PLANNING PROPOSAL

MONTGOMERY PLANNING SOLUTIONS

Lot 2 DP 607906 (No. 396)
Bells Line of Road Kurmond

August 2013

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This Planning Proposal was prepared by Robert Montgomery, Principal, Montgomery Planning Solutions in accordance with "A guide to preparing planning proposals" published by the NSW Department of Planning and Infrastructure, October 2012.

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DOCUMENT TRACKING

Version	Date	Revisions
1	October 2012	Submission to HCC
2	June 2013	i) Revised for "A guide to preparing planning proposals" published by the NSW Department of Planning October 2012 ii) Revised for amended HCC Community Strategic Plan adopted April 2013 iii) Revised to include preliminary wastewater treatment investigation.
3	15 August 2013	Minor changes including revised concept layout and proposed lot yield control for max 23 lots.
4	26 August 2013	Minor changes requested by Hawkesbury Council.

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Introduction

This Planning Proposal is prepared by Montgomery Planning Solutions on behalf of the owner of the land. The land is 13.07 hectares in area and comprises open grasslands with scattered trees over gently sloping terrain. The land is zoned mostly *RU1 Primary Production,* with a narrow strip along Bells Line of Road zoned *SP2 Classified Road*, under the provisions of Hawkesbury Local Environmental Plan 2012.

The land satisfies the rural village development criteria contained within the Hawkesbury Residential Land Strategy, adopted by Hawkesbury City Council on 10 May 2011. The land is within the Kurmond Village large lot residential/rural-residential investigation area as determined by Council on 7 February 2013

Preliminary reports have been prepared in relation to traffic, bushfire hazard and on-site wastewater disposal, which confirm that the land has the environmental capacity to sustain some 23 large residential allotments, as per the preliminary concept plan prepared by North Western Surveys.

The Planning Proposal satisfies all relevant State, Regional and Local criteria and it is recommended that Council prepare a draft local environmental plan to amend the Hawkesbury LEP 2012 Lot Size Map to permit a minimum lot size of 4,000m2, with a maximum yield of 23 lots for the land.

Description of Site

The land is described as Lot 2 DP 607906 (No. 396) Bells Line of Road, Kurmond. The land is 13.07 hectares in area and is essentially rectangular in shape, with a frontage of approximately 88 metres to Bells Line of Road. Lot 1, which contains the former Kurmond Bar and Grill, was created in 1980, and occupies the remainder of frontage to Bells Line of Road.

Figure 1: Satellite Image. Source: Nearmap, 24 September 2012.

The land falls gradually from Bells Line of Road, at a level of approximately 96m AHD, to a minor watercourse running north-west to south-east through the centre of the property, at approximately 60m AHD. The land then rises to a level of approximately 84m AHD in the northern corner. A smaller tributary to the watercourse runs north to south over part of the north western quarter of the land. Figure 2 below is a topographical map showing watercourses and contours at 10 metre intervals.

The land comprises cleared pasture with scattered trees and two dams. The minor watercourses support riparian vegetation of varying quality. A dwelling is positioned close to Bells Line of Road in the southern corner of the land. The land has been use for animal grazing for many years.

Figures 3 - 7 provide views over the land and beyond. It can be seen in figure 3 that the land comprises a relatively level platform near Kurmond Road, with a gentle fall to the north-east. Figure 7 provides a view over the part of the land which is on the northern side of the watercourse. More detail is provided in the slope analysis at figure 8, which demonstrates that the gradient of the land is less than 15%.

Figure 2: Topographical map. Source: NSW LPI SIX Viewer

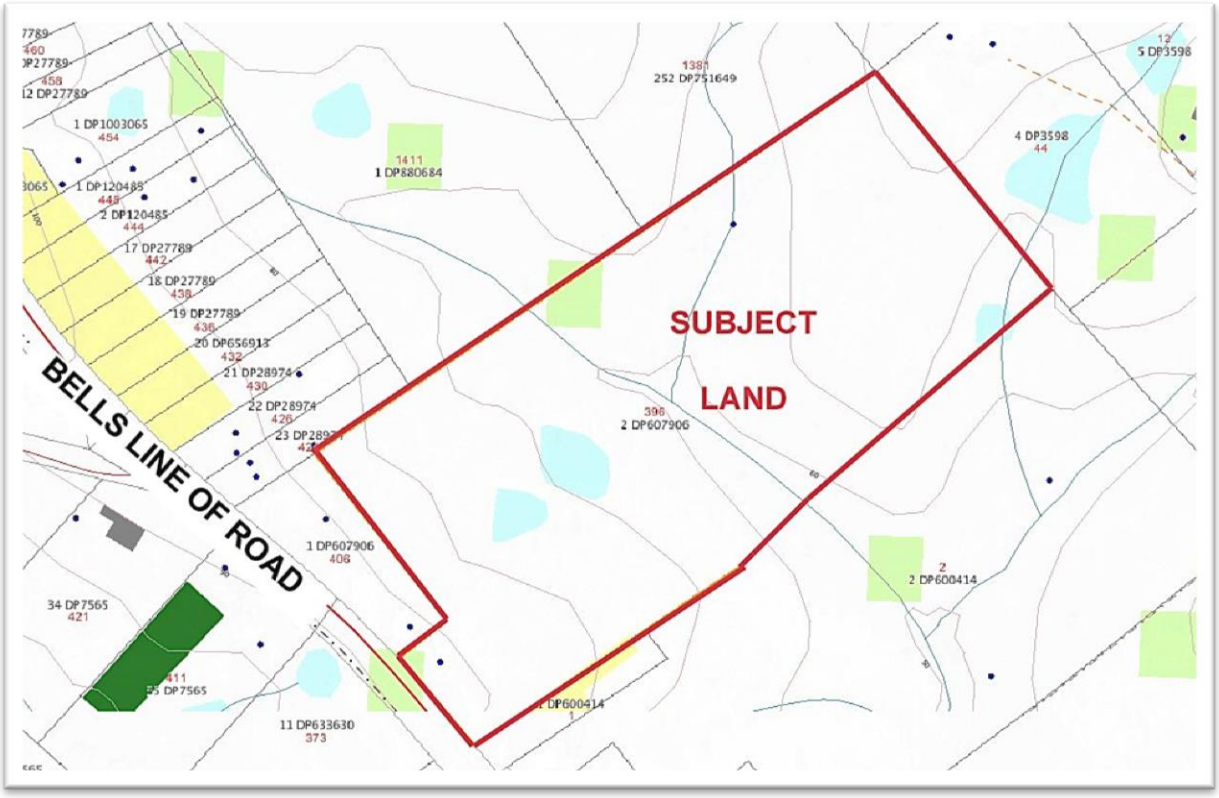


Figure 3: View over southern section of land looking north (near Bells Line of Road)

Figure 4: View over southern section of land looking north-west (near Bells Line of Road)

Figure 5: One of the two dams in the southern section of the land

Figure 6: Minor Watercourse – view upstream

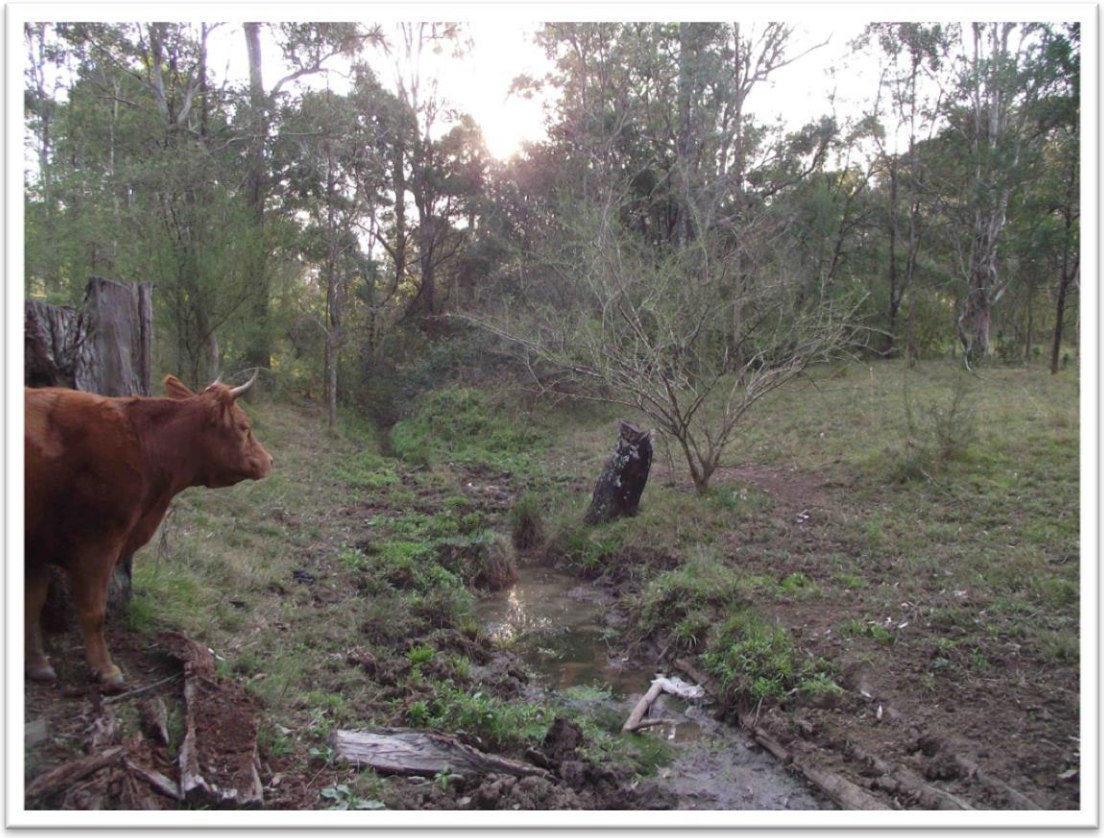


Figure 7: Minor Watercourse - view downstream

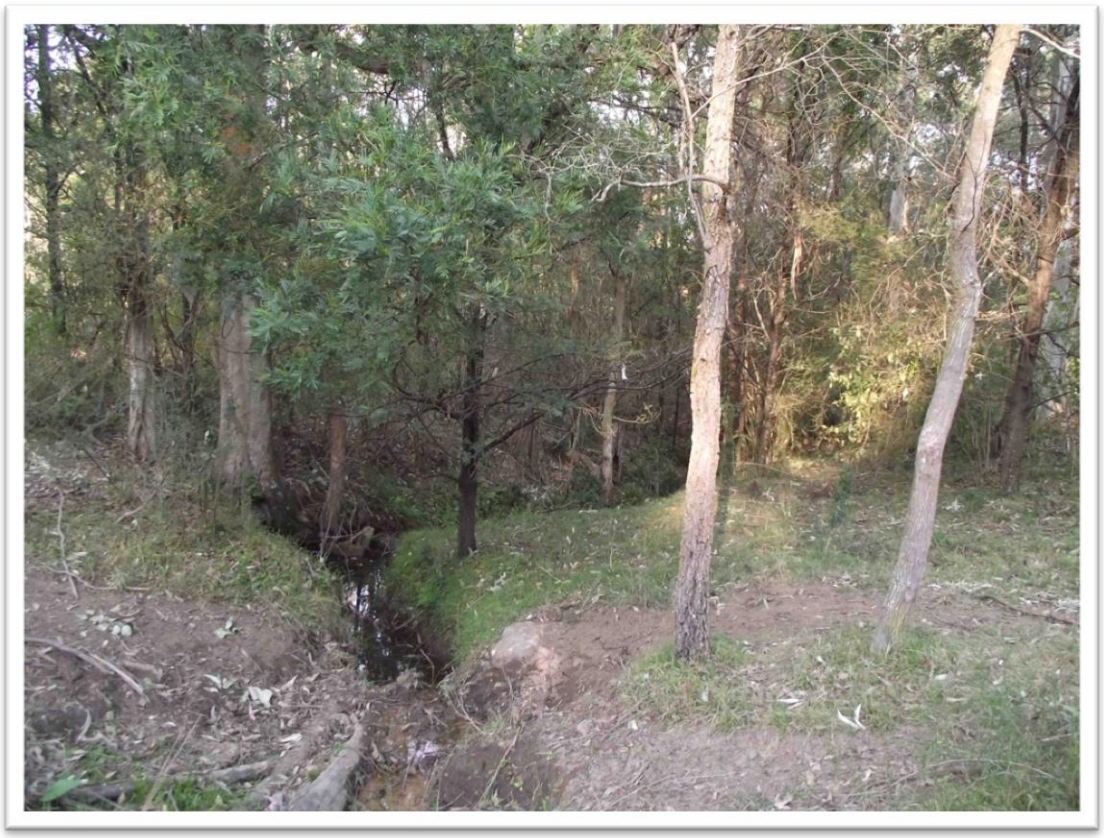


Figure 8: View over part of the northern half of the land

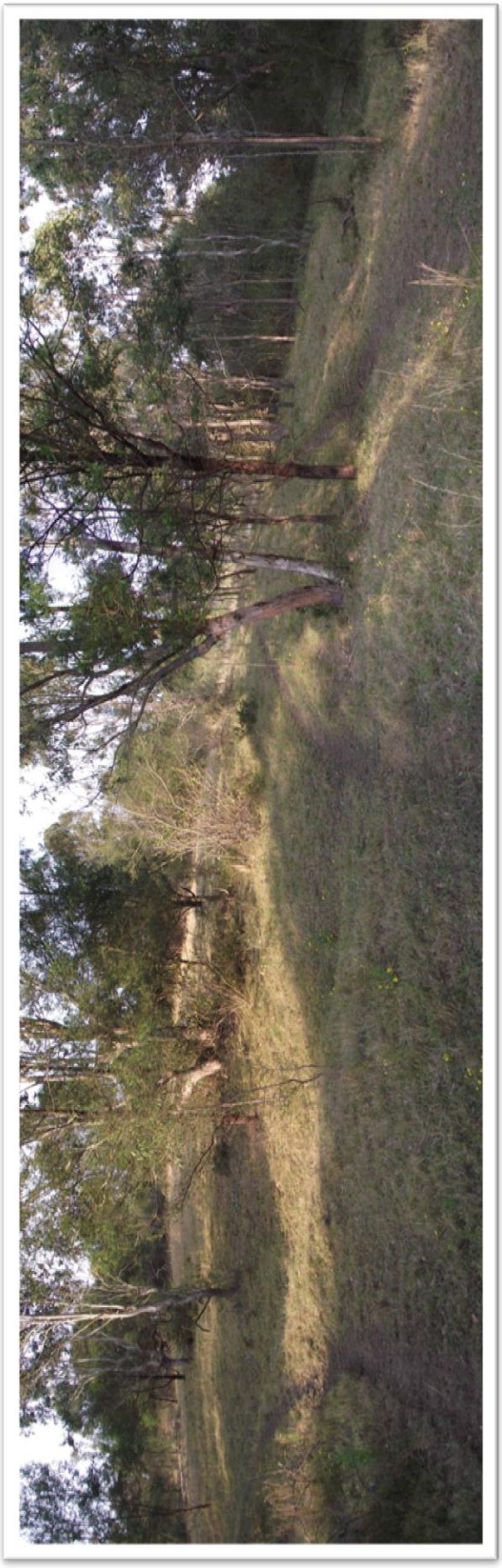
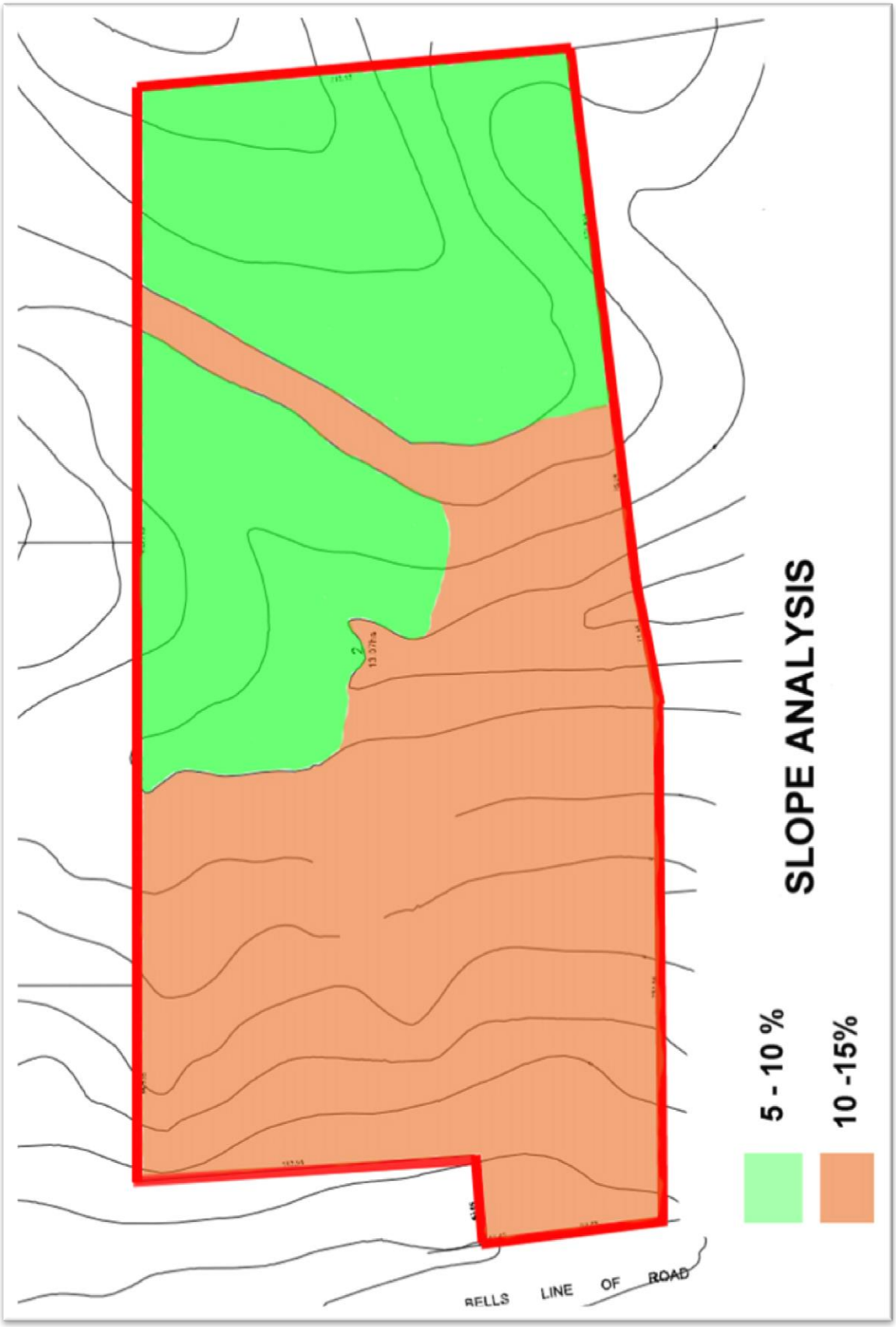


Figure 9: Preliminary Slope Analysis - Contours at 4m intervals from North Western Surveys Concept Layout



Surrounding Land Use

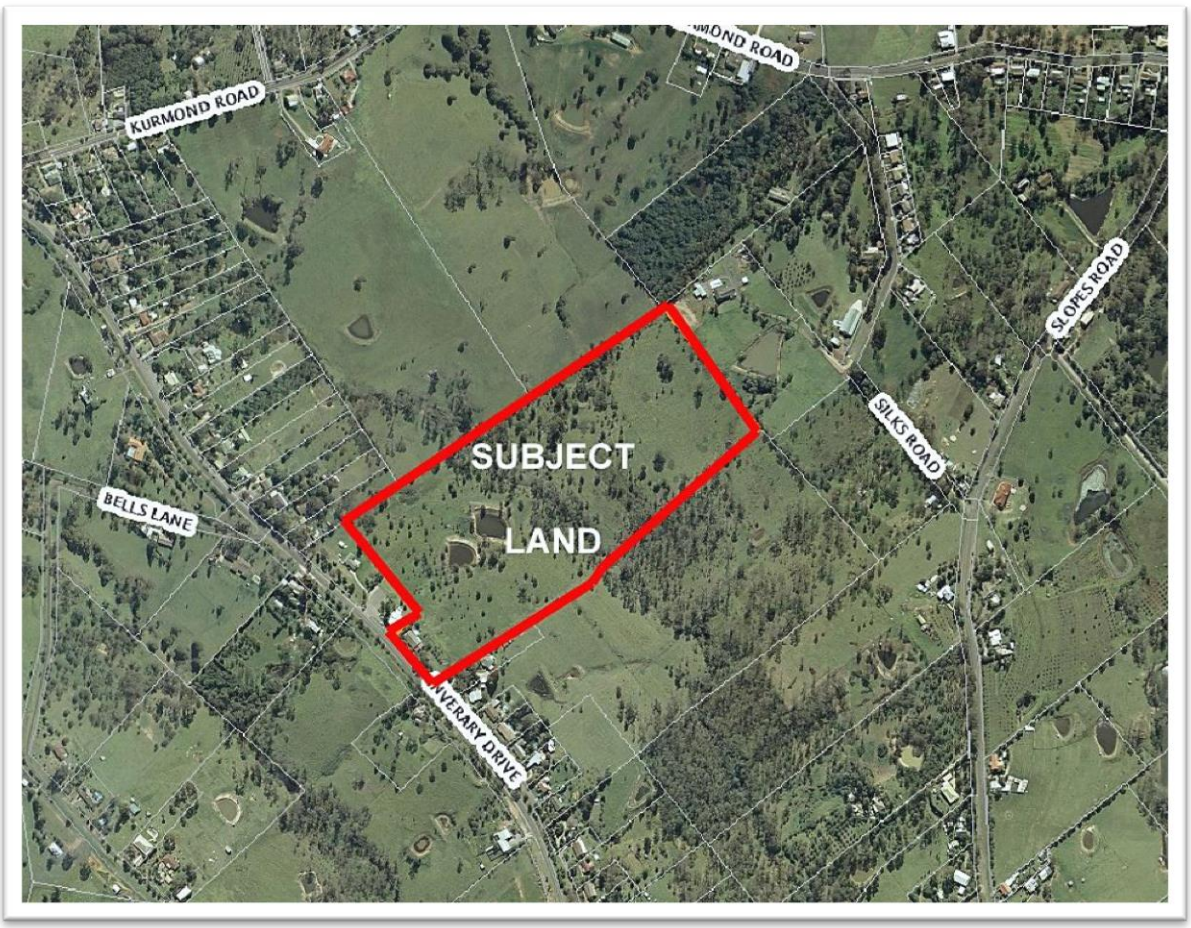
Land adjoining to the north-west along Bells Line of Road comprises a number of large residential lots of approximately 4,000m2 in area. Land adjoining to the south-east along Bells Line of Road comprises a number of residential lots of around 2,000m2 in area. The land between the south-western boundary and Bells Line of Road is 9,242m2 and is occupied by the former Kurmond Bar and Grill, which was damaged by fire some years ago and has not operated since.

