Generated**
AM	Subdivision	37	0.85 trips per lot	31
PM			0.90 trips per lot	33

Table 3: Trips Generated by the Proposed Rezoning and Potential Subdivision in Weekday Peak Hours

Peak Hour	Origin	Destination	Total
AM	25	6	31
PM	7	26	33

Table 4: Net Trip Distribution for Weekday Peak Hours

4.2 Traffic Volumes

The additional development trips are assigned onto the local traffic network. The following figures present the existing with the development trips (in red for origin trips and blue for destination trips) for the weekday AM and PM peak hours.

The additional development trips represent a medium proportion of the existing traffic volumes.

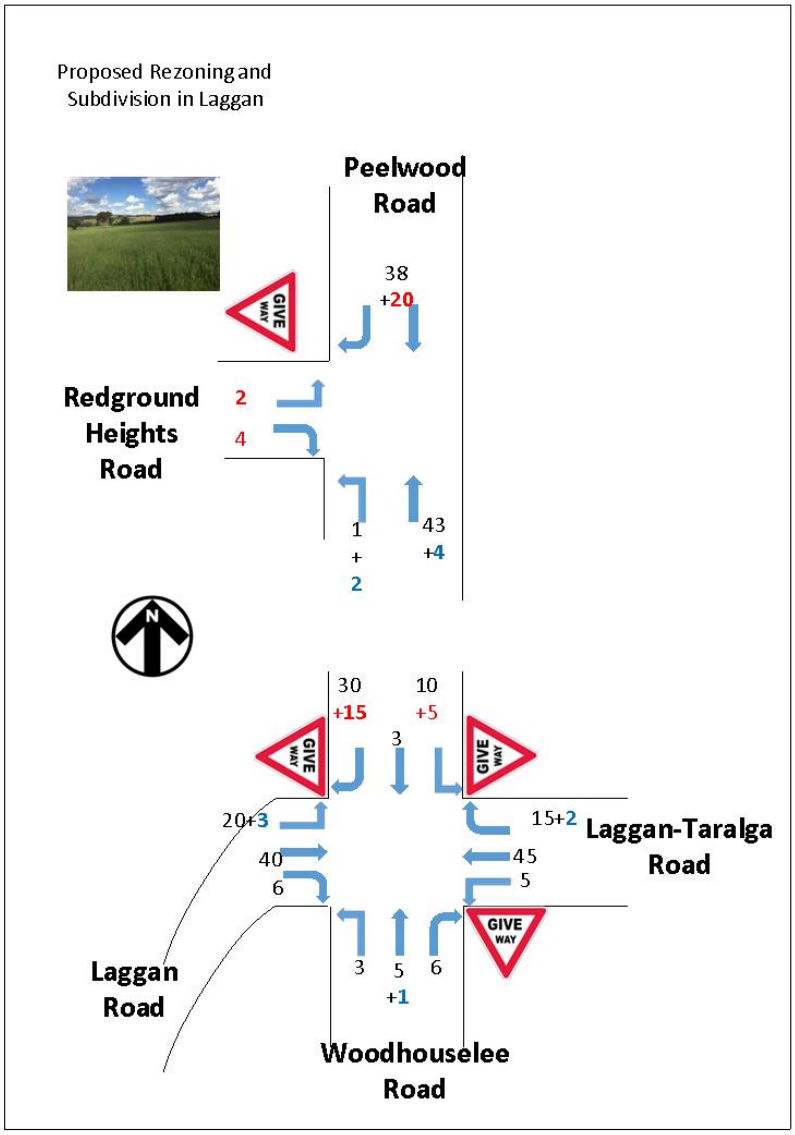


Figure 10: Existing Weekday AM Peak Hour Traffic Volumes with The Proposed Subdivision Traffic