The remainder of the land is surrounded by rural-residential lots ranging in size from approximately 2.5 to 10 hectares. It is also noted that there are a number of residential lots located to the north east along Kurmond Road. Land on the opposite side of Bells Line of Road comprises rural-residential lots ranging in size from approximately 8,000m2 to 8 hectares.

It is noted that the only agricultural activity in the locality is animal grazing. There is no intensive agriculture.

Figure 10 below is a satellite image which shows the established subdivision pattern in the locality and the surrounding land use.

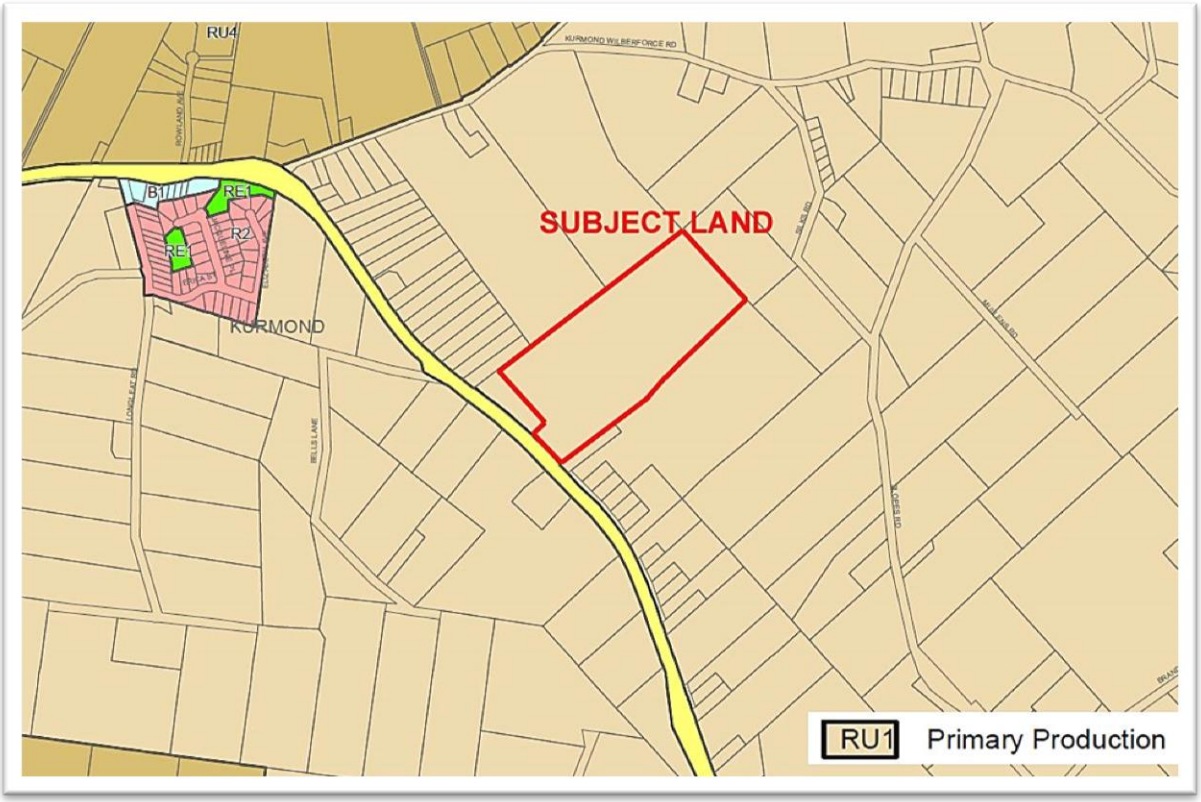
Figure 10: Surrounding land use and subdivision patterns. Source: NSW LPI SIX Viewer



Existing Statutory Provisions

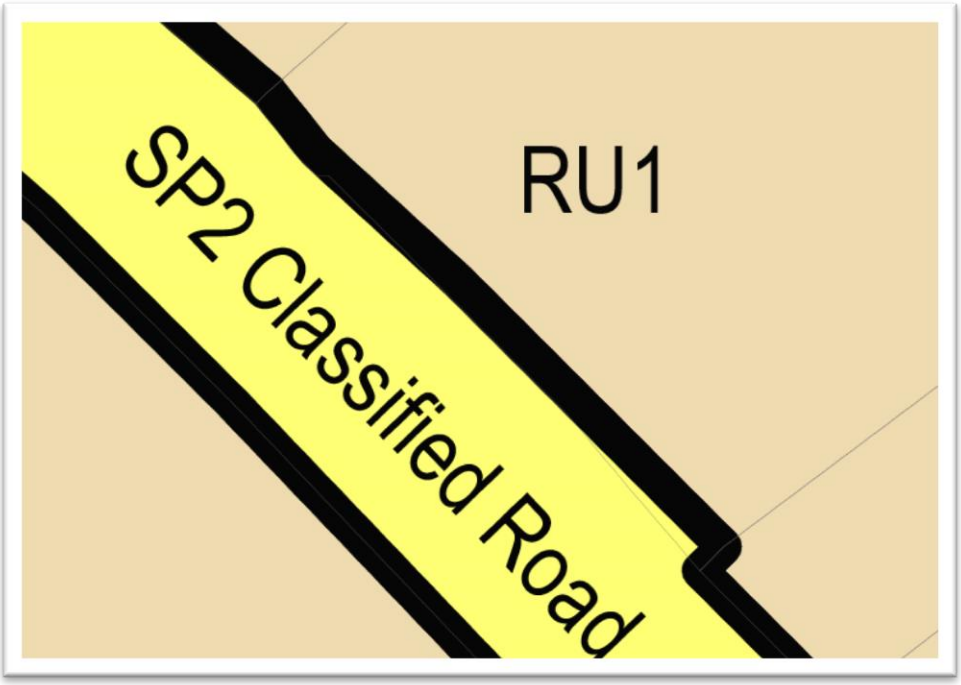
The subject land and surrounding land is mostly zoned “RU1 Primary Production” under the provisions of Hawkesbury Local Environmental Plan 2012.

Figure 11: Extract from HLEP 2012 Land Zoning Map – Sheet LZN_008AA



A narrow strip of land along Bells Line of Road is zoned “SP2 Classified Road” as shown in the enlarged zone map extract below.

Figure 12: Enlargement Extract from HLEP 2012 Land Zoning Map – Sheet LZN_008AA



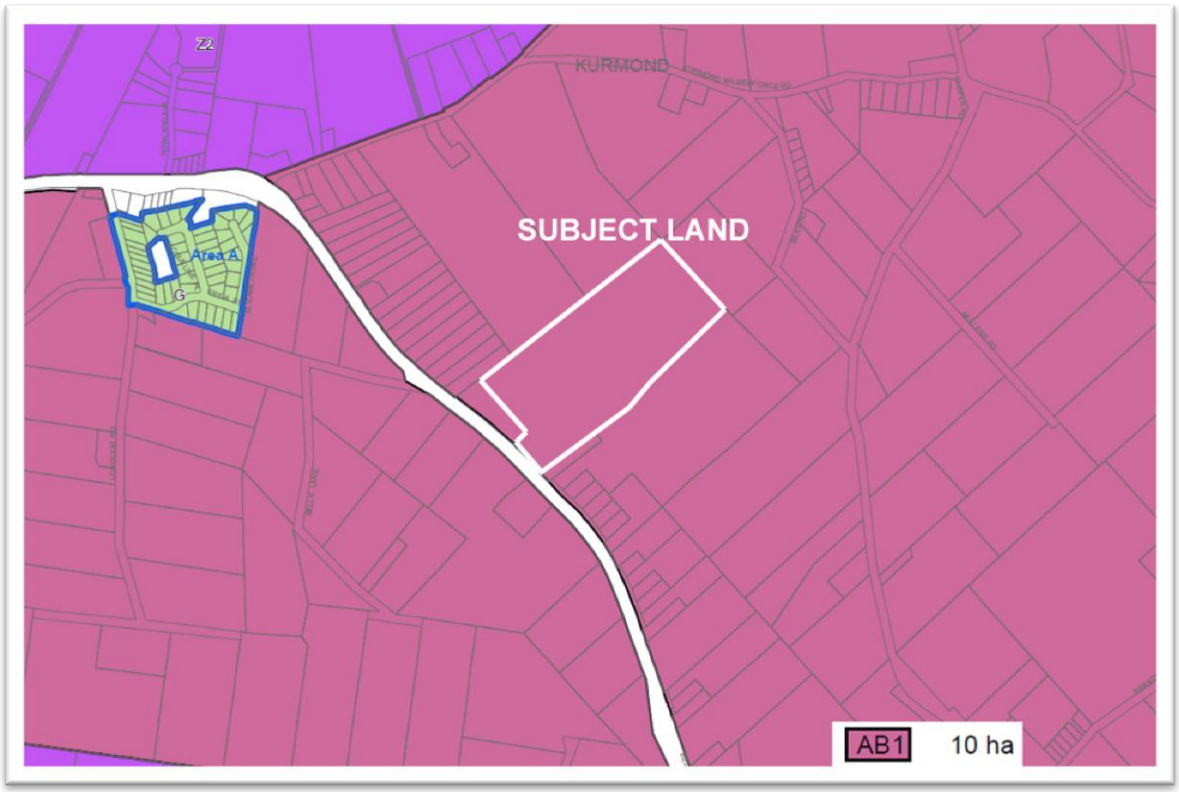
As part of the future subdivision, the road widening land will be surveyed and dedicated as public road.

The objectives of the RU1 Primary Production zone are as follows:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To encourage agricultural activities that do not rely on highly fertile land.*
- *To ensure that development occurs in a way that does not have a significant adverse effect on water catchments, including surface and groundwater quality and flows, land surface conditions and important ecosystems such as waterways.*
- *To promote the conservation and enhancement of local native vegetation including the habitat of threatened species, populations and ecological communities by encouraging development to occur in areas already cleared of vegetation.*
- *To ensure that development retains or enhances existing landscape values including a distinctive agricultural component.*
- *To ensure that development does not detract from the existing rural character or create unreasonable demands for the provision or extension of public amenities and services.*

In accordance with Clause 4.1 of HLEP 2012 the minimum permissible lot size is 10 hectares.

Figure 12: Extract from HLEP 2012 Lot Size Map Sheet LSZ_008AA



It is considered that the land is unsuitable for intensive agriculture due to the close proximity of residential development along Bells Line of Road and the relatively small lot size in terms of agricultural production. The land is located within 1 kilometre of Kurmond Village, and therefore satisfies the necessary criteria for rural village expansion.[1]

Council has seen many conflicting situations with orchards, market gardens and the like. Most of the lots in this locality are well below the minimum lot size. The lots which do meet the minimum lot size, including the subject land, are not large enough to support viable agriculture or to provide sufficient buffers between agriculture and residential uses.

It is considered that providing additional land for housing in this location is logical and represents *''the promotion and coordination of the orderly and economic use and development of land"* as stated in the Objects of the Environmental Planning & Assessment Act, 1979.

[1] Hawkesbury Residential Land Strategy, Adopted 10 May 2011.

Part 1 – Objectives or Intended Outcomes

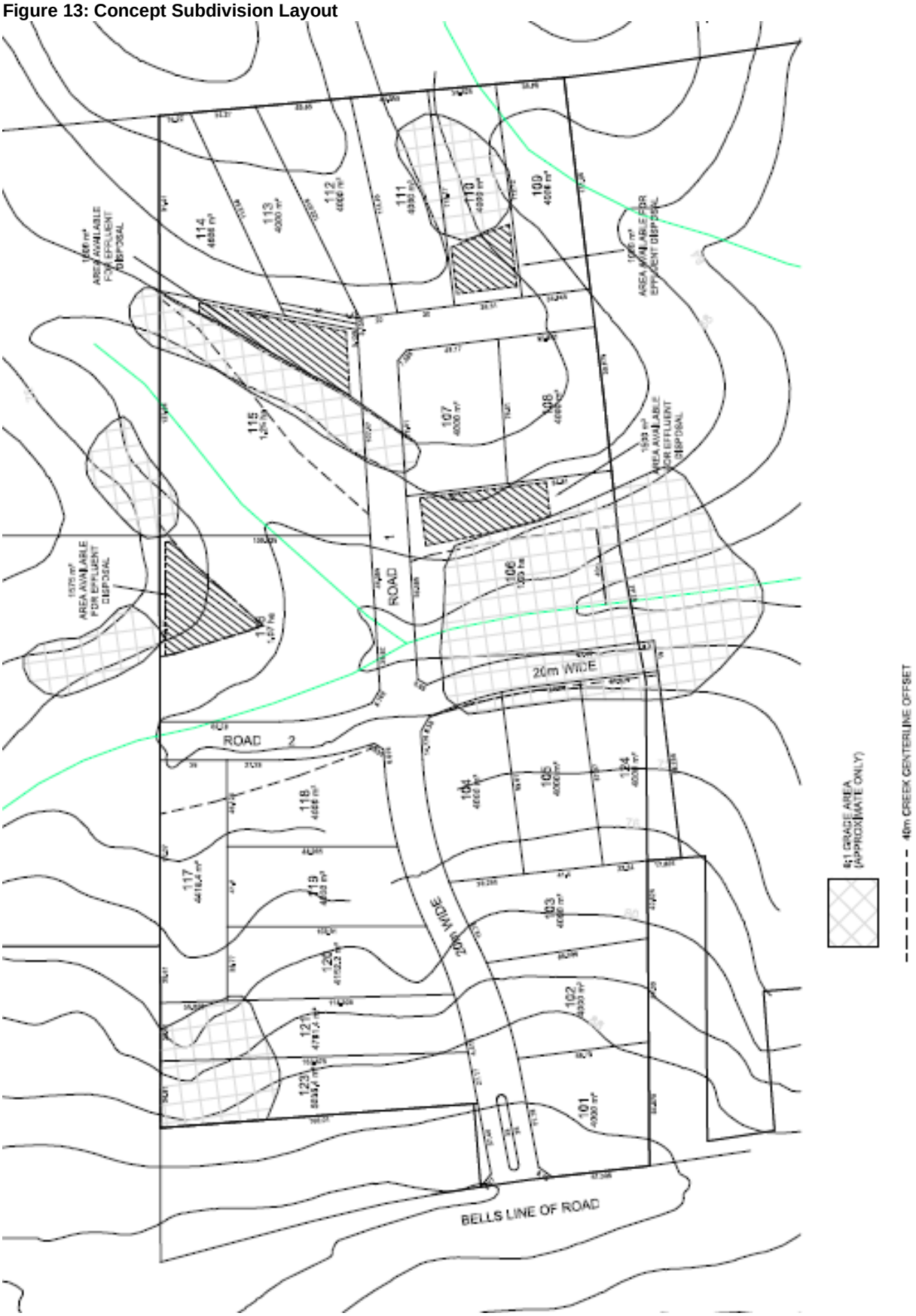
The objective of the planning proposal is to allow the land to be subdivided into large residential lots, which are sufficient in size to support sustainable housing within a rural village setting.

The intended outcome is to facilitate a development application to subdivide the land into a maximum of 23 lots, with a minimum size of 4,000m2. Figure 12 below is a concept plan for a viable subdivision. The plan makes provision for a single access road connecting with Bells Line of Road and retains the riparian corridor in larger lots surrounding the watercourse.

The concept layout is prepared having regard to the constraints identified in the preliminary wastewater report prepared by Australian Wetlands Consulting (Appendix 1). All proposed lots contain a sufficient area of unconstrained land for on-site effluent disposal. The areas suitable for on-site disposal are identified for proposed lots 106, 110, 115 and 116.

It is noted that the concept layout shows that proposed lot 124 is partially contained within adjoining land which is not the subject of this planning proposal. It is intended to submit a separate planning proposal for this land, hence the proposed incomplete road servicing proposed lots 104, 105 and 124. Should the separate planning proposal not proceed, the area of lot 124 which is within the adjoining property can be recovered by reconfiguring these three lots as the road will not be required. In my submission this aspect of the layout is acceptable as a concept at this time.

Figure 13: Concept Subdivision Layout



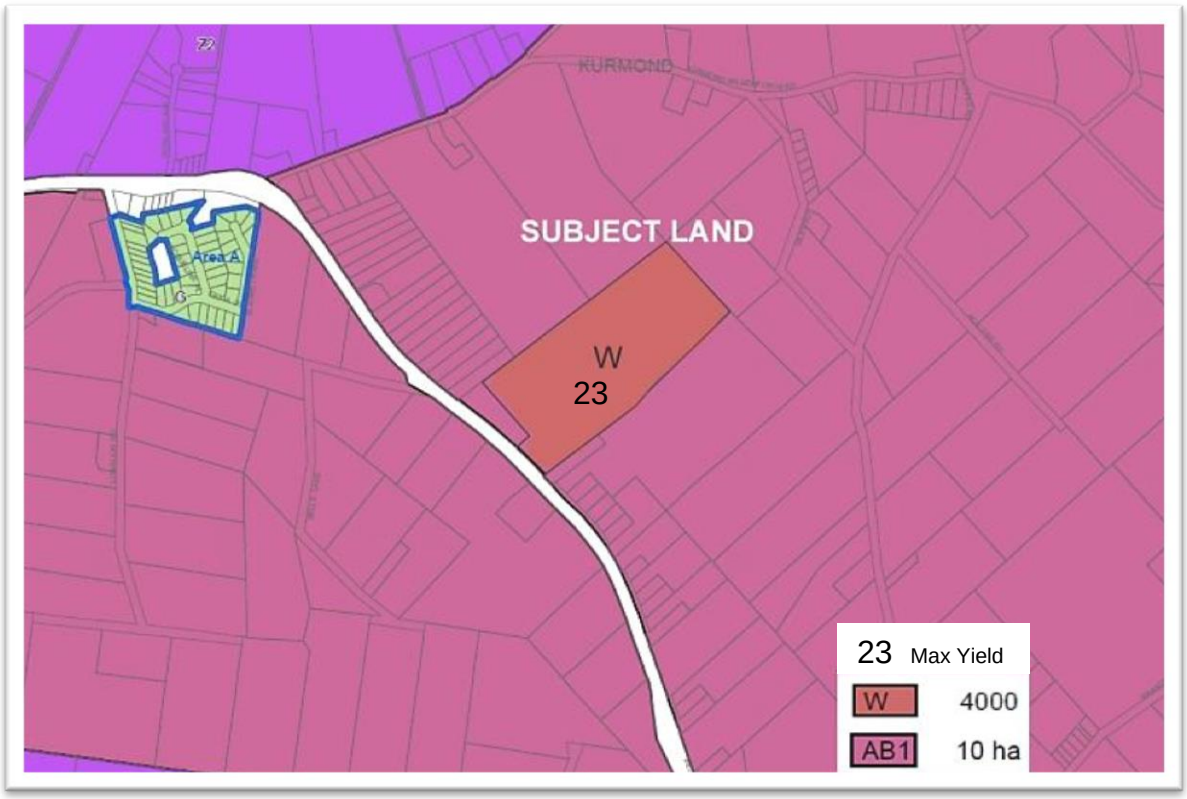
Part 2 – Explanation of Provisions

The proposed outcome will be achieved by amending Hawkesbury Local Environmental Plan 2012 in the following ways:

1. Amend Lot Size Map Sheet LSZ_008AA to change the minimum lot size for the land to 4,000 square metres with a maximum lot yield of 23 for the land, as shown in Figure 13 below; and

2. Inclusion of a new clause within Hawkesbury LEP 2012 to control the maximum number of lots into which the land can be subdivided, ie 23 lots

Figure 14: Proposed Amended HLEP 2012 Lot Size Map Sheet LSZ_008AA



Part 3 – Justification

Section A – Need for the planning proposal

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

Yes. The planning proposal has been prepared as a result of the Hawkesbury Residential Land Strategy. The proposal satisfies the criteria for rural village expansion as contained within the Strategy.

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

The alternative is to amend Hawkesbury LEP 2012 by including an additional permitted use of the land within Schedule 1 to allow the proposed subdivision of the land. However, it is considered that amending the Lot Size Map and inclusion of a lot yield clause as proposed is consistent with the ethos of the Standard Instrument LEP and is the best, most efficient and time effective approach to delivering the intended outcome of the proposal.

Section B – Relationship to strategic planning framework.

3. Is the planning proposal consistent with the objectives and actions of the applicable regional or subregional strategy (including the Sydney Metropolitan Strategy and exhibited draft strategies)?

The table below provides an assessment of the Planning Proposal against the relevant objectives and actions of the Metropolitan Plan for Sydney 2036 and the draft North West Subregional Strategy. The Metropolitan Plan actions are prefixed with the letters MP, the Subregional Strategy actions are prefixed with the letters NW.

Actions	**Response**
MP Objective B1 To focus activity inaccessible centres **MP Action B1.1** Plan for centres to grow and change over time. **MP Objective D1** To ensure an adequate supply of land and sites for residential development **MP Action D1.1** Locate at least 70 per cent of new housing within existing urban areas and up to 30 per cent of new housing in new release areas. **MP Objective D2** To produce housing that suits our expected future needs. **MP Action D2.1** Ensure local planning controls include more low rise medium density housing in and around smaller	The proposed development is a minor expansion of Kurmond Village. The Subregional Strategy classifies Kurmond as a rural village. The Subregional Strategy acknowledges that the LGA is largely constrained by the Hawkesbury - Nepean flood plain, with limited capacity for additional growth to the south of the Hawkesbury River due to the risk of flooding. The Subregional Strategy assumes that the majority of future housing growth within the LGA will need to occur on land located predominantly to the north of the River, in association with existing local centres. The Hawkesbury Residential Land Strategy (HRLS) was prepared in

local centres. **MP Objective F1** To contain Sydney's urban footprint **MP Action F1.1** Focus land release in Growth Centres. **NW Action B2.1.1** Councils to consider planning for houses growth in centres, particularly those well serviced by public transport. **NW Action C1.1.3** Hawkesbury Council to prepare a strategic residential land use study to consider opportunities for further growth around local centres to the north of the Hawkesbury River, cognisant of flooding and flood evacuation issues. **NW Action C1.3.1** North West councils to plan for sufficient zoned land to accommodate their local government area housing target in their Principal LEPs. **NW Action C2.1.2** Councils to provide in their LEPs zoned capacity for a significant majority of new dwellings to be located in strategic and local centres. **NW Action C2.3.2** North West councils to provide an appropriate range of residential zonings to cater for changing housing needs.	response to the Subregional Strategy. The HRLS found that there is limited capacity within existing residential zoned land of the LGA to accommodate more dwellings, hence the majority of new dwellings will need to be provided from greenfield sites / extension of the footprint of existing centres. The HRLS recognises that urban growth in the Hawkesbury is severely limited by environmental constraints such as State and National parks, agricultural land values, flooding issues, and noise constraints. The subject site is free from these constraints and satisfies the HRLS criteria for rural village expansion. The subject site would make a minor contribution to the housing target that has been set for the LGA by the State government. The Planning Proposal intends to create opportunities for large lot residential development, which adds to the range of housing opportunities. With good access to Kurmond Village, the future residents will support existing businesses, and in doing so will strengthen the viability of the centre. The other major release areas in the Hawkesbury LGA are Vineyard, Pitt Town and Bligh Park 2. While Vineyard has recently been released, it is only in the early stages of planning and actual lot production is not likely to occur for some years. Development of Pitt Town is currently underway. Bligh Park 2 is on hold pending resolution of flooding and flood evacuation issues.
MP Objective B1 To focus activity inaccessible centres **MP Action B1.3** Aim to locate 80 per cent of all new housing within walking catchments of existing and planned	State Plan Priority E5 sets a target to increase the proportion of people living within 30 minutes by public transport of a Strategic Centre. The nearest Strategic Centres are Penrith (Regional Centre) and Rouse Hill (planned Major

centres of all sizes with good public transport. **NW Action C2.1.3** North West councils to ensure location of new dwellings improves the subregion's performance against the target for State Plan Priority E5. **NW Action D2.3.3** State and local government to improve existing interchanges and bus stops. **NW Action D3.1.1** The Roads and Traffic Authority (now Roads and Maritime Service (RMS)), in cooperation with the local government, to continue to upgrade walking and cycling facilities, including cycleway development in Blacktown, Castle Hill and Colo. **NW Action D3.1.2** The NSW Government and local government to work together to align local walking and cycling networks with public transport routes to improve accessibility to public transport.	Centre). Westbus operates Route 682 along Bells Line of Road between Richmond and Kurrajong. This service operates every 30 minutes during the peak periods with the closest stop being located in the vicinity of the post office within Kurmond village. An off-road pedestrian/bike path which links Kurmond to North Richmond runs past the subject land. Colo High School and Kurmond Public School are also linked by this pathway.
MP Objective H3 To provide healthy, safe and inclusive places based on active transport **MP Action H3.1** Design and plan for healthy, safe, accessible and inclusive places. **NW Action C5.1.2** Councils to reflect best practise established by the Growth Centres Commission in land release areas outside the North West Growth Centre.	The Planning Proposal is a minor expansion of an existing rural village.
NW Action E2.1.2 Sydney Metropolitan and Hawkesbury – Nepean Catchment Management Authorities to work with agencies and North West councils to ensure that the aims and objectives of Catchment Action Plans are considered in the future management and planning of local council areas.	It is anticipated that as part of the consultation with public authorities the Hawkesbury – Nepean CMA will be given an opportunity to comment on the Planning Proposal.
NW Action E4.1 Maintain rural activities	Due to the size of the land and the

and resource lands.	proximity to residential neighbours, the land is not suitable for viable agriculture.
MP Objective G5 To achieve sustainable water use **MP Action G5.2** Ensure water cycle management for new release areas and sites for urban renewal. **NW Action E2.1.5** North West council to continue to promote water sensitive urban design.	The Planning Proposal is a minor expansion of an existing rural village. The minimum lot size proposed is 4,000m2, allowing for all stormwater and wastewater to be contained and treated within each allotment.
NW Action E6.3.1 The Heritage Office to work with local councils to identify areas in the North West Subregion to promote and provide access to heritage places, contribute to local economies and assist in sustaining heritage places.	The land and surrounding land is not identified as having heritage significance. Notwithstanding, it is anticipated that as part of the consultation with public authorities the Heritage Office will be given an opportunity to comment on the Planning Proposal.
NW Action F2.1.1 Councils to maintain or enhance the provision of local open space particularly in centres and along transport corridors where urban and residential growth is being located. **NW Action F2.1.2** Council to consider open space improvement programs with better facilities to encourage use. **NW Action F2.1.3** Councils to consider mechanisms to increase the capacity of local sports fields to a district level. **NW Action F2.1.4** NSW Government and local councils to development links between smaller reserves to create diversity and broader user experience. **NW Action F2.1.5** Local councils to consider modifying under utilised open space for informal activities such a skating, basketball, netball and the establishment of cafes.	It is considered that the additional population generated by this Planning Proposal (less than 100 persons) is unlikely to trigger a requirement for acquisition of additional open space land. This is especially the case where the minimum lot size will be 4,000m2, which provides for significantly large amounts of private open space.

The Metropolitan Plan for Sydney 2036 can be viewed at http://strategies.planning.nsw.gov.au/MetropolitanStrategyforSydney/PreviousMetropolitanstrategies.aspx

The Subregional Strategy can be viewed at
http://www.shop.nsw.gov.au/pubdetails.jsp?publication=7957

This planning proposal represents minor growth north of the Hawkesbury River which is associated with the existing Kurmond local centre. Therefore, the proposal is consistent with the North West Subregional Strategy and the Sydney Metropolitan Strategy.

4. Is the planning proposal consistent with the local Council's Community Strategic Plan or other local strategic plan?

The relevant strategic plans are the Hawkesbury Community Strategic Plan 2013-2032 and the Hawkesbury Residential Land Strategy, 2011.

4.1 Hawkesbury Community Strategic Plan 2013-2032

This plan was adopted by Hawkesbury City Council in May 2013. The provisions of the Community Strategic Plan which are of most relevance to the planning proposal are:

Looking after people and place

Directions

1. Be a place where we value, protect and enhance the historical, social, cultural and environmental character of Hawkesbury's towns, villages and rural landscapes
2. Offer residents a choice of housing options that meets their needs whilst being sympathetic to the qualities of the Hawkesbury
3. Population growth is matched with the provision of infrastructure and is sympathetic to the rural, environmental, heritage values and character of the Hawkesbury
4. Have development on both sides of the river supported by appropriate physical and community infrastructure
5. Have an effective system of flood mitigation, fire and natural disaster management and community safety which protects life, property and infrastructure
6. Have friendly neighbourhoods, connected communities, and supported household and families
7. Have future residential and commercial development designed and planned to minimise impacts on local transport systems, allowing easy access to main metropolitan gateways

Strategies

1. Revitalise and enhance town centres and villages
2. Encourage affordable, diverse and quality housing solutions in serviced areas
3. Manage rural and natural lands to support a balance of agriculture, environment and housing that delivers viable rural production and rural character
4. Recognise, protect and promote the values of indigenous, natural and built heritage through conservation and active use
5. Upgrade the necessary physical infrastructure and human services to meet contemporary needs and expectations
6. Provide for a safer community through planning, mitigation and response

Goals

1. Towns and villages to be vibrant places that people choose to live in and visit

2. Appropriate and affordable range of infrastructure and services available to meet contemporary needs
3. Viable tourism economy
4. Funded viable and sustainable events
5. Housing is available and affordable for the population whilst retaining agricultural and heritage values
6. Managed population growth that contributes to and sustains the local economy and services and respects agricultural and heritage values of the area
7. Maintain and foster the rural and heritage character within the Hawkesbury
8. Viable and sustainable agriculture industries retained and developed
9. Natural and built heritage valued socially and economically
10. Ongoing review and implementation of community disaster and safety plans
11. Continue to support agencies and volunteers who assist in maintaining a safe and socially valuable community

Caring for Our Environment

Directions

1. Be a place where we value, protect, and enhance the cultural and environmental character of Hawkesbury's towns, villages and rural landscapes
2. To look after our cultural and environmental assets for future generations so that they too can enjoy, and benefit from, a clean river and natural eco-systems, rural and cultural landscape
3. Take active steps to encourage lifestyle choices that minimise our ecological footprint
4. Work with our communities and businesses to use our resources in a sustainable way and employ best practices and technologies that are in harmony with our natural environment

Strategies

1. Effective management of our rivers, waterways, riparian land, surface and groundwaters, and natural eco-systems through local action and regional partnerships
2. Reduce our environmental footprint through resource and waste management
3. Manage growth with ecologically sustainable principles
4. Engage with the community and work together to care for our environment

Goals

1. Clean, healthy, usable rivers and waterways
2. Balance the needs of our ecology, recreational and commercial activities
3. Maximise sustainable use of potable and recycled water
4. Reduced greenhouse gas emissions
5. Our community is living more sustainably
6. Waste management facility operating on a commercial basis
7. Reduced waste to landfill
8. Environmental impact of growth is minimised
9. Healthy and functioning catchments and riparian corridors
10. Improved community awareness of the importance and value of healthy catchments, natural waterways, vegetated riparian corridors, surface water and groundwater resources.

Sustainability Principles

The following are considered relevant to the Planning Proposal.

Principle 4: Use of energy and other resources must be just and efficient, both across the globe and between generations

Principle 5: Even if there is doubt about the environmental impact that an action will have, one should err on the side of caution to protect the environment

It is submitted that the planning proposal is consistent with the Hawkesbury Community Strategic Plan. The planning proposal will assist in the achievement of some of the above Goals, particularly in terms of providing housing choice and creating a sustainable local economy. The proposal satisfies the environmental goals, by minimising the impact of growth and providing sustainable, managed housing opportunities in an area of high amenity.

The environmental impacts have been carefully considered through preliminary wastewater management, bushfire, flora and fauna and traffic reports. It is considered that the planning proposal satisfies the sustainability principles of the Plan.

The Hawkesbury Community Strategic Plan 2013 - 2032 can be viewed on Council's website www.hawkesbury.nsw.gov.au.

4.2 Hawkesbury Residential Land Strategy 2011

The Hawkesbury Residential Land Strategy guides the location and type of future residential development within the LGA. The strategy is based on best practice models of sustainable development which seek to guide future residential development within the LGA over the next 30 years and ensure future residential development is sustainable and meets the needs of the Hawkesbury population.

The review of population and dwelling characteristics (Chapter 3.0) identified that future population growth within the LGA is ageing and household sizes are decreasing. This will have significant impact on housing needs, services and facilities within the LGA.

The projections show an estimated demand for an additional 5,932 dwellings which is slightly higher than the dwelling target set in the North Western Subregional Strategy.

The Residential Strategy is designed to be suitably flexible to provide 5,000-6,000 dwellings with the final number of dwellings being shaped by market demand and more detailed environmental capacity analysis. As outlined in Section 3.3.6 [of the Strategy], the majority of additional dwellings (5,400 dwellings) will be located in existing or expanded urban and village areas where they can access such services and facilities. The remainder of future development (600 dwellings) will be located in the remaining localities, subject to compliance with the sustainability matrix for neighbourhood centres.[2]

The following table sets out the Rural Village Criteria from the Strategy, with comments in relation to the subject planning proposal.

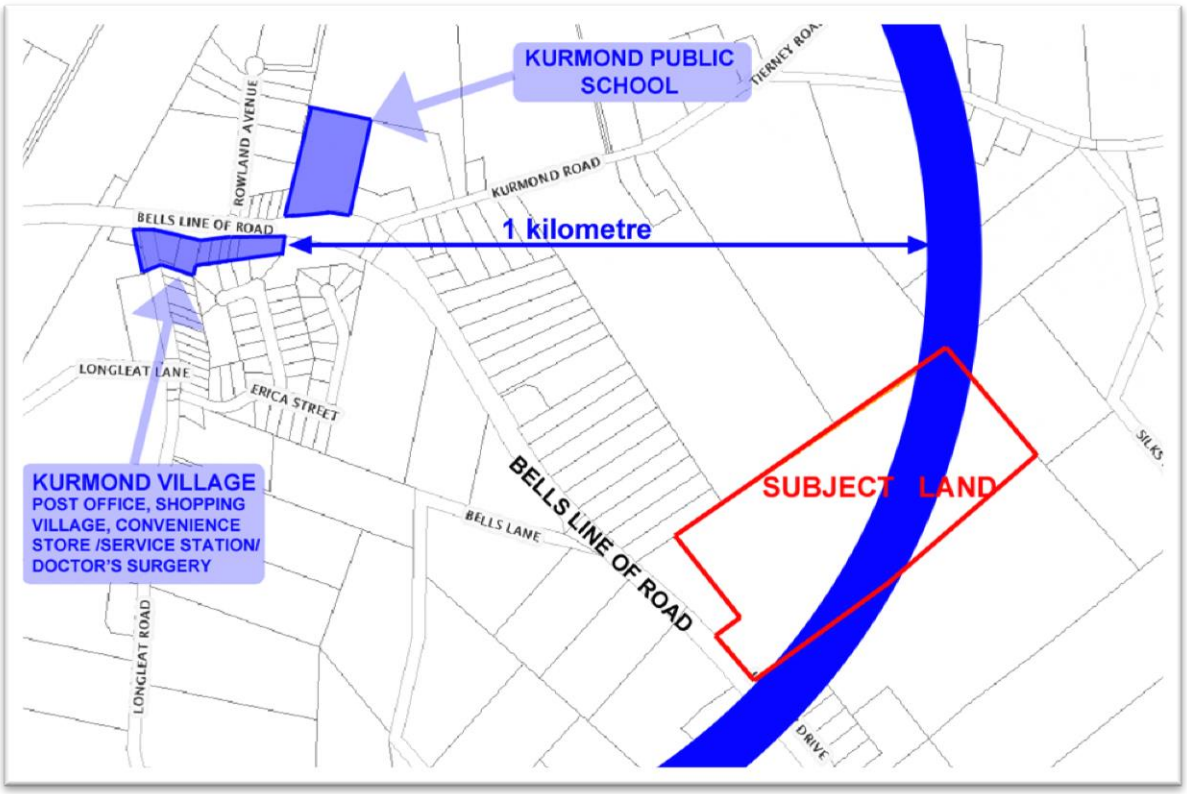
6.5 Rural Village Criteria	
Be able to have onsite sewerage disposal	Yes. The resulting large residential lots will be capable of on-site sewerage

[2] Hawkesbury Residential Land Strategy, 2011, pg 7/1

	disposal. This is confirmed by a preliminary wastewater investigation.
Cluster around or on the periphery of villages	Yes. The land adjoins residential allotments which form part of Kurmond Village.
Cluster around villages with services that meet existing neighbourhood criteria services as a minimum (within 1km radius)	Yes. The land is located within 1000m of Kurmond Village, which provides a range of services including primary school, post office, medical, neighbourhood shops, take-away and dine-in food and cafes.
Address environmental constraints and with minimal environmental impacts	Yes. The proposal will have minimal environmental impacts.
Within the capacity of the rural village	Yes. The proposal represents a minor expansion of the Kurmond Village only.

It is therefore concluded that the proposal meets all relevant criteria within the Hawkesbury Residential Land Strategy. Figure 15 shows the relationship between the land and the available nearby services.

Figure 15: Proximity to Local Services



It can be seen from Figure 15 that approximately two thirds of the subject land is within a 1 kilometre radius of Kurmond Village. It is submitted that the whole of the land satisfies the

intent of the HRLS rural village criteria to *"cluster around villages with services that meet existing neighbourhood criteria services as a minimum*".

It is also noted that there are existing residential lots in the immediate vicinity of the subject land which are just outside the 1 kilometre radius. In effect the planning proposal could be considered as infill development.

The Hawkesbury Residential Land Strategy can be viewed on Council's website www.hawkesbury.nsw.gov.au.

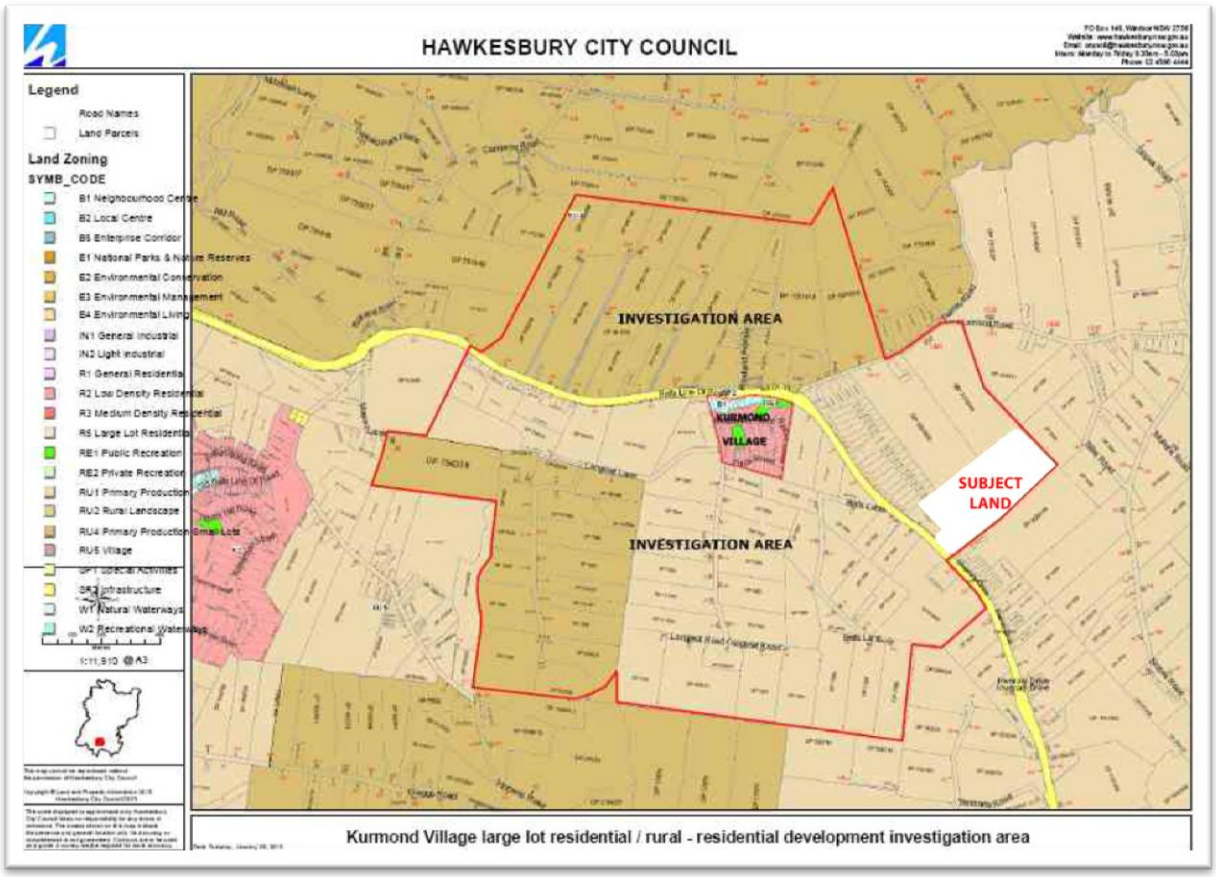
4.3 HCC Kurmond Village Investigation Area

On 7 February 2013, Hawkesbury City Council resolved, inter alia,

1. *"Council carry out investigations within the area on the map entitled "Kurmond Village large lot residential/rural-residential Investigation Area". These investigations are to determine the suitability of the identified lands for large lot residential and/or rural residential development and are to be funded by planning proposal application fees*.

2. *Investigations already undertaken by applicants for Planning Proposals within the Kurmond area be utilised by Council as a basis for their further investigations as appropriate."*

Figure 16: Kurmond Investigation Area. Source: HCC Business Paper for Ord Mtg 5 Feb 2013



As shown in Figure 16 above, the land is within the Kurmond Village large lot residential/rural-residential investigation area as determined by Council on 7 February 2013.

Our City Our Future Rural Rezonings Policy

This Policy was adopted by Hawkesbury City Council on 7 November 1995 and revised on 16 May 1998. Since that time, the Policy has essentially been superseded by the following studies and documents:

- NSW Department of Planning draft North West Subregional Strategy
- Hawkesbury Residential Land Strategy
- Hawkesbury Community Strategic Plan

Notwithstanding the above strategies and plans, the Our City Our Future Rural Rezonings Policy remains a formal policy of the Council. The following comments are provided in response to the relevant policy statements.

a. Fragmentation of land is to be minimised;

It is considered that the proposal minimises fragmentation of rural lands by creating mostly 4,000m2 residential lots, allowing for an acceptable increase in population, while not fragmenting larger agricultural lots.

b. Consolidation within and on land contiguous with existing towns and villages be preferred over smaller lot subdivision away from existing towns and villages;

It is submitted that the proposal is within a location which has access to services and facilities and is contiguous with residential lots associated with Kurmond Village.

This policy statement has been adopted by the Hawkesbury Residential Lands Strategy in Section 6.5 – Rural Village Criteria:

Cluster around or on the periphery of villages

Cluster around villages with services that meet existing neighbourhood criteria services as a minimum (within 1km radius)

c. No subdivision along main roads and any subdivision to be effectively screened from minor roads;

Bells Line of Road is a main road. The proposal intends to provide one new road to access all of the lots, as designed by Thompson Stanbury Associates. The Council supports this approach.

The land falls away from Bells Line of Road, and proposed lots will have frontage and access to a new internal road. The proposed subdivision will not be readily visible from this road.

d. No subdivision along ridgelines or escarpments;

Bells Line of Road follows a minor ridgeline. The land which is proposed to be subdivided falls away from the road to the north, which reduces visual impact of the proposal. It has been demonstrated that the proposal satisfies all relevant criteria of the Hawkesbury Residential Land Strategy and the Council supports the proposal.

e. Where on site effluent disposal is proposed, lots are to have an area of at least 1 (one) hectare unless the effectiveness of a smaller area can be demonstrated by geotechnical investigation;

This policy statement has been adopted by the Hawkesbury Residential Lands Strategy in Section 6.5 – Rural Village Criteria:

> Be able to have onsite sewerage disposal

The size of the proposed lots is 4,000m2. A wastewater investigation carried out by Australian Wetlands Consulting Pty Ltd confirms that the land is suitable for on-site effluent disposal. A copy of the report is attached as appendix 1.