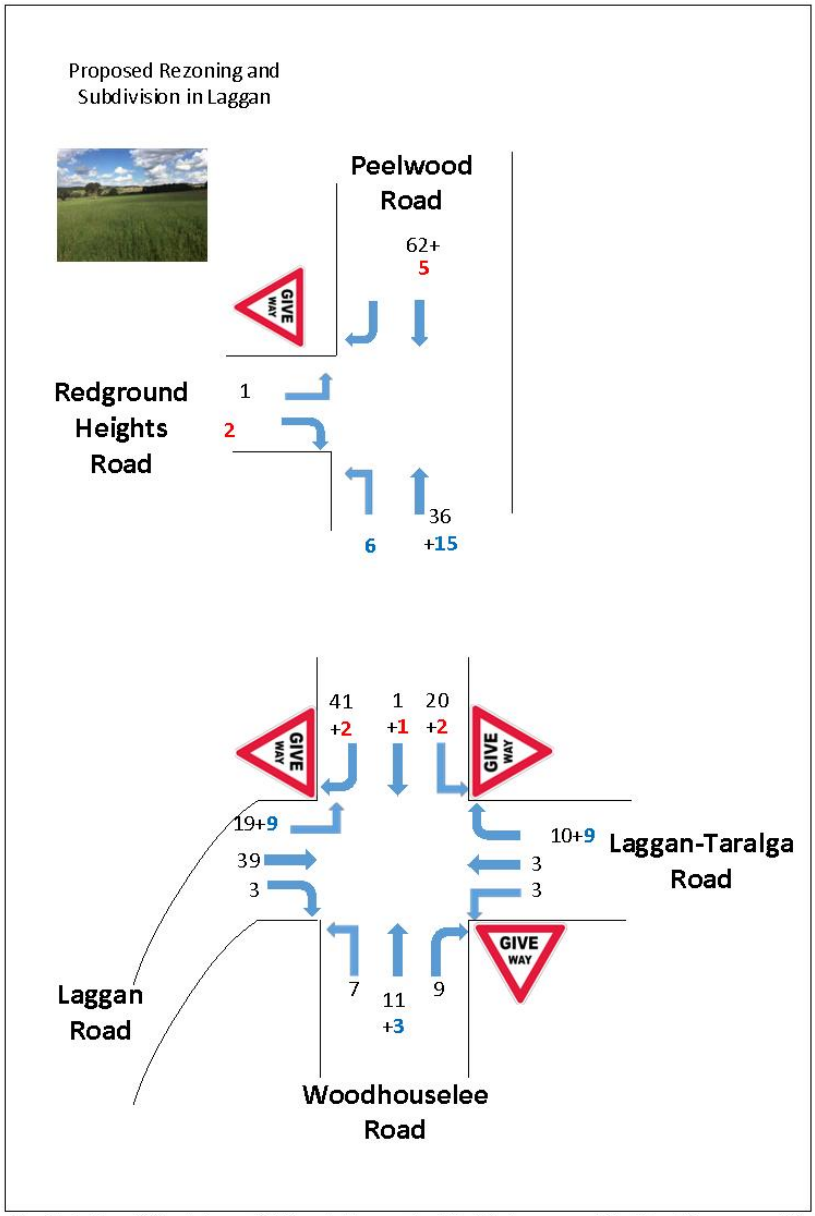


Figure 11: Existing Weekday PM Peak Hour Traffic Volumes with The Proposed Subdivision Traffic

4.3 Intersection Assessment

This section assesses the following intersections for the existing traffic with the residential development traffic. The results of the intersection assessment are as follows:

The Priority intersection of Peelwood Road with Laggan Road and Laggan-Talagra Road

- All turn movements have a LoS A for the AM and PM peak hours
- There is spare capacity at this intersection

The Priority intersection of Peelwood Road with Redground Heights Road

- All turn movements have a LoS A for the PM peak hours
- The additional trips do not change any of the turn movements LoS

The intersection performance will not change with the additional trips generated.

The full SIDRA results are presented in Appendix B for the existing conditions with the Residential apartment traffic. The full SIDRA results are presented in Appendix A for the existing conditions.

5. CONCLUSIONS

Based on the considerations presented in this report, it is considered that:

Traffic

- The proposed Rezoning and Potential Subdivision is a moderate trip generator for the weekday AM and PM peak hour.
- The additional trips from the proposed Rezoning and Subdivision can be accommodated at the nearby intersections without noticeably affecting intersection performance, delays or queues.
- There are no traffic engineering reasons why a development consent for the proposed Rezoning and Potential Subdivision development at 30-36 Peelwood Road in Laggan should be refused.