It is submitted that the Planning Proposal is consistent with this policy statement.

f. The existing proportion of tree coverage on any site is to be retained or enhanced;

The Planning Proposal will have no impact on tree coverage. The subdivision concept has been designed to retain riparian vegetation and to place building envelopes within existing cleared grazing paddocks. Additional plantings as part of subdivision works will enhance the overall tree coverage of the land.

g. Any rezoning proposals are to require the preparation of Environmental Studies and Section 94 Contributions Plans at the applicant's expense.

It is submitted that an environmental study is not required, as sufficient information is provided with the Planning Proposal in accordance with Department of Planning Local Plan Making Guidelines. Discussions have been held with Council officers about a possible Section 94 Plan and/or Special Infrastructure Contribution. At this stage no work has commenced on the plan and it is agreed that the developer would enter into a voluntary planning agreement with the Council, should the Section 94 plan not be completed in time.

h. Community title be encouraged for rural subdivision as a means of conserving environmental features, maintaining agricultural land and arranging for the maintenance of access roads and other capital improvements.

The form of title of subdivision is more appropriate for discussion in the lead up to a development application, once the Planning Proposal has progressed to the final stage. However, the preliminary subdivision concept provides that all lots will have access to a public road. Private roads are problematic in terms of the current Planning for Bushfire Protection requirements. There are no other community assets proposed.

4.5. HCC Policy: Rezoning of Land for Residential Purposes – Infrastructure Issues

This Policy was adopted by Council on 30 August 2011 and states:

> *That as a matter of policy, Council indicates that it will consider applications to rezone land for residential purposes in the Hawkesbury LGA only if the application is consistent with the directions and strategies contained in Council's adopted Community Strategic Plan, has adequately considered the existing infrastructure issues in the locality of the development (and the impacts of the proposed development on that infrastructure) and has made appropriate*

provision for the required infrastructure for the proposed development in accordance with the sustainability criteria contained in Council's adopted Hawkesbury Residential Land Strategy.

Note 1:
In relation to the term "adequately considered the existing infrastructure" above, this will be determined ultimately by Council resolution following full merit assessments, Council resolution to go to public exhibition and Council resolution to finally adopt the proposal, with or without amendment.

Note 2:
The requirements of the term "appropriate provision for the required infrastructure" are set out in the sustainability matrix and criteria for development/settlement types in chapter six and other relevant sections of the Hawkesbury Residential Land Strategy 2011.

It is submitted that the Planning Proposal is consistent with the directions and strategies contained in Council's adopted Community Strategic Plan, as demonstrated in Section 4.1.

The Council has considered the existing infrastructure issues in the locality and is satisfied that the proposal has made adequate provision for infrastructure. The proposal also satisfies the relevant sustainability criteria contained within the Hawkesbury Residential Land Strategy, as detailed in Section 4.2.

It is submitted that the planning proposal is consistent with this policy.

5. Is the planning proposal consistent with applicable state environmental planning policies?

A review of state environmental planning policies reveals that the following may be applicable and relevant:

- SEPP 44 -
- SEPP 55 – Remediation of Land
- SREP 9 -
- SREP No. 20 – Hawkesbury - Nepean River

SEPP No 44 Koala Habitat Protection

A preliminary ecological assessment was carried out by Australian Wetlands Consulting Pty Ltd. No evidence of koala activity was observed and no suitable habitat is located on the land.

SEPP 55 – Remediation of Land.

The land has been used for agriculture in the form of animal grazing for many years. However, there is no evidence to suggest that any activities have occurred on the land which would give rise to contamination.

Notwithstanding, it is noted that the Department of Planning Local Plan Making Guidelines states as follows:

> *In some cases it will be necessary to undertake technical studies or investigations to justify different aspects of a planning proposal. Generally, these studies or investigations should not be carried out in the first instance. Instead, the issues giving rise to the need for these studies or investigations should be identified in the planning proposal. The initial gateway determination will then confirm the studies or investigations required and the process for continuing the assessment of the proposal, including whether it will need to be resubmitted following completion of the studies or investigations.*

In terms of this planning proposal, it is considered that no study is warranted in order to progress the draft LEP. Any future development application for subdivision may then require further investigation.

SREP No. 20 – Hawkesbury - Nepean River

The aim of SREP 20 is to protect the environment of the Hawkesbury – Nepean River system by ensuring that the impacts of future land uses are considered in a regional context. Part 2 of SREP 20 provides general planning considerations, specific planning policies and recommended strategies. The following specific policy is relevant to the Planning Proposal:

(1) Total catchment management

Policy: Total catchment management is to be integrated with environmental planning for the catchment.

Strategies:

(a) Refer the application or other proposal for comment to the councils of each adjacent or downstream local government area which is likely to suffer a significant adverse environmental effect from the proposal.

(b) Consider the impact of the development concerned on the catchment.

(c) Consider the cumulative environmental impact of development proposals on the catchment.

The land drains to a minor watercourse which is a tributary of Redbank Creek. An investigation of the site was carried out by Australian Wetlands Consulting in June 2013, which states, in part:

"On-site wastewater management involves the treatment and release of domestic wastewater into the environment. Inappropriate use or disposal can have an adverse impacts such as: contamination of ground and surface water, degradation of soil and vegetation, spread of disease and pathogens, decreased amenity caused by odour. To manage these and the long term impacts of on-site wastewater treatment, regulatory and legislative requirements, guidelines and current best practice, management, and monitoring will be adopted and determine design and operational procedures to limit any adverse impacts. On-site systems will be designed and managed under these principles. Individual systems will be designed in a holistic manner taking into consideration the water cycle, catchment management, sustainable development principles and public health to mitigate any adverse cumulative impact."

The report concludes:

"It is submitted that the characteristics of the land, combined with recommended soil improvement and systems as required, will ensure that the impacts will be managed within the site. Therefore, it is proposed that, pending detailed design there will be no cumulative impact imposed on the environment by on-site wastewater management."

A copy of the report is included at Appendix 1.

Development of this type is encouraged by the Hawkesbury Residential Land Strategy. It has been demonstrated that there is no adverse cumulative impact in terms of this planning proposal.

(6) Flora and fauna

Policy: Manage flora and fauna communities so that the diversity of species and genetics within the catchment is conserved and enhanced.

The land is cleared pasture, with scattered trees mainly associated with the dam and water course. The riparian corridor will be maintained and supplemented by the proposed development by including it as a feature within some of the proposed allotments.

It is considered that the proposal will have a positive impact on flora and fauna, as the riparian corridor will be enhanced by the removal of animal grazing, which currently occurs over the whole of the land.

A preliminary ecological assessment of the site was carried out by Australian Wetlands Consulting in April 2013. The assessment found:

"The Hawkesbury Council's biodiversity mapping identifies significant vegetation on the land in the form of SSTF. The ecological inspection confirmed that the most areas identified as significant vegetation comprises of scattered trees with cleared grazing pasture or invasive weed

species. These scattered trees provide little or no vegetation connectivity as there is no continuous canopy, nor is there any native or significant understory or ground cover.

A database search from the BioNet Atlas of NSW Wildlife website. Search criteria : Public Report of all Valid Records of Entities in selected area [North: -33.49 West: 150.57999 East: 150.67999 South: -33.59] returned a total of 3,609 records of 1,130 species. (The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions).

No threatened species were observed during the ecological survey.

Vegetation along the creek and drainage lines does provide moderate connectivity however the majority of the vegetation are invasive weed species that requires clearance or control. Whilst some individual species of Shale-Sandstone Transition Forest community are present, the boundaries of this plant community is indistinct with no connectivity. No significant hollow bearing trees were found on the site. In addition the four dam sites provide habitat for aquatic bird species and frogs. It is expected that native vegetation along the two creek lines will be retained. It is recommended that a site Vegetation Management Plan (VMP) be developed and implemented to minimise impact and ensure appropriate management of weed species onsite."

The report concludes that the proposal will have no significant impact on threatened species, populations or ecological communities.

The ecological assessment report is appendix 2.

(9) Rural residential development

Policy: Rural residential development should not reduce agricultural sustainability, contribute to urban sprawl, or have adverse environmental impacts (particularly on the water cycle or on flora or fauna).

Note. *Refer also to items (1)–(7) and (12) for relevant strategies.*

Strategies:

(a) Give priority to agricultural production in rural zones.

(b) When considering a proposal for the rezoning or subdivision of land which will increase the intensity of development of rural land (for example, by increasing cleared or hard surface areas) so that effluent equivalent to that produced by more than 20 people will be generated, consider requiring the preparation of a Total Water Cycle Management Study or Plan.

(c) Maintain or introduce appropriate separation between rural residential use and agricultural use on the land that is proposed for development.

(d) Do not locate development in areas identified for future urban purposes in the Metropolitan Strategy.

(e) Consider the suitability of the land for keeping livestock, whether or not for commercial purposes, and appropriate mitigating measures to prevent land degradation.

(f) Consider the ability of the land to accommodate on-site effluent disposal in the long term.

(g) Consider any adverse environmental impacts of infrastructure associated with the development concerned

It is considered that this planning proposal will not be in conflict with the relevant policies and strategies of Sydney REP 20 and can proceed.

SREP 9 – Extractive Industry (No. 2 1995)

The primary aims of SREP No 9 (No.2 -1995) are to facilitate the development of extractive resources in proximity to the population of the Sydney Metropolitan Area by identifying land which contains extractive material of regional significance and to ensure consideration is given to the impact of encroaching development on the ability of extractive industries to realise their full potential. The site is not within the vicinity of land described in Schedule 1, 2 and 5 of the SREP nor will the proposed development restrict the obtaining of deposits of extractive material from such land.

State Environmental Planning Policies and Sydney Regional Environmental Plans can be viewed at http://www.legislation.nsw.gov.au/maintop/scanact/inforce/NONE/0 by clicking on "S" within the "Browse in Force" "EPIs" section.

6. Is the planning proposal consistent with applicable Ministerial Directions (s.117 directions)?

The Minister for Planning and Infrastructure, under section 117(2) of the EP&A Act, issues directions that local councils must follow when preparing planning proposals for new local environmental plans. The directions cover the following broad categories:

a. employment and resources

b. environment and heritage

c. housing, infrastructure and urban development

d. hazard and risk

e. regional planning

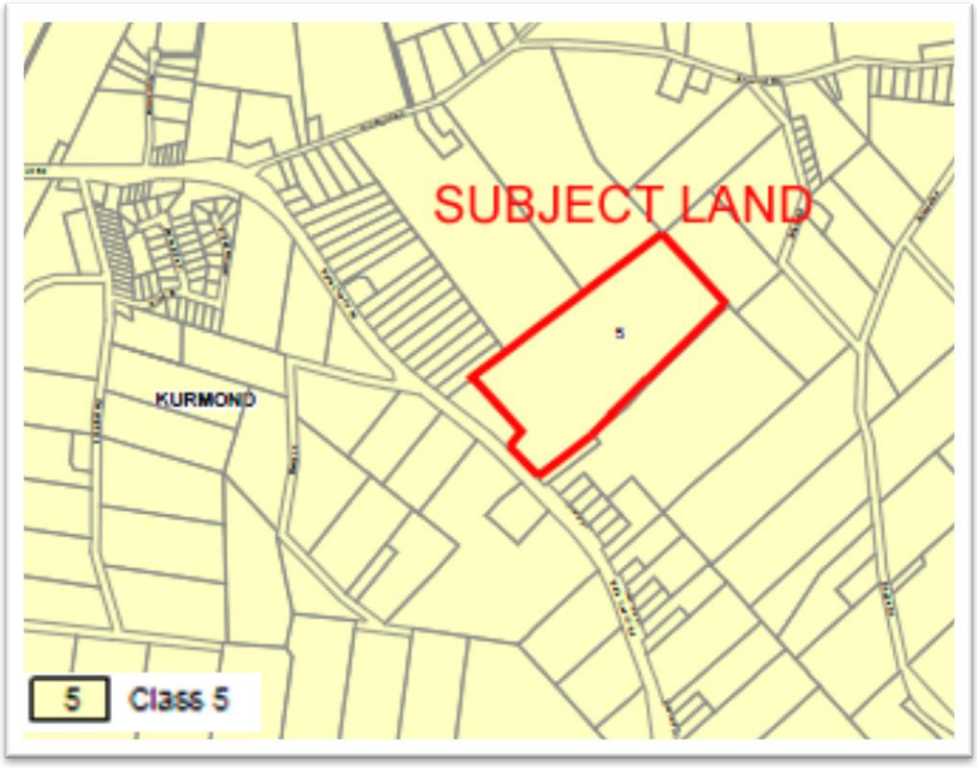
f. local plan making.

The following section provides an assessment of the planning proposal against applicable Section 117 directions. A full copy of the directions can be viewed at http://www.planning.nsw.gov.au/LinkClick.aspx?fileticket=dOkLhSFp9eo%3d&tabid=248&language=en-AU

Direction	Consistency	Reason
1.2 Rural Zones	Yes	The draft LEP will be consistent with paragraphs 4(a) and 4(b). 4(a): The rural zoning of land is not proposed to be changed. 4(b): The proposal will increase the permissible density of land within a rural zone, however the land is effectively within an existing village. Notwithstanding the above it is considered that the proposal is justified by a strategy (Hawkesbury Residential Land Strategy) as it meets the criteria for rural village development.
1.3 Mining, Petroleum Production and Extractive Industries	Probable	The Planning proposal may require consultation with NSW Industry and Investment as a result of this Direction. Advice is requested from the Department of Planning and Infrastructure as to whether consultation is required.

3.4 Integrated Land Use and Transport	Yes	The draft LEP will provide housing opportunities in a locality which is adequately serviced by public transport (in rural village terms). The draft LEP is consistent with the relevant guidelines and policy.
4.1 Acid Sulfate Soils	No	Figure 17 below is an extract from the Council's Acid Sulfate Soils Map, which shows that the property is identified as Class 5. It is considered that the inconsistency with this Direction is justified as the proposal is of minor significance.
4.4 Planning for Bushfire Protection	Yes	The Rural Fire Service will be consulted by the Council during preparation of the draft LEP. A preliminary assessment prepared by Control Line Consulting concludes that the proposal is able to comply with *Planning for Bushfire Protection*.
6.3 Site Specific Provisions (4)(a) (4)(b) (4)(c)	 Yes Yes No	The proposal will introduce a new maximum lot yield provision which applies to the site. The inconsistency is of minor significance and considered to be justified given the characteristics and constraints of the site.
7.1 Implementation of the Metropolitan Strategy	Yes	The planning proposal is consistent with the Metropolitan Strategy. This is discussed in question 4 under Section B of this report.

Figure17: Extract from HLEP 2012 Acid Sulfate Soils Map - Sheet ASS_008AA

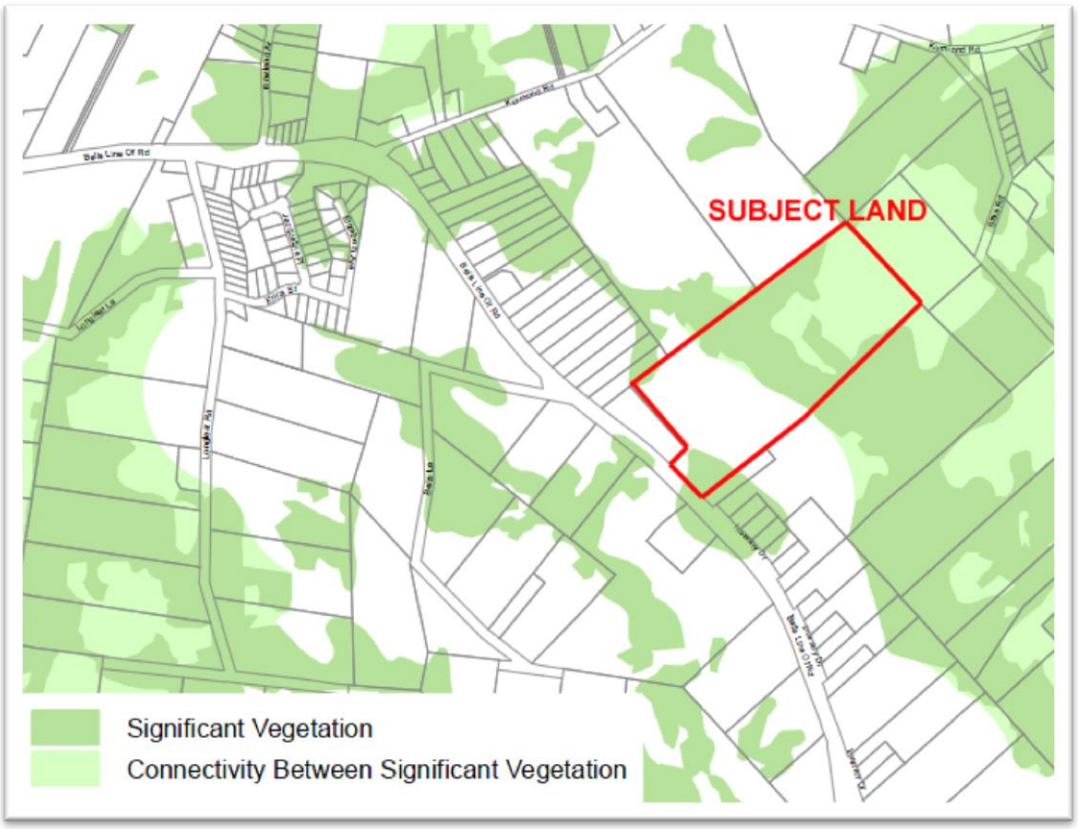


Section C – Environmental, social and economic impact.

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?

The Council's biodiversity mapping identifies some significant vegetation within the riparian corridor, and an area of connectivity between significant vegetation in the northern section of the land. Figure 18 below is an extract from the relevant map.

Figure 18: Extract form HLEP 2012 Terrestrial Biodiversity Map Sheet BIO_008AA



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"The Hawkesbury Council's biodiversity mapping identifies significant vegetation on the land in the form of SSTF. The ecological inspection confirmed that the most areas identified as significant vegetation comprises of scattered trees with cleared grazing pasture or invasive weed species. These scattered trees provide little or no vegetation connectivity as there is no continuous canopy, nor is there any native or significant understory or ground cover.

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boundaries of this plant community is indistinct with no connectivity. No significant hollow bearing trees were found on the site. In addition the four dam sites provide habitat for aquatic bird species and frogs. It is expected that native vegetation along the two creek lines will be retained. It is recommended that a site Vegetation Management Plan (VMP) be developed and implemented to minimise impact and ensure appropriate management of weed species onsite."

The report concludes that the proposal will have no significant impact on threatened species, populations or ecological communities. A copy of the report is appendix 2.

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

The land is classified as bushfire prone land. Any subdivision application which may follow this planning proposal will address the requirements of *Planning for Bushfire Protection* in detail. However a preliminary review of the proposal indicates that compliance will be achievable.

Attachment 3 is a preliminary bushfire hazard assessment report prepared by Control Line Consulting, which concludes:

"After consideration of the aims and objectives of Planning for Bush Fire Protection 2006 in the context of the Rezoning Application and the Concept Layout Plan for future development of the subject allotment it is my professional opinion that the provisions of bushfire regulatory requirements could be achieved and that the consent authorities would be likely to approve the indicated development."

The proposal will result in a new access road which will form a T-junction with Bells Line of Road. While the location provides adequate site distance in both directions, the current width of the Bells Line of Road carriageway would not allow west travelling vehicles to pass inside a vehicle which is stopped to turn right into the proposed subdivision.

Traffic impacts have been reviewed by Thompson Stanbury Associates. A copy of the report is appendix 4. In accordance with the recommendations contained in the Thompson Stanbury report, it is proposed to provide localised widening to create a right turn lane with painted median. This will minimise any potential traffic impacts.

9. Has the planning proposal adequately addressed any social and economic effects?

Yes.

There are positive social and economic effects arising from utilising land for minor expansion of the rural village of Kurmond. The land is within close proximity to existing schools, services and shops, all of which will benefit from the additional households which will be established on the land. The proposal will provide additional housing opportunities in a suitable area as identified by the Hawkesbury Residential Land Strategy.

It is noted that the land has not been identified as containing any items of European or aboriginal cultural heritage.

Section D – State and Commonwealth Interests

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

The land is serviced by electricity, telephone and communications and reticulated water. The likely demand for services created by the subdivision would be met by the usual contribution process with the relevant authorities.

The report by Thompson Stanbury provides a design for recommended treatment of the intersection of the proposed new road with Bells Line of Road. The design is for a T-junction with a channelised right turn treatment with a short turn slot in accordance with the relevant AUSTROADS design guidelines. The intersection will be constructed by the developer during the development process.

Waste water from future dwellings on the proposed lots will be treated and disposed on-site. Therefore there will be no additional demand for reticulated sewerage.

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

The following public authorities should be consulted in relation to the issues listed in the following table.

Public Authority	Issue
NSW Office of Environment & Heritage	Potential impact on flora and fauna
NSW Roads and Maritime Services	Access to Bells Line of Road (State Road)
NSW Rural Fire Services	The land is identified as bushfire prone
NSW Department of Trade & Investment – Mineral Resources Branch	Requirement of S 117 Direction 1.3

Part 4 – Mapping

Sufficient mapping has been included in this Planning Proposal to identify the mapping changes which are required. The Council will provide appropriate mapping in accordance with the *Standard technical requirements for LEP Maps*. The Council's mapping will be submitted for Gateway determination with the Planning Proposal.

Part 5 – Community Consultation

It is considered that a public exhibition period of 14 days would be sufficient community consultation for this planning proposal.

Part 6 – Project Timeline

Council staff has provided the following indicative timeline for DP&I's consideration. Note that the Applicant is of the view that the time frames included are overly generous. Therefore the time frames in red text are those which are considered to be more reasonable by the Applicant.

Project Phase	**Indicative Timeline**
1. Anticipated commencement date	12 weeks from date of referral to DP&I for Gateway determination
2. Completion of technical information prior to government agency consultation	6 weeks (2 weeks)
3. Government agency consultation	4 weeks
4. Preparation of written advice to the adjoining/ affected property owners, public notice in a local newspaper, and exhibition material	3 weeks (2 weeks)
5. Public consultation period	2 weeks
6. Consideration of submissions and a report on the matter to Council	10 weeks (5 weeks)
7. Advice to the Department, the applicant and submission authors of Council's resolution	2 weeks (1 week)
8. Request to PC to prepare a draft LEP under Section 59(1) of the Act with a copy of the request to DP & I	2 weeks
9. Finalisation of the content of the draft LEP by PC in consultation with Council and issuing of legal opinion on the draft plan	6 weeks
10. Request to the Department for online notification of the LEP	2 weeks (1 week)

Conclusion

It is considered that this planning proposal satisfies all of the requirements for a Gateway Determination by the LEP Review Panel. In summary, the proposal is justified for the following reasons:

1. The land has the appropriate physical characteristics to support large lot residential development as proposed.

2. The proposed rezoning will make use of existing infrastructure, therefore no additional infrastructure is required.

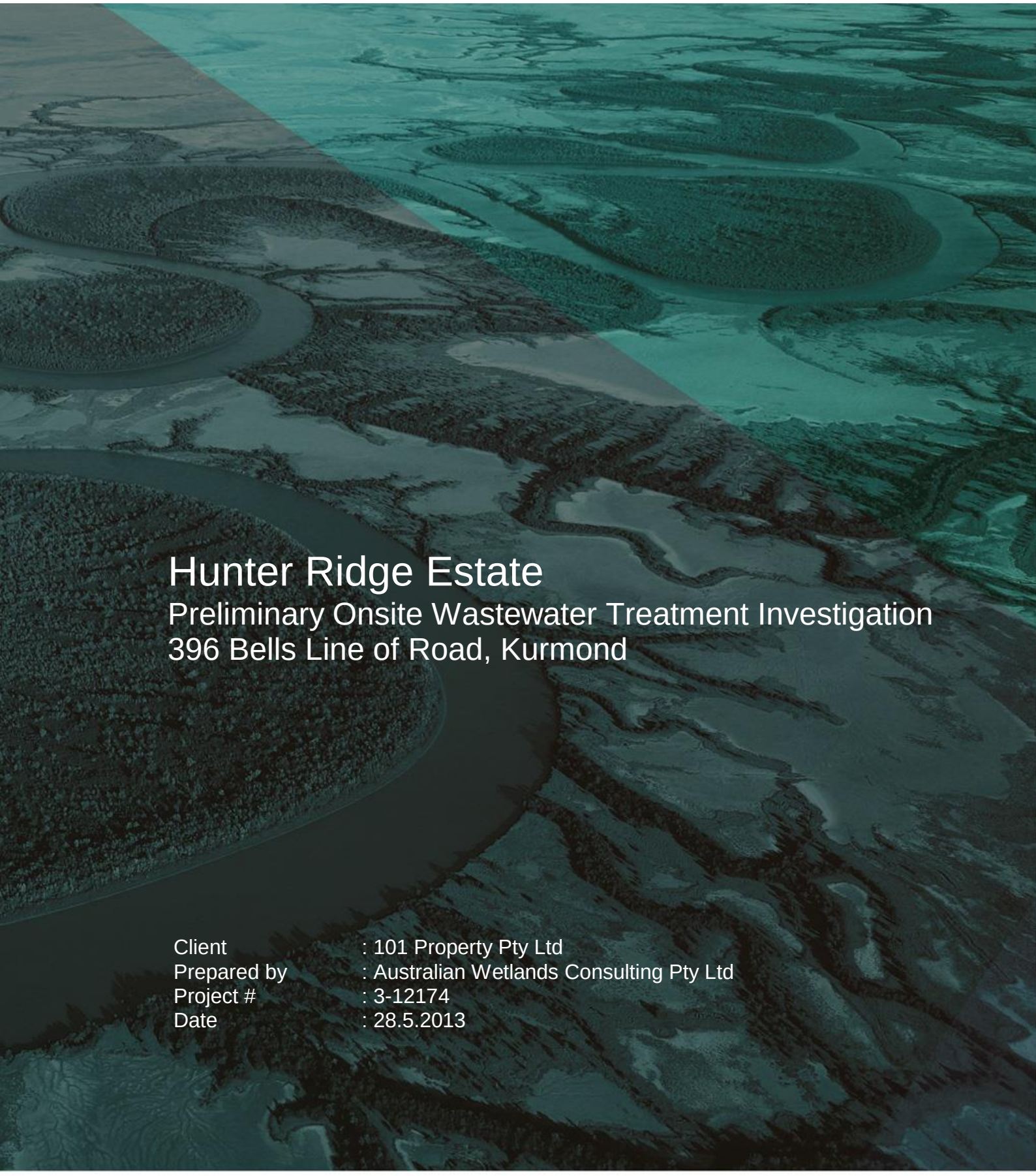
3. There will be no adverse environmental or visual impact as a consequence of development of the land. The proposal effectively represents infill development.

4. The proposal represents a suitable expansion of the existing Kurmond Village.

5. The proposal is consistent with all relevant State, Regional and Local Strategies, including the Hawkesbury Residential Land Strategy.

Accordingly Hawkesbury City Council is requested to support this application, and resolve to prepare a draft local environmental plan as proposed.

Appendix 1: Wastewater Investigation



Hunter Ridge Estate

Preliminary Onsite Wastewater Treatment Investigation
396 Bells Line of Road, Kurmond

Client	: 101 Property Pty Ltd
Prepared by	: Australian Wetlands Consulting Pty Ltd
Project #	: 3-12174
Date	: 28.5.2013

Leading environmental solutions...

AWC

Project control

Project name: Hunter Ridge Estate Wastewater Treatment Investigation
396 Bells Line of Road, Kurmond

Job number: 3-12174
Client: 101 Group
Contact: Rob Montgomery

Prepared by: Australian Wetlands Consulting Pty Ltd

201/ 62 Moore Street
Austinmer, NSW, 2515

P | (02) 4283 8308
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Date:	Revision:	Prepared by:	Reviewed by:	Distributed to:
5.06.2013	A	R. Berry	DM	101

Table of Contents

Introduction

The purpose of this investigation is to develop, with a high degree of confidence, an understanding of the site and its constraints to ascertain requirements for the sustainable on-site treatment and disposal of residential wastewater generated within the proposed Hunter Ridge Estate. Extensive investigations were undertaken regarding the best options for waste management onsite. In consultation with Hawkesbury Council (Onsite Wastewater approvals officer D. West, 4.6.13) it was established that 40m offsets from the water courses onsite would be appropriate.

The property is located at 396 Bells Line of Road, Kurmond. The proposal comprises 27 residential lots with an average lot size of 4000m2. House types are assumed to be typically 4-5 bedroom homes with 1.5 people per room or six people per house.

ASNZS 1547:2012 On-site domestic wastewater management and Sydney Catchment Authorities Design and Installation of On-Site Wastewater Systems 2012 , the 'Silver Book' have been adopted as the guiding documents and standard for sampling procedures and analysis.

Climate – BOM data obtained for Richmond RAAF base.

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Temperature															
Mean maximum temperature (°C)	30.0	29.1	26.8	23.9	20.6	17.9	17.4	19.7	22.7	25.0	26.7	28.5	24.0	19	1993 2013
Mean minimum temperature (°C)	17.6	17.7	15.6	11.4	7.6	4.9	3.6	4.4	8.0	11.0	14.1	16.0	11.0	18	1993 2013
Rainfall															
Mean rainfall (mm)	78.5	125.8	74.2	48.9	52.4	48.0	31.2	30.7	49.7	52.8	83.5	61.6	737.8	19	1994 2013
Decile 5 (median) rainfall (mm)	67.4	141.2	70.2	40.0	37.1	35.2	24.6	16.4	33.2	32.8	82.2	55.4	721.4	19	1994 2013
Mean number of days of rain ≥ 1 mm	7.6	8.5	7.6	5.8	5.7	5.4	4.2	3.4	4.7	5.9	8.1	6.5	73.4	19	1994 2013
Mean 9am temperature (°C)	22.1	21.3	19.1	17.0	13.1	10.0	8.9	11.4	15.4	18.3	19.2	20.9	16.4	17	1993 2010
Mean 9am relative humidity (%)	72	78	80	76	82	83	80	69	63	58	68	68	73	16	1993 2010
Mean 9am wind speed (km/h)	9.1	8.1	6.6	6.9	5.7	6.3	5.9	8.1	9.9	10.3	9.9	8.9	8.0	16	1993 2010
3 pm conditions															
Mean 3pm temperature (°C)	28.5	27.4	25.8	23.0	19.7	17.0	16.5	18.7	21.5	23.5	25.2	27.5	22.9	17	1993 2010
Mean 3pm relative humidity (%)	47	52	52	49	53	53	48	39	39	40	46	44	47	16	1993 2010
Mean 3pm wind speed (km/h)	16.6	15.6	14.7	14.4	12.6	13.5	14.3	17.7	19.4	19.1	19.0	17.7	16.2	16	1993 2010

Site character

The site is orientated North/ South ranging from flat to undulating grazing to relatively shallow gullies. Three unnamed, temporary water courses cross the site flowing West to East. Appendix A illustrates the watercourse lines and 40m offsets plus land areas steeper than 1V:6H.

Historically the site has been heavily modified through fire and tree felling for grazing land. The majority of land at the site comprises scattered trees (predominantly black wattle and woody weed species) cleared grazing land, 4 dams, isolated patches of Eucalypt sp (various) and vegetated watercourse lines with mixed invasive ground and shrub layer and native tree species.

Soils

Soils samples at 3 sites were taken as a preliminary assessment of site soils to determine whether soils are suitable for on-site waste management. From the 3 sites, 4 soil samples (S1-S4) were taken at intercepted soil horizons to min 500mm depth.

- S1 and S2 were taken from sample site 1 (S 33.33.231, E 150,42.163, 80m). S1 is the top AH horizon and is deemed to be consistent over the site varying only in depth.
- S3 from sample site 2, (S33,33.233, E150,42.044, 73m),
- S4 from sample site 3, (S33,33.234, E150,42.12, 75m).

Soil samples were collected and sent to Environmental Analysis Laboratory for analysis and were tested for the following parameters:

- colour,
- texture,
- salinity and sodicity,
- instability,
- cation exchange capacity,
- mobility of nutrients,

Soil Characteristics

Soil results are provided in Appendix B. In summary site soils are:

- Generally light to medium clay
- Slight sodic in places
- Moderately acidic
- Slightly low Cation Exchange Capacity

Site and soil limitations to wastewater disposal

These limitations include:

- Hydrology
- Existing watercourse lines
- Slope/ gradient
- pH between 5.17-5.65

- Slightly low effective cation exchange capacity of 4.76-8.41, which may affect nutrient uptake of some plants.
- Overland flow of water from upslope land.

As per Table L1 of ASNZS 1547:2012 for category 5 and 6 soils light to medium clays, soil modification procedures may be required.

In order to ameliorate against these limitations for absorption by the soil, the follow actions are needed at a preliminary level. Soils can be improved with addition of lime and organic matter as per the following table. Alternative options and technologies will be explored in addition to absorption by the soil during design development.

	Sample 1 (S 33.33.231, E 150,42.163, 80m).	Sample 2 (S 33.33.231, E 150,42.163, 80m).	Sample 3 (S33,33.233, E150,42.044, 73m)	Sample 4 (S33,33.234, E150,42.12, 75m).
Lime mg/kg DW	1486	1865	2369	1997
Lime kg/m3 DW	2.4	3.0	3.8	3.2
Phosphorus kg/m3 DW	0.25	0.23	0.22	0.19
Gypsum kg/m3 DW	1.0	1.1	0.4	3.4

System setbacks and exclusion zones

As per published standards and guidelines the following setbacks are provided for system locations on site:

- 40m from dams or drainage lines
- 100m from named water courses
- 6m (up grade), 3m (down grade) of property boundaries
- 3m from paths, walkways, driveways,
- 15m from dwellings for surface irrigation,
- 6m to dwellings for sub-surface irrigation
- 6m to swimming pools

Existing vegetation

The preliminary Ecological survey for site flora and fauna was undertaken on the 20th of April at 396 Bells line of Road. A site assessment was completed by inspecting the site and mapping/describing vegetation communities present and identifying conservation values as per the *Threatened Species Conservation Act 1995* or the *Environment Protection Biodiversity Conservation Act 1999.* The Hawkesbury Council's biodiversity mapping identifies significant vegetation on the land in the form of SSTF. The ecological inspection confirmed that the most areas identified as significant vegetation comprises of scattered trees with cleared grazing pasture or invasive weed species. Accordingly, it is considered that the proposal and the establishment of exclusion zones for onsite wastewater treatment and disposal will have no significant impact on threatened species populations or ecological communities.

Figure 1 – Site showing shaded riparian zone surrounded by grazing land

Land application

A dedicated irrigation area is proposed for each lot based on the current lot layout. It has been assumed that a 1000m2 area be dedicated to the treatment system most suited to individual sites. Design analysis of individual sites at a later date will determine individual system requirements based on site character.

As per ASNZS 1547:2012 and at a preliminary level, the site lends itself to most technologies. Land application/ irrigation methods will be implemented dependent on detailed soil analysis, slope analysis, hydrology and available land. The results of soil analysis show the site has light to medium clays that are slightly acidic soil with a low cation exchange capacity (CEC) and so it is suggested that soils would improved through cultivation and addition of organic matter and gypsum regardless of slope. This being the case treatment systems characterised by slope will be employed as follows:

- Surface irrigation up to 10% slope
- Evaporation/ transpiration trenches/ beds up to 10% slope
- Mounds up to 15% slope
- Sub-surface irrigation up to 30% slope

Possible Cumulative Impact

On-site wastewater management involves the treatment and release of domestic wastewater into the environment. Inappropriate use or disposal can have an adverse impacts such as: contamination of ground and surface water, degradation of soil and vegetation, spread of disease and pathogens, decreased amenity caused by odour. To manage these and the long term impacts of on-site wastewater treatment, regulatory and legislative requirements, guidelines and current best practice, management, and monitoring will be adopted and determine design and operational procedures to limit any adverse impacts. On-site systems will be designed and managed under these principles. Individual systems will be designed in a holistic manner taking into consideration the water cycle, catchment management, sustainable development principles and public health to mitigate any adverse cumulative impact.

Conclusion

Preliminary investigations including soil analysis, flora and fauna investigations and constraints mapping indicate that the site exhibits suitable characteristics and available land, based on the preliminary lot layout for a variety of on-site wastewater treatment systems. Concern has been raised by the Council in respect of the potential cumulative impact of on-site disposal on individual future allotments. It is submitted that the characteristics of the land, combined with recommended soil improvement and systems as required, will ensure that the impacts will be managed within the site. Therefore, it is proposed that, pending detailed design there will be no cumulative impact imposed on the environment by on-site wastewater management.

References

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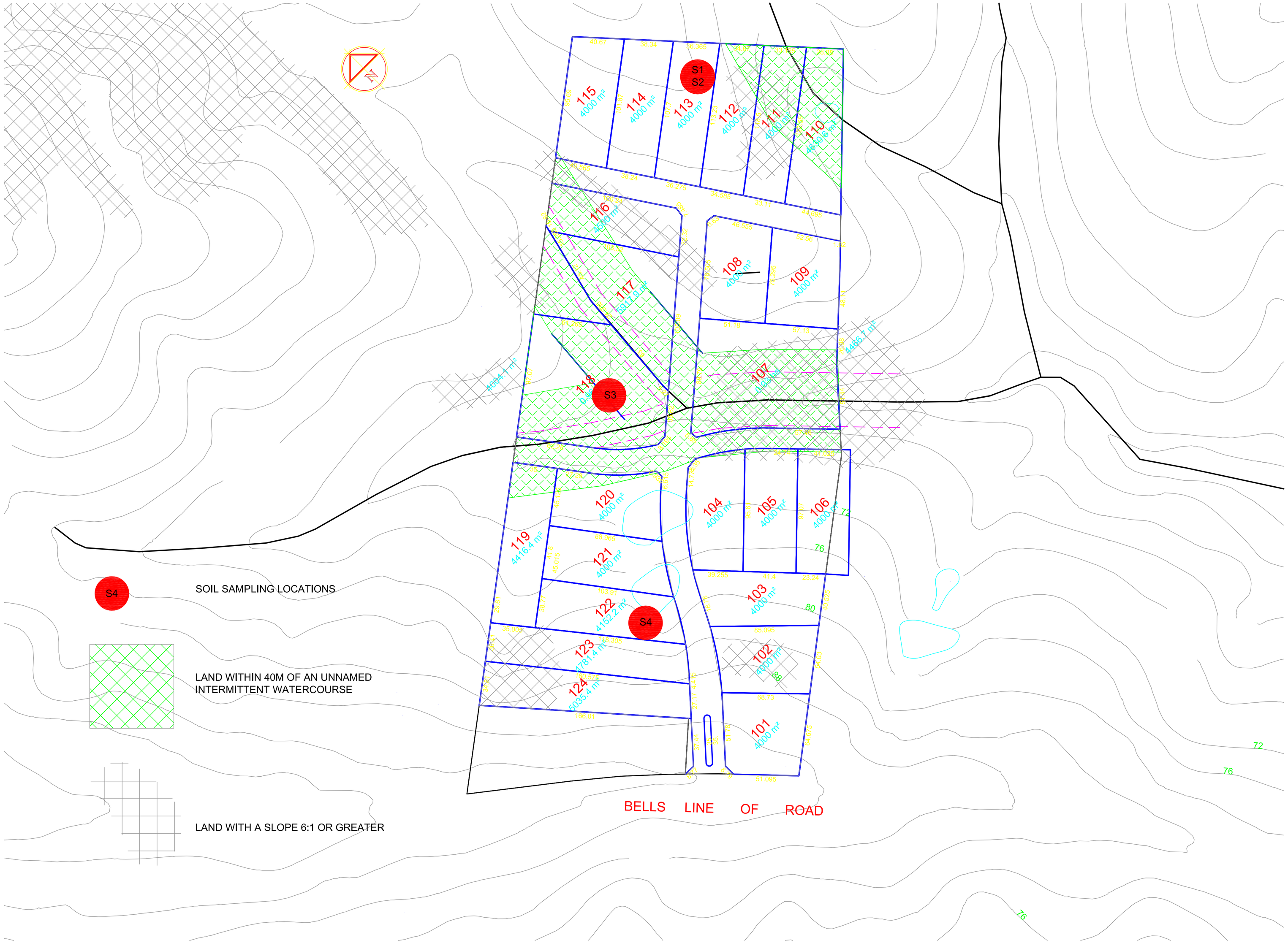
Appendix A – Site Plan and Constraints



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REV.	ISSUE / AMENDMENTS	DATE	DESIGNED	DRAWN	CHECKED

CLIENT: 101

PROJECT: Hunter Ridge Estate

DRAWING: Wastewater Constraints Mapping

DRAWING CREATED: 28.12.11

SCALE: NTS

AW JOB No.	CAD FILE No.	DWG No.	REV.

Appendix B - Soil Analysis

ROUTINE AGRICULTURAL SOIL ANALYSIS REPORT

Job No:	C2662
No of Samples:	4
Date Supplied:	15/10/2012
Supplied by:	Richard Berry

	Sample 1	Sample 2	Sample 3
Sample ID:	S1	S2	S3
Crop:	N/G	N/G	N/G
Client:	AWC	AWC	AWC

Method	*Nutrient*		*Units*	*C2662/1*	*C2662/2*	*C2662/3*
Morgan 1	Calcium	Ca	mg/kg	204	165	41
	Magnesium	Mg		102	144	40
	Potassium	K		115	68	44
	Phosphorus	P		0.8	0.5	0.3
Bray1	Phosphorus	P	mg/kg	4.1	5.6	6.0
Colwell				13	5.6	4.5
Bray2				12	4.0	2.4
KCl	Nitrate Nitrogen	N	mg/kg	2.4	0.4	0.7
	Ammonium Nitrogen			6.5	3.8	6.2
	Sulfur	S		13	7.1	8.8
1:5 Water	pH		units	5.52	5.49	5.17
	Conductivity		dS/m	0.049	0.027	0.017
Calculation	Organic Matter		% OM	5.8	4.7	3.0
Ammonium Acetate + Calculations	Calcium	Ca	$cmol^+/Kg$	2.02	1.27	0.26
			kg/ha	909	569	117
			mg/kg	406	254	52
	Magnesium	Mg	$cmol^+/Kg$	1.62	1.69	0.41
			kg/ha	442	460	111
			mg/kg	197	205	50
	Potassium	K	$cmol^+/Kg$	0.72	0.37	0.19
			kg/ha	630	327	168
			mg/kg	281	146	75
	Sodium	Na	$cmol^+/Kg$	0.16	0.20	0.06
			kg/ha	81	103	32
			mg/kg	36	46	14
KCl	Aluminium	Al	$cmol^+/Kg$	0.41	0.68	0.77
			kg/ha	83	137	155
			mg/kg	37	61	69
Acidity Titration	Hydrogen	H^+	$cmol^+/Kg$	1.38	2.71	3.06
			kg/ha	31	61	69
			mg/kg	14	27	31
Calculation	Effective Cation Exchange Capacity (ECEC)		$cmol^+/Kg$	6.32	6.92	4.76
Base Saturation Calculations	Calcium	Ca	%	32.1	18.3	5.5
	Magnesium	Mg		25.7	24.4	8.6
	Potassium	K		11.4	5.4	4.0
	Sodium - ESP	Na		2.5	2.9	1.3
	Aluminium	Al		6.5	9.8	16.1
	Hydrogen	H^+		21.9	39.2	64.4
Calculation	Calcium/ Magnesium Ratio		ratio	1.2	0.8	0.6
DTPA	Zinc	Zn	mg/kg	1.2	0.7	0.5
	Manganese	Mn		22	9	10
	Iron	Fe		163	162	221
	Copper	Cu		1.0	1.2	0.3
$CaCl_2$	Boron	B	mg/kg	0.46	0.50	0.40
	Silicon	Si		45	49	38
LECO IR Analyser	Total Carbon	C	%	3.34	2.66	1.70
	Total Nitrogen	N	%	0.19	0.13	0.09
Calculation	Carbon/ Nitrogen Ratio		ratio	17.4	20.4	18.8
	Lab Texture			Light Clay	Light Clay	Clay Loam
	Basic Colour			Brownish	Brownish	Brownish
Calculation	Chloride Estimate		equiv. ppm	31	17	11
See note 10	Emerson Aggregate Test		..	*EAT Class 5*	*EAT Class 3*	*EAT Class 5*

EAL Soil Testing Notes

1. All results as dry weight - 40°C oven dried soil crushed to <2mm
2. Methods from Rayment and Lyons, 2011. *Soil Chemical Methods*
3. Soluble Salts included in Exchangeable Cations - NO PRE-WASH
4. 'Morgan 1 Extract' adapted from 'Science in Agriculture', 'Non-Toxic Farming' and Lamonte Soil Handbook.
5. Guidelines for phosphorus have been reduced for Australian soils
6. Indicative guidelines are based on 'Albrecht' and 'Reams' concepts
7. Total Acid Extractable Nutrients indicate a store of nutrients
8. Contaminant Guides based on 'Residential with gardens and accessible soil including childrens daycare centres, preschools, primary schools, town houses or villas' (NSW EPA 1998).
9. Information relating to testing colour codes is available on Sheet 2 - "*Understanding you soil results*"
10. MEAT Method from On-site Sewage Management Guidelines using the SAR5 solution. **MEAT Class 1:** Worked bolus material disperses; **Class 2:** Aggregates disperse (cloud solution); **Class 3:** Aggregates slake; **Class 4:** No change to aggreagate- non-dispersive.