APPENDIX A

SIDRA Intersection Results for Existing Traffic Conditions

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	v/c	sec		veh	m				km/h
South: Peelwood Road												
1	L2	1	0.0	0.024	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	49.4
2	T1	45	0.0	0.024	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
Approach		46	0.0	0.024	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.9
North: Peelwood Road												
8	T1	40	0.0	0.021	0.0	LOS A	0.0	0.0	0.01	0.01	0.01	49.9
9	R2	1	0.0	0.021	4.7	LOS A	0.0	0.0	0.01	0.01	0.01	48.9
Approach		41	0.0	0.021	0.1	NA	0.0	0.0	0.01	0.01	0.01	49.9
West: Redground Heights Road												
10	L2	1	0.0	0.002	4.7	LOS A	0.0	0.0	0.12	0.51	0.12	46.3
12	R2	1	0.0	0.002	4.8	LOS A	0.0	0.0	0.12	0.51	0.12	45.9
Approach		2	0.0	0.002	4.7	LOS A	0.0	0.0	0.12	0.51	0.12	46.1
All Vehicles		89	0.0	0.024	0.2	NA	0.0	0.0	0.01	0.03	0.01	49.8

Table A1: Weekday Priority intersection of Peelwood Road with Redground Heights Road for AM peak hour

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woodhouselee Road												
1	L2	3	0.0	0.013	4.8	LOS A	0.0	0.3	0.19	0.50	0.19	46.4
3a	R1	5	0.0	0.013	4.0	LOS A	0.0	0.3	0.19	0.50	0.19	46.6
3	R2	6	0.0	0.013	5.0	LOS A	0.0	0.3	0.19	0.50	0.19	46.0
Approach		15	0.0	0.013	4.6	LOS A	0.0	0.3	0.19	0.50	0.19	46.3
East: Laggan-Taralga Road												
4	L2	5	0.0	0.050	7.0	LOS A	0.2	1.2	0.05	0.62	0.05	55.1
5	T1	47	0.0	0.050	5.8	LOS A	0.2	1.2	0.05	0.62	0.05	55.2
6b	R3	16	0.0	0.050	7.5	LOS A	0.2	1.2	0.05	0.62	0.05	54.4
Approach		68	0.0	0.050	6.3	LOS A	0.2	1.2	0.05	0.62	0.05	55.0
NorthEast: Peelwood Road												
24b	L3	11	0.0	0.025	8.0	LOS A	0.0	0.0	0.00	0.63	0.00	66.1
24a	L1	3	0.0	0.025	6.1	LOS A	0.0	0.0	0.00	0.63	0.00	65.5
26a	R1	32	0.0	0.025	6.3	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
Approach		45	0.0	0.025	6.6	NA	0.0	0.0	0.00	0.63	0.00	65.6
West: Laggan Road												
10a	L1	21	0.0	0.046	4.4	LOS A	0.2	1.2	0.11	0.47	0.11	46.5
11	T1	42	0.0	0.046	3.4	LOS A	0.2	1.2	0.11	0.47	0.11	47.0
12	R2	6	0.0	0.046	5.1	LOS A	0.2	1.2	0.11	0.47	0.11	46.5
Approach		69	0.0	0.046	3.8	LOS A	0.2	1.2	0.11	0.47	0.11	46.8
All Vehicles		198	0.0	0.050	5.4	NA	0.2	1.2	0.07	0.56	0.07	52.9

Table A2: Weekday Priority intersection of Peelwood Road with Laggan Road and Laggan-Taralga Road for AM peak hour

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Peelwood Road												
1	L2	1	0.0	0.020	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	49.4
2	T1	38	0.0	0.020	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
Approach		39	0.0	0.020	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.9
North: Peelwood Road												
8	T1	65	0.0	0.034	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
9	R2	1	0.0	0.034	4.7	LOS A	0.0	0.0	0.00	0.01	0.00	49.0
Approach		66	0.0	0.034	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.9
West: Redground Heights Road												
10	L2	1	0.0	0.002	4.7	LOS A	0.0	0.0	0.11	0.51	0.11	46.4
12	R2	1	0.0	0.002	4.9	LOS A	0.0	0.0	0.11	0.51	0.11	45.9
Approach		2	0.0	0.002	4.8	LOS A	0.0	0.0	0.11	0.51	0.11	46.2
All Vehicles		107	0.0	0.034	0.2	NA	0.0	0.0	0.00	0.02	0.00	49.8

Table A3: Weekday Priority intersection of Peelwood Road with Redground Heights Road for PM peak hour