Calculations

1. For conductivity 1 dS/m = 1 mS/cm = 1000 µS/cm
2. 1 $cmol^+/Kg$ = 1 meq/100g; 1 Lb/Acre = 2 ppm (parts per million); kg/ha = 2.24 x ppm; mg/kg = ppm
3. Conversions for 1 $cmol^+/Kg$ = 230 Kg/Hectare Sodium, 780 Kg/Ha Potassium, 240 Kg/Ha Magnesium, 400 Kg/Ha Calcium
4. Organic Matter = %C x 1.75
5. Chloride Estimate = EC x 640 (most likely over-estimate)
6. ECEC = sum of the exchangeable cations $cmol^+/Kg$
7. Base saturation calculations = (cation cmol+/Kg) /ECEC x 100
8. Ca/Mg ratio from the exchangeable $cmol^+/Kg$ results

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

Results Checked by Kris Saville
Senior Agricultural Analyst

ROUTINE AGRICULTURAL SOIL ANALYSIS REPORT

Job No:	C2662
No of Samples:	4
Date Supplied:	15/10/2012
Supplied by:	Richard Berry

				Sample ID:	**Sample 4** S4	***Medium Soil***	***Light Soil***	***Sandy Soil***
				Crop:	N/G			
				Client:	AWC	*e.g Clay Loam*	*e.g Loam*	*e.g Loamy Sand*
	Method	*Nutrient*		*Units*	*C2662/4*			
	Morgan 1	Calcium	Ca	mg/kg	129	*750*	*375*	*175*
		Magnesium	Mg		170	*105*	*60*	*25*
		Potassium	K		83	*75*	*60*	*50*
		Phosphorus	P		0.6	*12*	*10*	*5.0*
	Bray1	Phosphorus	P	mg/kg	8.5	*30 note 8*	*24 note 8*	*20 note 8*
	Colwell				6.4	*50*	*45*	*35*
	Bray2				2.8	*60 note 8*	*48 note 8*	*40 note 8*
	KCl	Nitrate Nitrogen	N	mg/kg	0.8	*13*	*10*	*10*
		Ammonium Nitrogen			6.1	*18*	*15*	*12*
		Sulfur	S		12	*8.0*	*8.0*	*7.0*
	1:5 Water	pH		units	5.65	*6.5*	*6.3*	*6.3*
		Conductivity		dS/m	0.039	*0.150*	*0.120*	*0.100*
	Calculation	Organic Matter		% OM	4.1	*>4.5*	*>3.5*	*>2.5*
	Ammonium Acetate + Calculations	Calcium	Ca	cmol$^+$/Kg	1.00			
				kg/ha	451			
				mg/kg	201	*2150*	*1000*	*375*
		Magnesium	Mg	cmol$^+$/Kg	2.03			
				kg/ha	552			
				mg/kg	246	*200*	*145*	*75*
		Potassium	K	cmol$^+$/Kg	0.50			
				kg/ha	442			
				mg/kg	197	*190*	*150*	*100*
		Sodium	Na	cmol$^+$/Kg	0.58			
				kg/ha	300			
				mg/kg	134	*60*	*51*	*25*
	KCl	Aluminium	Al	cmol$^+$/Kg	0.90			
				kg/ha	181			
				mg/kg	81	*45*	*41*	*14*
	Acidity Titration	Hydrogen	H^+	cmol$^+$/Kg	3.40			
				kg/ha	76			
				mg/kg	34	*5*	*5*	*2*
	Calculation	Effective Cation Exchange Capacity (ECEC)		cmol$^+$/Kg	8.41	*14*	*7*	*4*
	Base Saturation Calculations	Calcium	Ca	%	11.9	*76*	*69*	*60*
		Magnesium	Mg		24.1	*12*	*16*	*20*
		Potassium	K		6.0	*4*	*5*	*8*
		Sodium - ESP	Na		6.9	*2*	*3*	*3*
		Aluminium	Al		10.7	*7*	*7*	*9*
		Hydrogen	H^+		40.4			
	Calculation	Calcium/ Magnesium Ratio		ratio	0.5	*6.3*	*4.3*	*3.0*
	DTPA	Zinc	Zn	mg/kg	0.7	*5.0*	*4.0*	*3.0*
		Manganese	Mn		11	*22*	*18*	*15*
		Iron	Fe		149	*22*	*18*	*15*
		Copper	Cu		1.6	*2.0*	*1.6*	*1.2*
	$CaCl_2$	Boron	B	mg/kg	0.60	*1.7*	*1.4*	*1.0*
		Silicon	Si		57	*45*	*40*	*35*
	LECO IR Analyser	Total Carbon	C	%	2.35	*>2.6*	*>2.0*	*>1.4*
		Total Nitrogen	N	%	0.15	*>0.25*	*>0.20*	*>0.15*
	Calculation	Carbon/ Nitrogen Ratio		ratio	15.6	*10-12*	*10-12*	*10-12*
		Lab Texture			Medium Clay	..	..	..
		Basic Colour			Brownish	..	..	..
	Calculation	Chloride Estimate		equiv. ppm	25	..	..	..
	See note 10	Emerson Aggregate Test		..	*EAT Class 3*	..	..	..

EAL Soil Testing Notes

1. All results as dry weight - 40°C oven dried soil crushed to <2mm
2. Methods from Rayment and Lyons, 2011. *Soil Chemical Methods*
3. Soluble Salts included in Exchangeable Cations - NO PRE-WASH
4. 'Morgan 1 Extract' adapted from 'Science in Agriculture', 'Non-Toxic Farming' and Lamonte Soil Handbook.
5. Guidelines for phosphorus have been reduced for Australian soils
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7. Total Acid Extractable Nutrients indicate a store of nutrients
8. Contaminant Guides based on 'Residential with gardens and accessible soil including childrens daycare cent preschools, primary schools, town houses or villas' (NSW EPA 1998).
9. Information relating to testing colour codes is available on Sheet 2 - "*Understanding you soil results*"
10. MEAT Method from On-site Sewage Management Guidelines using the SAR5 solution. **MEAT Class 1:** W
Class 2: Aggregates disperse (cloud solution); **Class 3:** Aggregates slake; **Class 4:** No change to aggreagate

Calculations

1. For conductivity 1 dS/m = 1 mS/cm = 1000 µS/cm
2. 1 cmol$^+$/Kg = 1 meq/100g; 1 Lb/Acre = 2 ppm (parts per million); kg/ha = 2.24 x ppm; mg/kg = ppm
3. Conversions for 1 cmol$^+$/Kg = 230 Kg/Hectare Sodium, 780 Kg/Ha Potassium, 240 Kg/Ha Magnesium, 400
4. Organic Matter = %C x 1.75
5. Chloride Estimate = EC x 640 (most likely over-estimate)
6. ECEC = sum of the exchangeable cations cmol$^+$/Kg
7. Base saturation calculations = (cation cmol+/Kg) /ECEC x 100
8. Ca/Mg ratio from the exchangeable cmol$^+$/Kg results

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Results Checked by Kris Saville
Senior Agricultural Analyst

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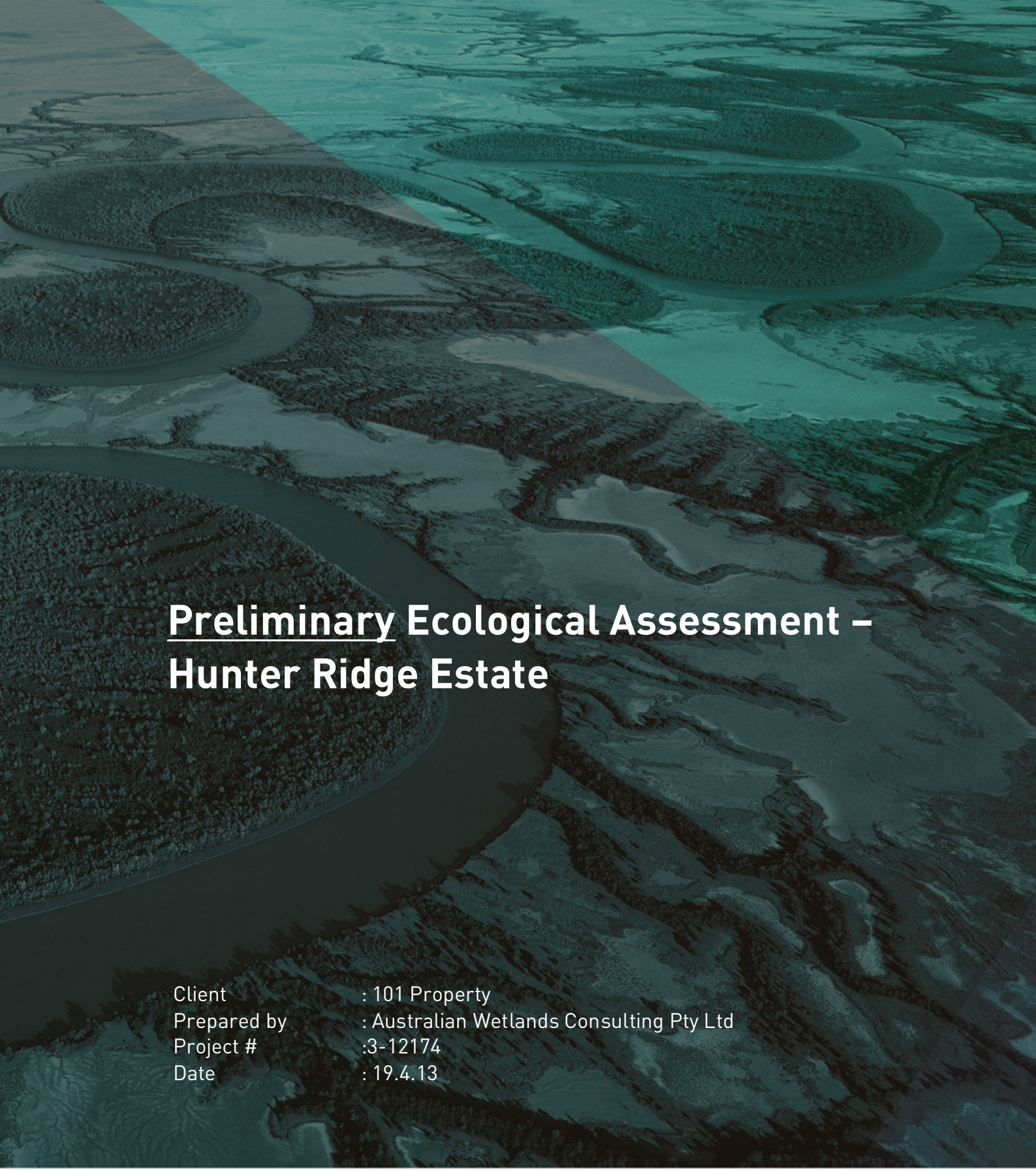
Appendix 2: Ecological Assessment



Preliminary Ecological Assessment – Hunter Ridge Estate

Client	: 101 Property
Prepared by	: Australian Wetlands Consulting Pty Ltd
Project #	:3-12174
Date	: 19.4.13

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Preliminary Ecological Assessment – Hunter Ridge Estate

396 Bells Line of Road, Kurmond

Project control

Project name: **Preliminary Ecological Assessment – Hunter Ridge Estate**
396 Bells Line of Road, Kurmond

Job number: 3-12174
Client: 101 Property
Contact: Ken Hardaker

Prepared by: Australian Wetlands Consulting Pty Ltd

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Date:	Revision:	Prepared by:	Reviewed by:	Distributed to:
23.04.13	A	Richard Berry Richard Mason		K. Hardaker

Table of Contents

Introduction and Background

The preliminary Ecological survey for site flora and fauna was undertaken on the 20th of April at 396 Bells line of Road.

A site assessment was completed by inspecting the site and mapping/describing vegetation communities present and identifying conservation values as per the *Threatened Species Conservation Act 1995* or the *Environment Protection Biodiversity Conservation Act 1999.*

The following outlines the results of the assessment and describe the conservation values of the vegetation, disturbance levels, weed presence and other relevant matters. Please note that the site assessment was general in nature only and no specific targeted searches for threatened flora were undertaken other than to ground truth Council mapping for the presence of the Shale Sanstone Transition Forest (SSTF) Community.

The Site – 396 Bells Line of Road, Kurmond, NSW

Historically the site has been heavily modified through fire and tree felling for grazing land. The majority of land at the site comprises of scattered trees (predominantly black wattle and woody weed species) cleared grazing land, 4 dams, isolated patches of Eucalypt sp (various) and vegetated creek lines with mixed invasive ground and shrub layer and native tree species (refer to figure 1 below).

Figure 1 – Site showing shaded riparian zone surrounded by grazing land

The Hawkesbury Council's biodiversity mapping identifies significant vegetation on the land in the form of SSTF. The ecological inspection confirmed that the most areas identified as significant vegetation comprises of scattered trees with cleared grazing pasture or invasive weed species. These scattered trees provide little or no vegetation connectivity as there is no continuous canopy, nor is there any native or significant understory or ground cover.

A database search from the BioNet Atlas of NSW Wildlife website. Search criteria : Public Report of all Valid Records of Entities in selected area [North: -33.49 West: 150.57999 East: 150.67999 South: -33.59] returned a total of 3,609 records of 1,130 species. (The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions).

No threatened species were observed during the ecological survey.

Vegetation along the creek and drainage lines does provide moderate connectivity however the majority of the vegetation are invasive weed species that requires clearance or control. Whilst some individual species of Shale-Sandstone Transition Forest community are present, the boundaries of this plant community is indistinct with no connectivity. No significant hollow bearing trees were found on the site. In addition the four dam sites provide habitat for aquatic bird species and frogs. It is expected that native vegetation along the two creek lines will be retained. It is recommended that a site Vegetation Management Plan (VMP) be developed and implemented to minimise impact and ensure appropriate management of weed species onsite.

Accordingly, it is considered that the proposal will have no significant impact on threatened species populations or ecological communities.

The following Species were observed during the ecology survey (including calls, scat or nesting sites).

Table 0.1. Species recorded onsite

Common Name	Scientific Name
Birds	
Willie Wagtail	Rhipidura leucophrys
Crested Pigeon	Ocyphaps lophotes
Common Bronzewing	Phaps chalcoptera
Sulphur crested Cockatoo	Cacatua galerita
Galah	Elophus roseicapillus
Rainbow lorikeet	Trichoglossus haematodus
Crimson Rosella	Platycercus elegans
Grey Fantail	Rhipidura fulignosa
Silver Eye	Zosteropus luteus
Noisy Miner	Manorina melanocephala
Indian Myna	Acridotheres tristis
House Sparrow	Passer domesticus
Black faced Cuckoo shrike	Coracina novaehollandiae
Australian raven	Corvus coronoides
Superb Fairy-wren	Malurus cyaneus
Pacific Black Duck	Anas supercilliosa
Wood duck	Chennonetta jubata
Australian Grebe	Tachybaptus novaeholandiae
Dusky Moorhen	Gallinula tenebrosa
Straw-necked Ibis	Threskiornis molucca
Australian Magpie	Gymnorhina tibicen
Pied Currawong	Strepera graculina
Grey butcherbird	Cracticus torquatus
Laughing Kookaburra	Dacelo novaeguineae
Mammals	
Common Ringtail Possum	Pseudocheirus peregrinus
Red fox	Vulpes vulpes

Common Name	Scientific Name
Rabbit	Oryctolagus cuniculus
Frogs	
Common Eastern froglet	Crinia signifera
Brown striped frog	Limnodynastes peronii
Weeds	
Moth Vine	Araujia sericifera
Crofton Weed	Ageratina adenophora
Annual Ragweed	Ambrosia artemisiifolia
Cobbler's Pegs	Bidens pilosa
Boneseed	Chrysanthemoides monilifera subsp. monilifera
Spear Thistle	Cirsium vulgare
Flaxleaf Fleabane	Conyza bonariensis
A Fleabane	Conyza spp.
Tall fleabane	Conyza sumatrensis
Potato Weed	Galinsoga parviflora
Catsear	Hypochaeris radicata
Lantana	Lanatana camara (WON)
Fireweed	Senecio madagascariensis
Prickly Sowthistle	Sonchus asper subsp. asper
Common Sowthistle	Sonchus oleraceus
Cape Honeysuckle	Tecoma capensis
Common Chickweed	Stellaria media
Fat Hen	Chenopodium album
Wandering Jew	Tradescantia fluminensis
Mother of millions	Bryophyllum delagoense

Common Name	Scientific Name
Birds-foot Trefoil	Lotus corniculatus
White Clover	Trifolium repens
Common vetch	Vicia sativa
Camphor Laurel	Cinnamomum camphora
Paddy's Lucerne	Sida rhombifolia
White Jasmine	Jasminum polyanthum
Large-leaved Privet	Ligustrum lucidum
Small-leaved Privet	Ligustrum sinense
African Olive	Olea europaea subsp. cuspidata
Creeping Oxalis	Oxalis corniculata
Radiata Pine	Pinus radiata
Perennial Veldtgrass	Ehrharta calycina
Paspalum	Paspalum dilatatum
Kikuyu Grass	Pennisetum clandestinum
Rambling Dock	Acetosa sagittata
Black Bindweed	Fallopia convolvulus
Myrtle Rust	Uredo rangelii
Blackberry complex	Rubus fruticosus sp. agg.
Wild Tobacco Bush	Solanum mauritianum
Black-berry Nightshade	Solanum nigrum
Trees	
Black Wattle	Acacia decurrens
Narrow-leaved Ironbark	Eucalyptus crebra
Thin-leaved Stringybark	Eucalyptus eugenioides

Common Name	Scientific Name
Grey Gum	Eucalyptus punctata
Sydney Blue Gum	Eucalyptus saligna
Forest Red Gum	Eucalyptus tereticornis

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Appendix 3:
Preliminary Bushfire Hazard Assessment

Control Line
CONSULTING

PO Box 7137
Wilberforce NSW 2756
P: 02 4577 0125 F: 02 4577 4688
E: craig@controllineconsulting.com.au

ABN 47 857 816 658

Building Construction in Bush Fire Prone Areas

Preliminary
Bushfire Hazard Assessment Report

REF No. 12.10.117

Address	Lot 2 DP 607906 396 Bells Line of Road, Kurmond. NSW 2757
For	101 Property Pty Ltd
The site was inspected on	15th October, 2012

Report Preparation

Craig Burley

Grad Dip Design for Bushfire Prone Areas
FPAA Certified BPAD-A Practitioner

BUSHFIRE PLANNING AND DESIGN
Certified Practitioner
Certification No. BPD-PA-09370
Signature

Executive Summary

We have been engaged by 101 Property Pty Ltd, the owners of the subject land to prepare a preliminary bush fire hazard assessment report to be a supplement for inclusion in a Rezoning Application to Hawkesbury City Council.

The site has been identified as being bushfire prone land and therefore the legislative requirements for any future proposed development would be applicable.

The purpose of this report was establish if there are any major constraints from a bushfire regulatory perspective for the subdivision of lands (subject to rezoning) and then the construction of residential dwellings upon the created allotments.

This report has found that whilst there would be bushfire related consent conditions applied to the lands at both subdivision and construction phases of development none of these should ultimately be overly restrictive or prohibit development approval by bushfire regulatory provisions.

1.0 Introduction

We have been engaged by 101 Property Pty Ltd, the owners of the subject land to prepare a preliminary bush fire hazard assessment report to be a supplement for inclusion in a Rezoning Application to Hawkesbury City Council over the subject land.

The site has been identified as being bushfire prone land and therefore the legislative requirements for the proposed development would be applicable at the time of development application for both subdivision and any future construction.

1.1 Purpose of Report

- To determine the vegetation type, the expected fire behaviour and the threat to the subject lands; and
- To assess the proposal with reference to *Planning for Bush Fire Protection* 2006; and
- To assess the proposed construction with reference to the Building Code of Australia Volume 2; and
- To determine the level of construction with reference to AS 3959-2009 *Construction of buildings in bushfire prone areas;* and
- To identify any other such measures as to improve the chances of building survival during a bushfire event; and
- To assist the consent authority Hawkesbury City Council in the determination of the rezoning application subject to this proposal.

1.2 Scope of Report

The scope of this report is limited to the Bushfire Hazard Assessment for the proposed development site and only contains recommendations for the subject property. Where reference is made to adjacent or adjoining lands, this report does not purport to assess those lands; rather it may discuss bushfire progression on and through those lands with the possible bushfire impact to the subject property and the proposed rezoning.

1.3 Regulatory Controls

The preparation of this report has given consideration to the various legislative and regulatory requirements including the *Rural Fires Act* 1997, *Environmental Planning and Assessment Act 1979*, the Building Code of Australia, *Planning for Bush Fire Protection* 2006 and AS 3959-2009 *Construction of buildings in bushfire prone areas.*

1.4 Methodology

A site inspection for the purpose of assessing bushfire related matters affecting this site was conducted on the 15th October, 2012 and a review of the proposed concept layout plans as supplied by Montgomery Planning Solutions and prepared by North Western Surveys has taken place.

An assessment of slope was conducted out to a distance of 100 metres and assessment of vegetation to a distance of 140 metres from the proposed rezoning land.

The findings were related and assessed with reference to *Planning for Bush Fire Protection* 2006 Addendum to Appendix 3 and section 2 of AS 3959-2009 *Construction of buildings in bushfire prone areas* for the formulation of the preliminary bushfire hazard assessment.

1.5 The Proposal

The proposal has been identified as the Hunter Ridge Estate and as indicated by consultation with the proponents and perusal of concept plans supplied shows the subject lands to be subdivided into 27 individual rural/residential allotments ranging in size from 4000m² to a maximum of 8200m².

These parcels shall be serviced by a central public road leading from the northern side of the Bells Line of Road. This road shall be a no through road that terminates at a turning circle within the northern most section of the estate.

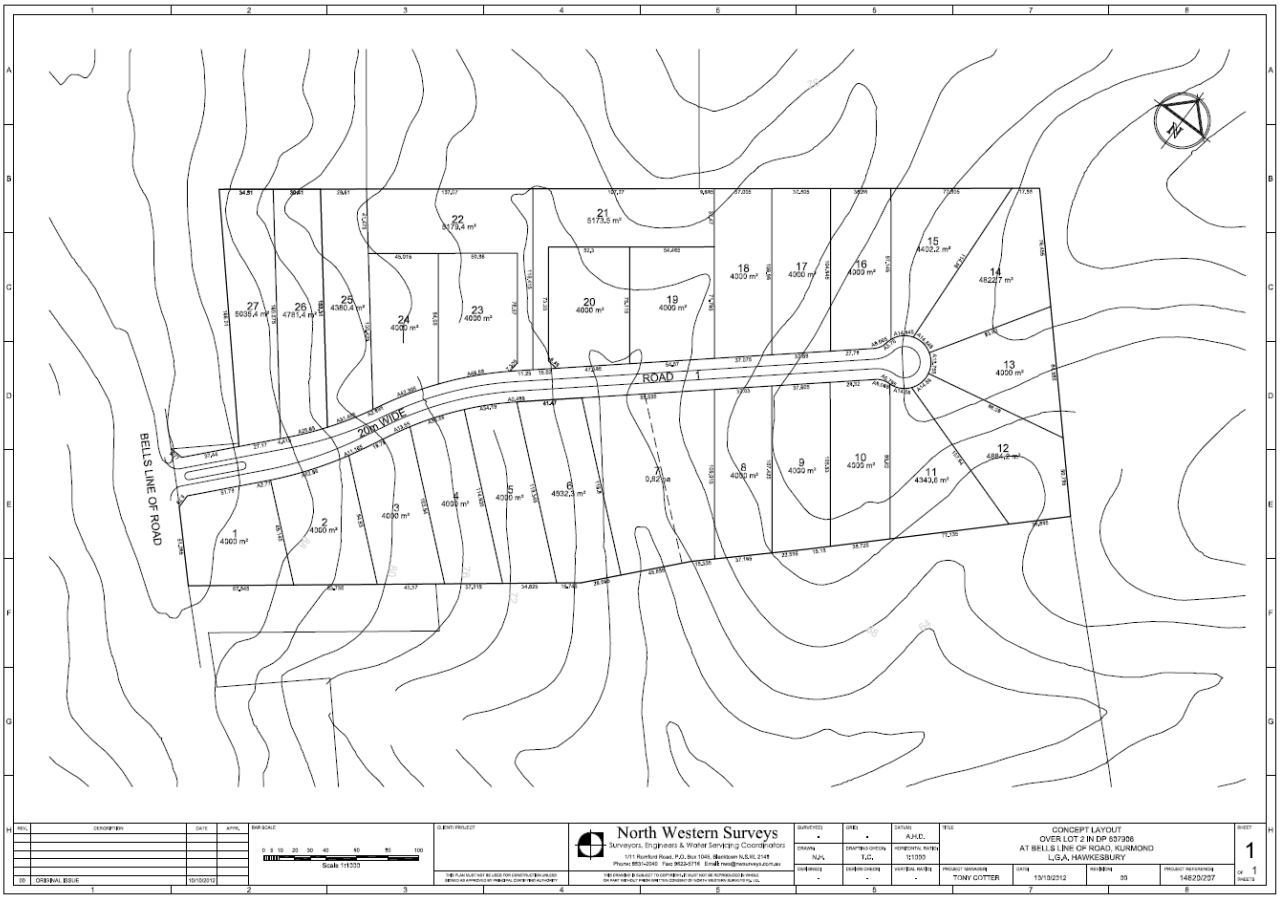

Figure 1; Concept Layout ex North Western Surveys

2.0 Site and Adjacent Developments

The following seeks to describe the site, the adjoining lands and land uses effective upon the development proposal.

2.1 Site Description

The site is identified as Lot 2 DP 607906
396 Bells Line of Road,
Kurmond. NSW 2757
LGA Hawkesbury City Council

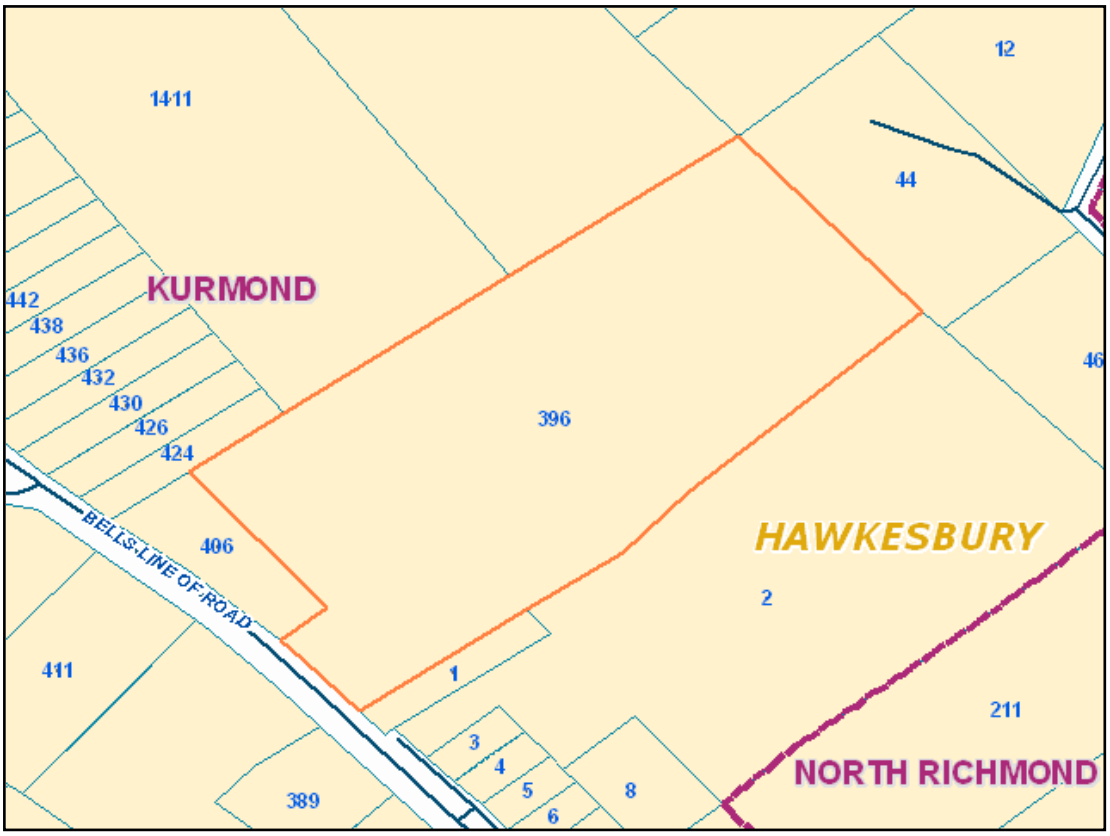

Figure 2: Address validation ex Dept of Lands

The site is at present a rural allotment of approximately 13.07 hectares located on the northern side of Bells Line of Road approximately 1.0 kilometre to the southeast of the existing residential development associated with the Kurmond village.

The area in which the proposal is located is generally rural and rural/residential development that has been established for many years.

Provision of mains reticulated water supply, electricity and phone is available to the proposal by existing infrastructure.

The subject allotment is located within an area that should be considered as having a limited direct interface to bushfire hazardous vegetation but is exposed to substantially more areas of grassland hazardous fuels.

The subject allotment has both north easterly and south westerly aspect slopes on either side of a centrally located naturally occurring topographical drainage feature that passes through the allotment from the north western boundary to the south eastern boundary. The drainage conditions flow in a south easterly direction into Redbank Creek.

At present the site has structural improvements limited to being an existing Class 1a residential dwelling located within the southern most section of the parcel in close proximity to the Bells Line of Road.

In terms of vegetation the vast majority of the allotment is clearly showing signs of being entirely cleared of any substantial forest vegetation and would recently have been best described as being open grasslands with scattered shade trees.

However the site to some degree has been allowed to revegetate and whilst still having substantial areas of open grasslands other areas have significant sections of what is clearly regrowth trees being particularly black wattle species.

The site is shown upon the Hawkesbury Bushfire Prone Land Map (Figure 2) to be within category 1 vegetation (shown orange) and category 2 vegetation (shown yellow) together with some very limited sections of buffer zone (shown red).

However the site inspection and interpretation of aerial photography for the site confirms that the area of category 1 vegetation particularly in the northern section of the subject allotment is quite overstated and significant sections of this area would be better described as being category 2 vegetation.

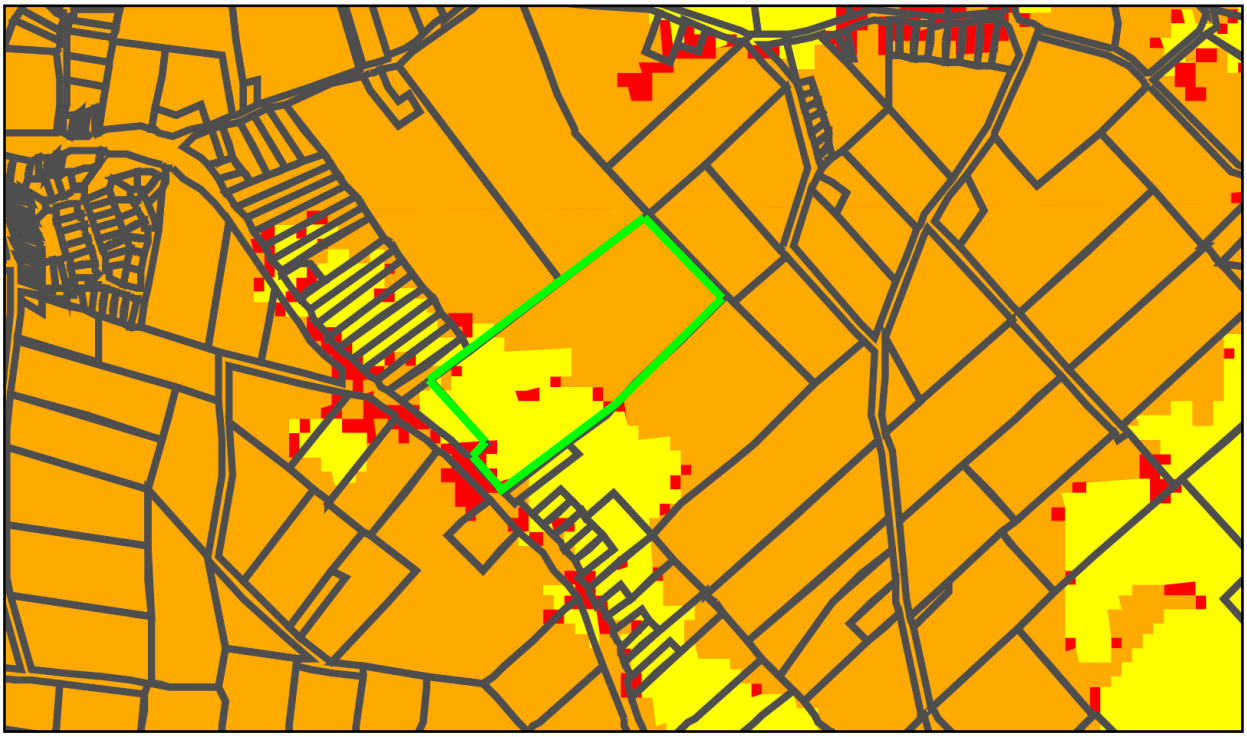

Figure 3; Section Hawkesbury LGA Bushfire Prone Land Map

2.2 Description of Adjoining Lands

To the northwest, northeast and southeast from the subject allotment are lands that appear to be predominantly used for grazing purposes for both horses and cattle.

These lands are in the majority best described as being open grasslands with scattered shade trees over gently undulating slopes within the upper catchment areas of Redbank Creek.

There is a limited section of land adjacent to the central area of southeast allotment boundary that does have a more consistent spatial arrangement of standing trees which this report has considered to be best described as a woodland vegetation formation. This area is further discussed within section 4 of this report.

Adjacent to the southwest subject allotment boundary is single rural residential development on a parcel of land approximately 6000m² and a non-operating restaurant which was recently closed by damage from a structural fire event.

Beyond these two allotments is the carriageway of the Bells Line of Road and beyond this is open grazing lands similar to those previously described as being adjacent to the subject allotment.

Additionally it is worth noting that consistently along the north eastern side of the Bells Line of Road is other rural residential allotments that are similar in size to those proposed within the concept layout plan.

The closest section of forest vegetation is located to be not closer than approximately 250 metres to the southeast of the subject allotment which is therefore located well in excess of the mandated study area required by *Rural Fires Act* 1997, NSW Rural Fire Service and the document *Planning for Bush Fire Protection* 2006.

Figure 3: Aerial photo depicting localised terrain and adjoining allotments

3.0 Environmental Considerations

The scope of this report has not been to provide an environmental survey.

It is envisaged that some vegetation removal will be required to provide for areas of asset protection zones and that studies will be undertaken by others to assess the effects of the rezoning from a flora and fauna perspective which is beyond the expertise of the author of this report.

However such findings should be considered when establishing areas of asset protection zones for future development.

4.0 Bushfire Hazard Assessment

The bushfire hazard assessment was conducted for the proposed development, using the procedures as outlined in *Planning for Bush Fire Protection* 2006, Addendum to Appendix 3 and section 2 of AS 3959-2009 *Construction of buildings in bushfire prone areas* procedure to determine the bushfire attack level (BAL) likely upon the development.

The assessment was conducted on the assumption of the building footprint being positioned as described in section 1.5 The Proposal of this report and the site plan.

4.1 Classification of Vegetation, Distance from Proposed Development

The vegetation was assessed for a distance of 140 metres from the proposed development in each of the following directions. To the northwest, northeast, southeast and southwest being the general direction adjacent and away from the proposed development site.

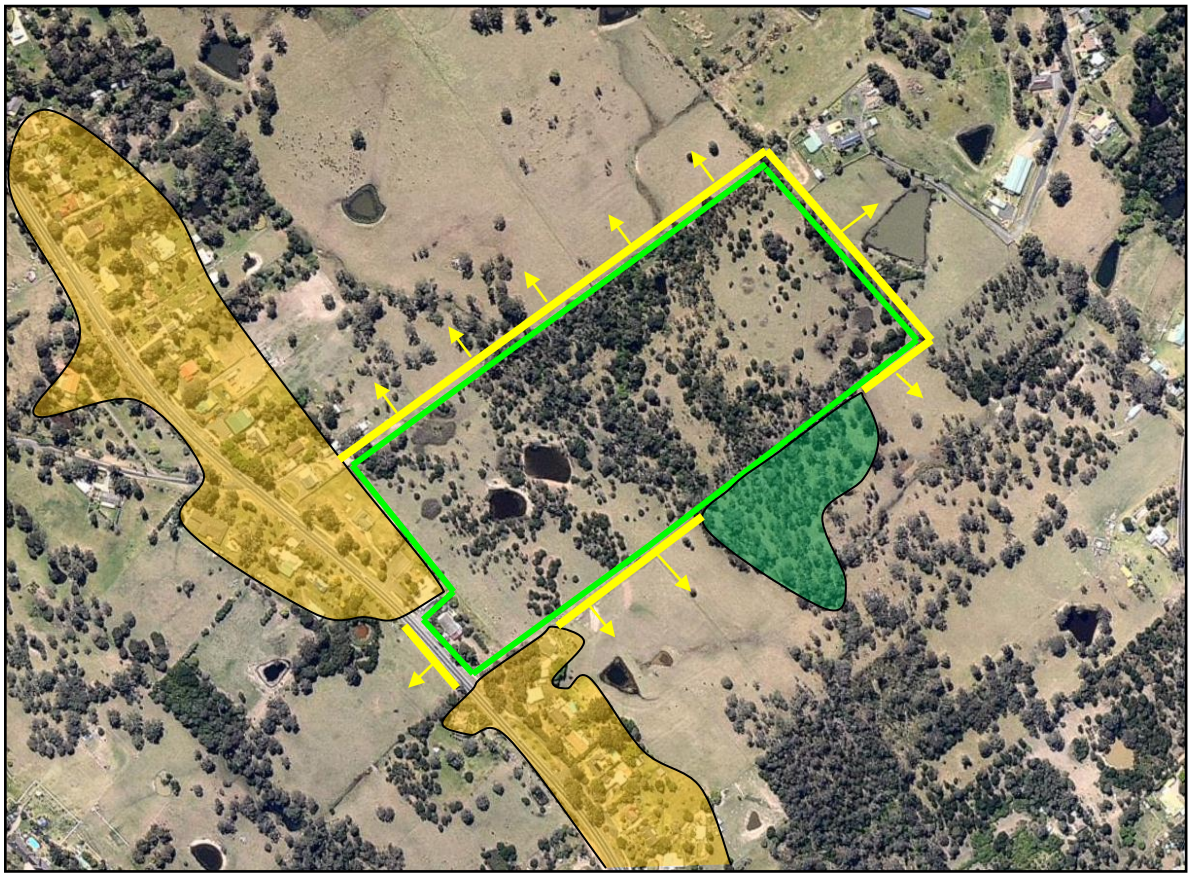

Figure 4: Vegetation study area 140 metre approx. buffer

Developed lands Woodland Grassland

It is assumed by this report that any bushfire or grassfire hazardous vegetation would be reduced within the subject allotment to a level which satisfies the provisions for an asset protection zone and therefore the only areas of fuels would potentially be located off site.

The areas identified as being developed lands contain no significant sections of bushfire or grassfire hazardous vegetation.

However there are significant sections of the development allotment that interface with grassland fuels and a small section of woodland adjacent to the south eastern boundary.

4.2 Slope Assessment

The slope was assessed for a distance of 100 meters within the bushfire hazardous vegetation and reference to slope classifications has been undertaken considering the procedure specified within section 2 of AS 3959-2009 *Construction of buildings in bushfire prone areas.*

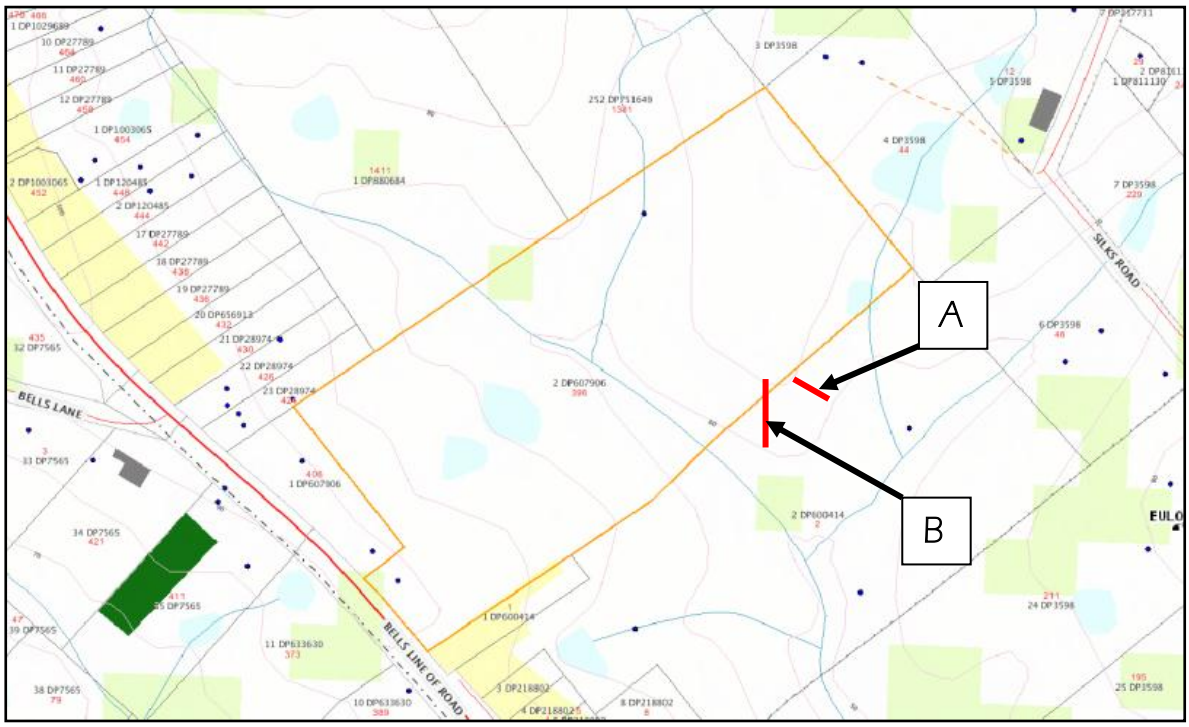

Figure 5; Slope assessment study area Image ex Dept Lands

The **effective slope** of the land, out to a distance of 100 metres from the proposed scope of works (that is, the slope of the land most likely to influence bushfire behaviour for the purposes of calculating the Category of Bushfire Attack and Asset Protection Zones), has been assessed (using a clinometer) and desktop analysis as being;

- Downslope > 10 to 15 degrees to the southeast – **A (Woodland)**
- Downslope > 5 to 1 degrees to the south – **B (Woodland)**

For the areas of grassland vegetation the slope ranges from 0 to 15 degrees downslope however the requirements of *Planning for Bush Fire Protection* 2006 do not alter over the differing slope ranges. However it should be noted that at the time of actual construction the requirements for slope consideration for grasslands will apply by the provisions of AS 3959-2009 *Construction of buildings in bushfire prone areas.*

4.3 Category of Bushfire Attack

The bushfire attack level (BAL) for the proposed development was determined by using the information gathered with respect to the separation distances, the classification of the vegetation, the effective slope and provision of asset protection zones specified in this report.

The separation distances nominated have determined by reference to Appendix 2 Table A2.4 of *Planning for Bush Fire Protection* 2006 – Minimum Specifications for Asset Protection Zones for Residential and Rural Residential Subdivision Purposes (for Class 1 and 2 buildings) in Fire Danger Index (FDI) 100 Fire Areas to achieve less than 29kW/m² radiant heat exposure on any building element.