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woodhouselee Road												
1	L2	7	0.0	0.024	7.1	LOS A	0.1	0.6	0.15	0.59	0.15	54.5
3a	R1	12	0.0	0.024	6.6	LOS A	0.1	0.6	0.15	0.59	0.15	54.8
3	R2	9	0.0	0.024	7.0	LOS A	0.1	0.6	0.15	0.59	0.15	53.9
Approach		28	0.0	0.024	6.8	LOS A	0.1	0.6	0.15	0.59	0.15	54.4
East: Laggan-Taralga Road												
4	L2	3	0.0	0.014	6.9	LOS A	0.0	0.3	0.01	0.66	0.01	54.4
5	T1	3	0.0	0.014	5.8	LOS A	0.0	0.3	0.01	0.66	0.01	54.5
6b	R3	11	0.0	0.014	7.6	LOS A	0.0	0.3	0.01	0.66	0.01	53.8
Approach		17	0.0	0.014	7.2	LOS A	0.0	0.3	0.01	0.66	0.01	54.0
NorthEast: Peelwood Road												
24b	L3	21	0.0	0.036	8.0	LOS A	0.0	0.0	0.00	0.64	0.00	66.0
24a	L1	1	0.0	0.036	6.1	LOS A	0.0	0.0	0.00	0.64	0.00	65.3
26a	R1	43	0.0	0.036	6.3	LOS A	0.0	0.0	0.00	0.64	0.00	65.2
Approach		65	0.0	0.036	6.8	NA	0.0	0.0	0.00	0.64	0.00	65.4
West: Laggan Road												
10a	L1	20	0.0	0.058	6.5	LOS A	0.2	1.6	0.14	0.57	0.14	54.4
11	T1	63	0.0	0.058	6.0	LOS A	0.2	1.6	0.14	0.57	0.14	55.1
12	R2	3	0.0	0.058	7.0	LOS A	0.2	1.6	0.14	0.57	0.14	54.4
Approach		86	0.0	0.058	6.1	LOS A	0.2	1.6	0.14	0.57	0.14	54.9
All Vehicles		197	0.0	0.058	6.5	NA	0.2	1.6	0.09	0.60	0.09	57.8

Table A4: Weekday Priority intersection of Peelwood Road with Laggan Road and Laggan-Taralga Road for PM peak hour

APPENDIX B

SIDRA Intersection Results for Existing and Subdivision Traffic

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Peelwood Road												
1	L2	3	0.0	0.027	4.6	LOS A	0.0	0.0	0.00	0.03	0.00	49.3
2	T1	49	0.0	0.027	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	49.8
Approach		53	0.0	0.027	0.3	NA	0.0	0.0	0.00	0.03	0.00	49.8
North: Peelwood Road												
8	T1	61	0.0	0.032	0.0	LOS A	0.0	0.0	0.01	0.01	0.01	49.9
9	R2	1	0.0	0.032	4.7	LOS A	0.0	0.0	0.01	0.01	0.01	49.0
Approach		62	0.0	0.032	0.1	NA	0.0	0.0	0.01	0.01	0.01	49.9
West: Redground Heights Road												
10	L2	3	0.0	0.006	4.7	LOS A	0.0	0.1	0.14	0.51	0.14	46.3
12	R2	4	0.0	0.006	4.9	LOS A	0.0	0.1	0.14	0.51	0.14	45.9
Approach		7	0.0	0.006	4.8	LOS A	0.0	0.1	0.14	0.51	0.14	46.1
All Vehicles		122	0.0	0.032	0.5	NA	0.0	0.1	0.01	0.05	0.01	49.6

Table B1: Weekday Priority intersection of Peelwood Road with Redground Heights Road for AM peak hour with Sub-division Traffic

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woodhouselee Road												
1	L2	3	0.0	0.014	4.8	LOS A	0.0	0.3	0.21	0.50	0.21	46.4
3a	R1	6	0.0	0.014	4.1	LOS A	0.0	0.3	0.21	0.50	0.21	46.6
3	R2	6	0.0	0.014	5.0	LOS A	0.0	0.3	0.21	0.50	0.21	46.0
Approach		16	0.0	0.014	4.6	LOS A	0.0	0.3	0.21	0.50	0.21	46.3
East: Laggan-Taralga Road												
4	L2	5	0.0	0.052	7.0	LOS A	0.2	1.3	0.06	0.62	0.06	55.1
5	T1	47	0.0	0.052	5.9	LOS A	0.2	1.3	0.06	0.62	0.06	55.1
6b	R3	18	0.0	0.052	7.6	LOS A	0.2	1.3	0.06	0.62	0.06	54.4
Approach		71	0.0	0.052	6.4	LOS A	0.2	1.3	0.06	0.62	0.06	54.9
NorthEast: Peelwood Road												
24b	L3	16	0.0	0.036	8.0	LOS A	0.0	0.0	0.00	0.63	0.00	66.1
24a	L1	3	0.0	0.036	6.1	LOS A	0.0	0.0	0.00	0.63	0.00	65.5
26a	R1	47	0.0	0.036	6.3	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
Approach		66	0.0	0.036	6.7	NA	0.0	0.0	0.00	0.63	0.00	65.5
West: Laggan Road												
10a	L1	24	0.0	0.048	4.4	LOS A	0.2	1.3	0.14	0.46	0.14	46.4
11	T1	42	0.0	0.048	3.5	LOS A	0.2	1.3	0.14	0.46	0.14	46.9
12	R2	6	0.0	0.048	5.2	LOS A	0.2	1.3	0.14	0.46	0.14	46.4
Approach		73	0.0	0.048	3.9	LOS A	0.2	1.3	0.14	0.46	0.14	46.7
All Vehicles		225	0.0	0.052	5.6	NA	0.2	1.3	0.08	0.56	0.08	53.7

Table B2: Weekday Priority intersection of Peelwood Road with Laggan Road and Laggan-Taralga Road for AM peak hour with Sub-division Traffic

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Peelwood Road												
1	L2	6	0.0	0.031	4.6	LOS A	0.0	0.0	0.00	0.06	0.00	49.2
2	T1	54	0.0	0.031	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	49.7
Approach		60	0.0	0.031	0.5	NA	0.0	0.0	0.00	0.06	0.00	49.6
North: Peelwood Road												
8	T1	71	0.0	0.037	0.0	LOS A	0.0	0.0	0.01	0.01	0.01	49.9
9	R2	1	0.0	0.037	4.7	LOS A	0.0	0.0	0.01	0.01	0.01	49.0
Approach		72	0.0	0.037	0.1	NA	0.0	0.0	0.01	0.01	0.01	49.9
West: Redground Heights Road												
10	L2	1	0.0	0.002	4.7	LOS A	0.0	0.1	0.15	0.51	0.15	46.3
12	R2	2	0.0	0.002	4.9	LOS A	0.0	0.1	0.15	0.51	0.15	45.9
Approach		3	0.0	0.002	4.9	LOS A	0.0	0.1	0.15	0.51	0.15	46.0
All Vehicles		135	0.0	0.037	0.4	NA	0.0	0.1	0.01	0.04	0.01	49.7

Table B3: Weekday Priority intersection of Peelwood Road with Redground Heights Road for PM peak hour with Sub-division Traffic

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woodhouselee Road												
1	L2	7	0.0	0.027	7.1	LOS A	0.1	0.6	0.16	0.59	0.16	54.5
3a	R1	15	0.0	0.027	6.7	LOS A	0.1	0.6	0.16	0.59	0.16	54.8
3	R2	9	0.0	0.027	7.0	LOS A	0.1	0.6	0.16	0.59	0.16	53.9
Approach		32	0.0	0.027	6.9	LOS A	0.1	0.6	0.16	0.59	0.16	54.5
East: Laggan-Taralga Road												
4	L2	3	0.0	0.023	7.0	LOS A	0.1	0.5	0.03	0.67	0.03	54.3
5	T1	3	0.0	0.023	5.9	LOS A	0.1	0.5	0.03	0.67	0.03	54.3
6b	R3	20	0.0	0.023	7.7	LOS A	0.1	0.5	0.03	0.67	0.03	53.6
Approach		26	0.0	0.023	7.4	LOS A	0.1	0.5	0.03	0.67	0.03	53.8
NorthEast: Peelwood Road												
24b	L3	23	0.0	0.039	8.0	LOS A	0.0	0.0	0.00	0.64	0.00	65.9
24a	L1	2	0.0	0.039	6.1	LOS A	0.0	0.0	0.00	0.64	0.00	65.3
26a	R1	45	0.0	0.039	6.3	LOS A	0.0	0.0	0.00	0.64	0.00	65.2
Approach		71	0.0	0.039	6.8	NA	0.0	0.0	0.00	0.64	0.00	65.4
West: Laggan Road												
10a	L1	28	0.0	0.062	6.5	LOS A	0.2	1.7	0.15	0.57	0.15	54.3
11	T1	63	0.0	0.062	6.0	LOS A	0.2	1.7	0.15	0.57	0.15	55.0
12	R2	3	0.0	0.062	7.0	LOS A	0.2	1.7	0.15	0.57	0.15	54.3
Approach		95	0.0	0.062	6.2	LOS A	0.2	1.7	0.15	0.57	0.15	54.8
All Vehicles		223	0.0	0.062	6.6	NA	0.2	1.7	0.09	0.60	0.09	57.6

Table B4: Weekday Priority intersection of Peelwood Road with Laggan Road and Laggan-Taralga Road for PM peak hour with Sub-division Traffic