This maximum permissible level of radiant heat exposure is a baseline requirement of the NSW Rural Fire Service within the subdivision approval process. It is also referred to within AS 3959-2009 *Construction of buildings in bushfire prone area* as Bushfire Attack Level (BAL) 29.

For the allotments effected by the woodland vegetation with consideration of the effective slope beneath the vegetation it will be a requirement that a minimum distance of 25 metres separation from a potential building footprint and the hazard (offsite)will need to be provided within the proposed development.

For the balance of the allotments being effected by the grassland hazard *Planning for Bushfire Protection* 2006 only requires that 10 metres is provided in form of separation irrespective of slope.

The areas of separation shall be maintained as asset protection zones (APZ). The elements of an asset protection zone are discussed within the next section of this report.

Clearly the Concept Layout Plan supplied for perusal within the context of formulating this report, shows that these minimum separation distances are very easily achieved and it is actually envisaged that distances of separation would ultimately be well in excess of the minimum requirements of *Planning for Bush Fire Protection* 2006.

5.0 Assessment of the extent to which the development potentially conforms or deviates from Chapter 4 of *Planning for Bush Fire Protection* 2006

5.1 Asset Protection Zones

The provision of asset protection zones for any future subdivision, subsequent to a rezoning, must be fully provided for onsite to satisfy the requirements of *Planning for Bush Fire Protection* 2006.

The maintenance of the majority of area upon the subject allotment currently would not satisfy the requirements of an inner protection area of an asset protection zone as contained in *Planning for Bush Fire Protection* 2006.

The following is a summary of the requirements for an asset protection zone inner protection area as described within the documents *Planning for Bush Fire Protection* 2006 and NSW RFS *Standards for Asset Protection Zones*.

Inner Protection Area

An IPA should provide a tree canopy cover of less than 15% and the tree canopy should be located greater than 2.0 metres from any part of the roof line of a dwelling. Garden beds of flammable shrubs should not be located under trees and should be located not closer than 10 metres from an exposed window or door. Trees should have lower limbs removed up to a height of 2.0 metres above the ground.

Ground fuels such as fallen leaves, twigs (less than 6mm in diameter) and branches should be removed on a regular basis, and grass needs to be kept closely mown and where possible green.

A report formulated for the purposes of subdivision will recommend that the entire site where not built upon is maintained to the requirements of an inner protection area of an asset protection zone and managed to these provisions for the lifetime of the development.

The site inspection undertaken for the purposes of the rezoning application noted the site is primarily dominated by regrowth vegetation of which black wattle is quite abundant. This species is has a short life span and it is evident that many of these trees were at or approaching life termination.

The other native trees were reasonably sparse in spatial arrangement and it would not be likely that a substantial number would need removal to accommodate asset protection zones arising from any future development.

In terms of shrub and ground layer fuels these are easily managed by regular slashing or mowing.

It is my opinion that the provision of adequate and complying areas asset protection zones could be easily achieved over the subject allotment in the context of the Concept Layout Plan supplied for consideration.

5.3 Construction Level

The Building Code of Australia contains both the performance requirements and the 'deemed to satisfy' provisions relating to construction of class 1, 2 & 3 buildings that are proposed for *construction in bushfire prone areas*. To satisfy the performance provision P2.3.4 of the Building Code of Australia Vol. 2, a Class1a building that is constructed in a designated bushfire prone area must be designed and constructed to reduce the risk of ignition from a bushfire while the fire front passes.

Australian Standard 3959-2009 *Construction of buildings in bushfire prone areas* is referenced by the BCA as the deemed to satisfy construction standard for residential dwellings in designated bushfire prone areas with the exception that the requirements shall be varied to comply with the Addendum to Appendix 3 of *Planning for Bushfire Protection 2*006.

As noted previously any construction of dwellings or proposed buildings footprints must not be exposed to greater than BAL 29 and this can be easily achieved within the context of the Concept Plan supplied.

5.4 Access / Egress

5.4.1 To the Proposed Development

The access to the subject site is from Bells Line of Road which is a sealed two lane road in a well maintained condition and under most conditions should provide adequate access and egress for both residents and emergency service vehicles.

Bells Line of Road links to other through roads which would afford the residents the ability to evacuate the area to a location not being directly implicated by the mechanisms of bushfire attack, although under most bushfire or grassfire conditions this would generally not be required.

5.4.2 Within the Site

The Concept Layout Plan for the subject allotment shows for the construction of a central public road that terminates within the northern section of the site.

Whilst road construction details have not been shown it is envisaged that compliance to relevant section of *Planning for Bush Fire Protection* 2006 Access (1) Public Roads can be easily achieved.

5.5 Utility Supplies

5.5.1 Water

This section of Kurmond is serviced by a mains reticulated water system and the site inspection noted that this system is within the carriageway of Bells Line of Road.

The provisions of *Planning for Bush Fire Protection* 2006 will require that if the mains water is integrated within any future development it should be undertaken to satisfy AS 2419 – 2005 *Fire hydrant installations*.

If mains reticulated water to that specification is not achieved individual Static Water Supplies (SWS) will need to be provided at individual residences at the time of future development.

5.5.2 Electricity

The preferred methodology for the connection of electricity is by underground cabling as stated within *Planning for Bush Fire Protection* 2006.

5.5.3 Gas

At the time of report preparation it was not proposed to connect gas supply to the subject allotment. However any future connection to either mains or portable gas supply should be undertaken and maintained to the provisions of AS 1596-2002 *Storage and handling of LP Gas.* All piping associated with the installation must be metal.

5.6 Landscaping

A formal landscaping plan was not supplied for perusal at the time of formulating this report however this must be undertaken to satisfy Appendix 5 of *Planning for Bushfire Protection* 2006.

6.0 Conclusion

After consideration of the aims and objectives of *Planning for Bush Fire Protection* 2006 in the context of the Rezoning Application and the Concept Layout Plan for future development of the subject allotment it is my professional opinion that the provisions of bushfire regulatory requirements could be achieved and that the consent authorities would be likely to approve the indicated development.

Craig Burley
Grad.Dip. Building in Bushfire Prone Areas (UWS)
FPA Australia Certified BPAD-A Practitioner

Caveat

Quote from *Planning for Bush Fire Protection* 2006, '*not withstanding the precautions adopted, it should always be remembered that bushfire burn under a wide range of conditions and an element of risk, no matter how small always remains.*'

Quote from Standards Australia, '*Although the standard is designed to improve the performance of such buildings, there can be no guarantee, because of the variable nature of bushfires, that any one building will withstand bushfire attack on every occasion.*'

References

Planning for Bush Fire Protection 2006 Planning NSW in conjunction with NSW Rural Fire Service

Building Code of Australia Volume 2 2005 Australian Building Codes Board

AS 3959 –2009 Construction of buildings in bushfire prone areas Standards Australia & Australian Building Codes Board

Landscape and building Design for Bushfire Areas Ramsay C. & Rudoplh L. CSIRO 2003

Quantifying bushfire penetration into urban areas in Australia Keping Chan & McAneny J. Geophysical Research Letters, Volume 31, L12212, doi:10.1029/2004GL020244,2004

Bushfires in Australia Luke R.H. & McArthur CSIRO 1978

Performance of Building Elements in Bushfire Prone Areas Poon S.L. & England J.P. Warrington Fire Research Australia

Address Validation Search Department of Lands www.maps.nsw.gov.au

Standards for Asset Protection Zones NSW Rural Fire Service 2005

Ocean Shores to Dessert Dunes Keith D. Department of Environment and Conservation Sydney 2004

Appendix 4: Traffic Impact Statement

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THOMPSON STANBURY ASSOCIATES

ABN: 79 943 737 368

22 October 2012

General Manager
Hawkesbury Council
PO Box 21
WINDSOR
NSW 1860

Dear Sir,

TRAFFIC IMPACT STATEMENT
PROPOSED RESIDNETIAL SUBDIVISION
396 BELLS LINE OF ROAD, KURMOND

This Practice has been engaged by the applicant and owner of the subject property, Ken Hardaker, to report upon an assessment of traffic impacts in support of approval to the rezoning and subdivision of the subject property.

INTRODUCTION

The proposal consists of the rezoning of an existing rural parcel of land to form a rural residential subdivision creating 27 allotments, providing a minimum lot size of 4,000m^2. The subdivision is proposed to be serviced by a new access road, extending to the north-east from Bells Line of Road into the site.

The purpose of this report is to assess the likely traffic implications resulting from the proposed rezoning and subdivision addressing each of the following issues:

- Review current traffic conditions with respect to safety and efficiency in the vicinity of the site;

- Assess vehicle safety associated with the proposed new access road junction with Bells Line of Road in respect to current Roads & Maritime Services and Austroads criteria for safe access for the prevailing sign posted speed limit;

- Identify the potential external traffic generation of the proposed subdivision based on established traffic generation rates provided by Roads & Maritime Services; and

- Derive and comment on the impact of the generated traffic flows and new road junction arrangements and recommend, where necessary, measures to address these impacts.

Throughout this report, reference is made to the following documents:

- The Roads & Maritime Services' *Guide to Traffic Generating Developments*; and

- Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*.

The report has been prepared pursuant to State Environmental Planning Policy (Infrastructure) 2007.

This report should be read in conjunction with the following:

- Subdivision plans prepared by North Western Surveys;

- A concept intersection design plan for the subdivision access road prepared by the Practice; and

- A sight distance diagram detailing the available sight distance between the proposed new subdivision access road and Bells Line of Road prepared by this Practice.

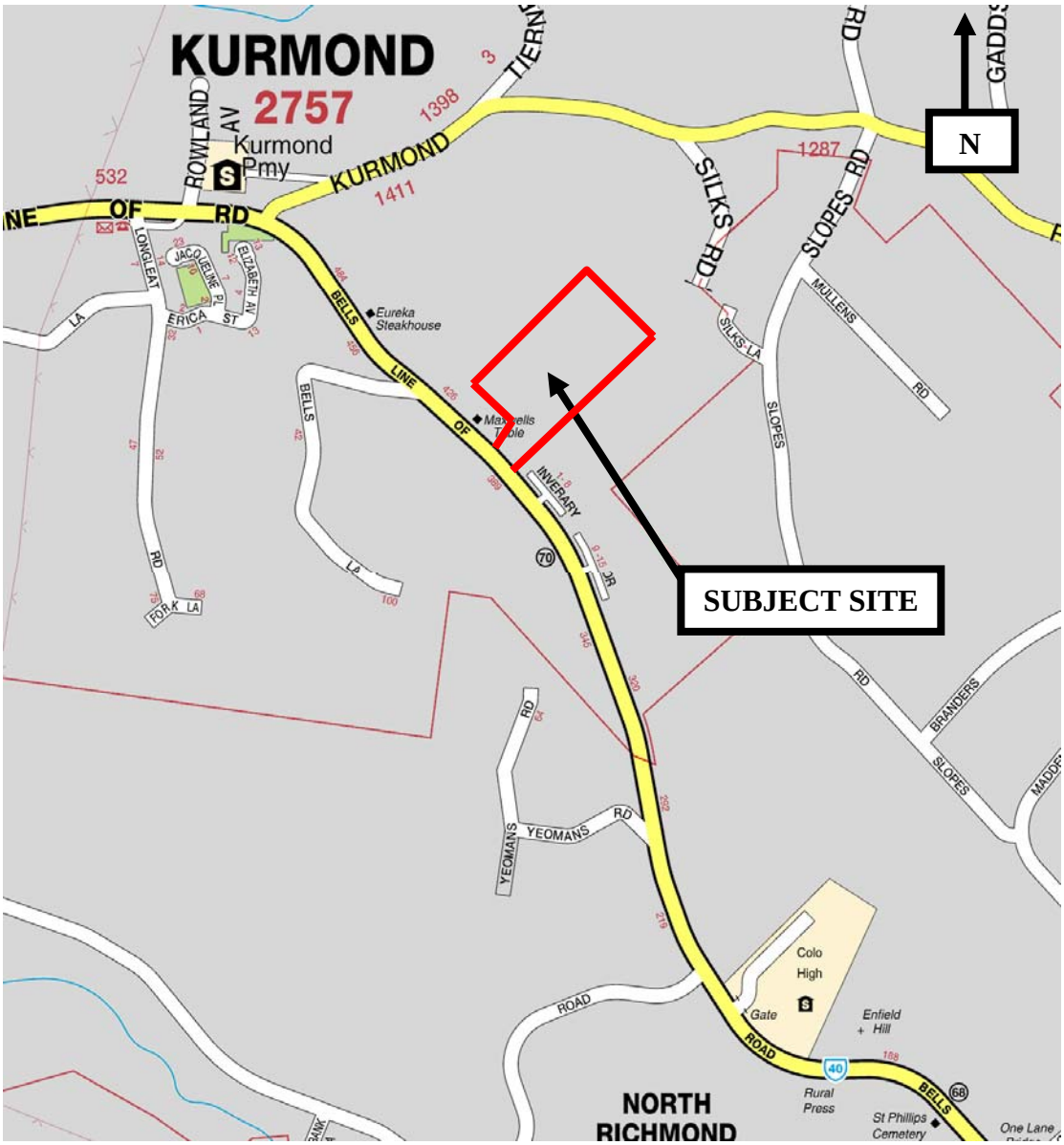
Copies of the above plans are appended to this correspondence.

SITE DETAILS

Site Location

The subject site is located on the north-eastern side of Bells Line of Road, Kurmond approximately midway between Kurmond Road to the north and Yeomans Road to the south. This location is illustrated overleaf within a neighbourhood context by **Figure 1**, being an extract of UBDs *Australian City Streets*, Version 4.

FIGURE 1
SITE LOCATION



Site Description

The site provides a real property description of Lot 2 DP 607906, Bells Line of Road, Kurmond. The land forms an irregular shape providing a frontage of approximately 90m to Bells Line of Road. The site provides a total area of approximately 13.07 ha.

Existing Use

The subject site accommodates a single rural residential dwelling fronting and providing unrestricted vehicular access to Bells Line of Road via a combined ingress / egress driveway located within the southern corner of the site.

The remainder of the site comprises disused grass and farmland, including two large dams.

Surrounding Uses

Rural residential land-uses occupy surrounding allotments, with the exception of the land adjoining immediately to the north-west, which accommodates a restaurant building known as Kurmond Wine Bar and Grill (previously known as Kurmond Roadhouse and Maxwell's Table). The restaurant was recently extensively damaged by fire however an application was approved in 2010 for its rebuilding. Work has not yet commenced on this rebuilding.

Other non rural residential development within the subject vicinity includes a strip of commercial / retail developments located approximately 1km to the north-west associated with the Kurmond town centre.

EXISTING TRAFFIC CONDITIONS

Surrounding Road Function & Hierarchy

Bells Line of Road performs a State Road function under the care and control of the Roads & Maritime Services providing an east-west arterial function between North Richmond and Lithgow. Immediately adjoining the subject site, Bells Line of Road forms a 9m wide pavement providing one through lane of traffic in each direction with directional lanes being separated by a double barrier centre line. Marked edge lines delineate the edge of pavement whilst unsealed shoulders are provided along both carriageway alignments. Traffic flow is governed by a sign posted speed limit of 60km/h.

Bells Line of Road intersects with lower order rural residential access roads to the north and south of the site in Bells Lane and Yeomans Road respectively. These intersections operate under major / minor priority control with Bells Line of Road forming the priority route. Further to the north-west, Bells Line of Road intersects with Kurmond Road within the Kurmond town centre. Kurmond Road performs a collector road function providing an easterly connection to Spinks Road, Creek Ridge Road and Putty Road. It is noted that none of these public road junctions are provided with exclusive turning lanes within Bells Line of Road to assist turning movements.

The closest traffic controls are recently installed signals governing the intersection of Bells Line of Road, Old Bells Line of Road and Mill Road approximately 2km to the north-east.

Traffic Volumes

In order to obtain an indication of the existing operation of the local road network in the vicinity of the site, reference is made to morning and evening peak hour traffic surveys undertaken by staff of this Practice. Traffic surveys were undertaken of the directional travel lanes of Bells Line of Road immediately adjoining the subject site between 7.00am – 9.00am and 4.00pm – 6.00pm on 3 September 2012. The peak hour volumes obtained from the surveys are represented overleaf diagrammatically as **Figure 2** whilst full details are contained within **Appendix 1**.

FIGURE 2
SEPTEMBER 2012 PEAK HOUR VOLUMES
8.00AM – 9.00AM & 4.00PM – 5.00PM
BELLS LINE OF ROAD, KURMOND

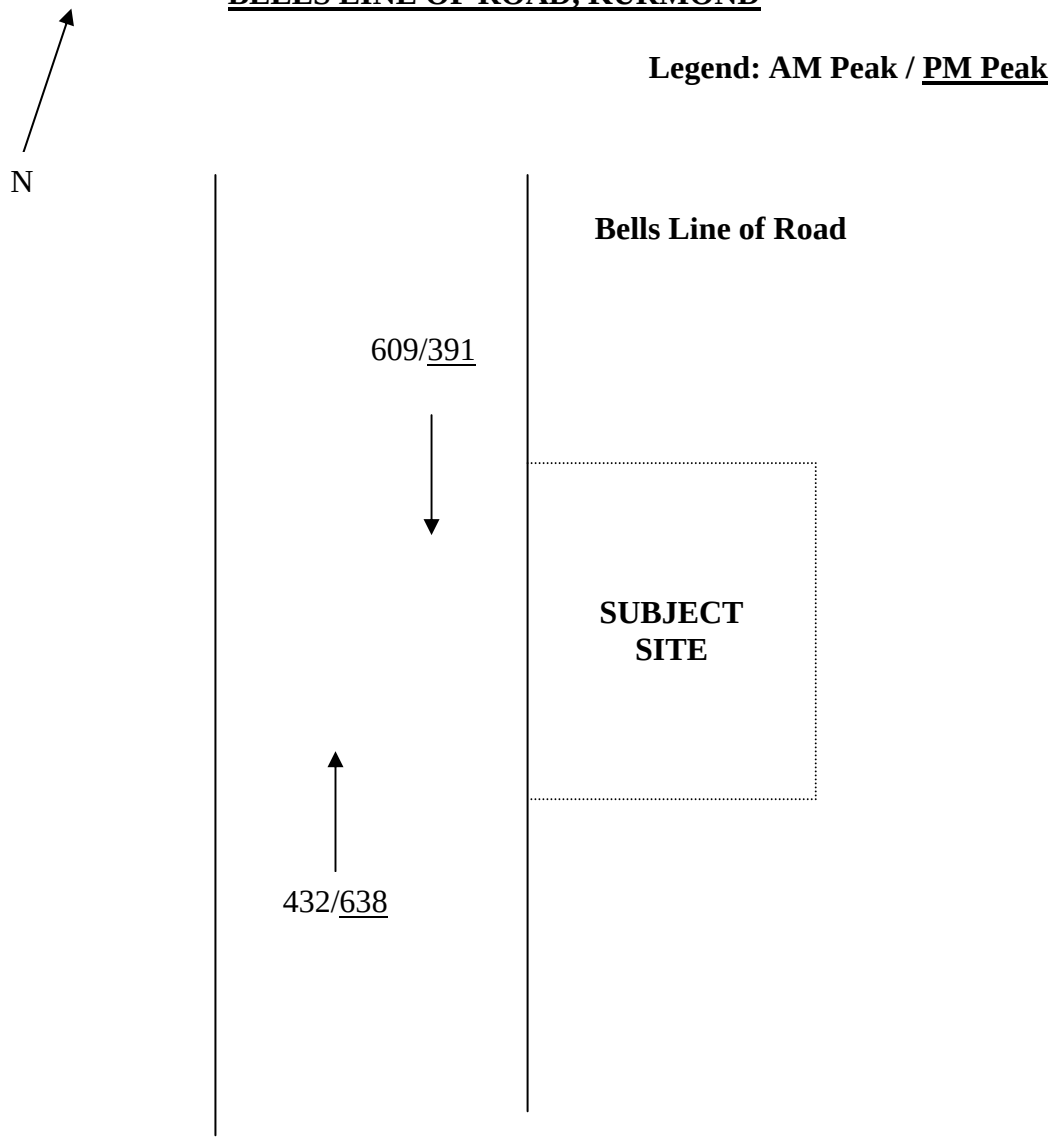


Figure 2 indicates through Bells Line of Road movements are tidal during peak periods with south-eastbound traffic movements dominating during the morning peak and north-westbound traffic movements dominating during the evening peak.

Existing Road Network Operation

AUSTROADS states that a conservative capacity of a 2 lane rural roadway carriageway is approximately 1,800 vehicles per hour per direction, not taking into consideration the terrain conditions or the percentage of heavy vehicles. **Figure 2** indicates that the peak hourly directional travel volume of Bells Line of Road is between approximately 400 - 650 vehicles, whilst traffic flow characteristics observed during the undertaking of the surveys indicate the terrain is generally rolling and heavy vehicles constitute approximately 5% of peak hour flows. Further, platooning of traffic flows occurs whereby vehicles generally travel at or near the sign posted

speed limit of 60km/h with maximum groupings of 7-8 vehicles separated by gaps of up to 30 seconds at most times.

These previously mentioned traffic characteristics provide motorists, accordingly to the Roads & Maritime Services' *Guide to Traffic Generating Developments* with a level of service "B" where LOS value of "B" is described as stable flow where drivers have a reasonable freedom to select their desired speed and manoeuvre within the traffic stream and the general level of conform and convenience is good.

Public Transport

Public transport facilities are limited within the surrounding area given the regional nature of the locality. Notwithstanding this, Westbus operates Route 682 along Bells Line of Road between Richmond and Kurrajong. This service operates every 30 minutes during the peak periods with the closest stop being located in the vicinity of the post office within the Kurmond town centre.

PROPOSED DEVELOPMENT

Development Application

The subject application involves the rezoning and subdivision of the existing rural residential lot into 27 lots varying in size from 4,000m^2 – 8,200m^2.

The lots are proposed to be serviced by a single new internal access road running approximately east-west intersecting with Bells Line of Road. The access road is proposed to provide a reservation of 20m wide, containing a carriageway width of 8m. This road reservation is proposed to widen to 25m on immediate approach to Bells Line of Road to accommodate a subdivision entry feature comprising a dual carriageway comprising 4m wide directional carriageways, separated by a 5m wide landscaped central median. The internal access road is proposed to terminate in the north-eastern portion of the site via a cul-de-sac.

A majority of the lots are proposed to provide direct and unrestricted connectivity to the internal access road, with the exception of lots 21 and 22 located approximately central to the northern site boundary, which are proposed to be accessed from the internal roadway via battle axe arrangements. No lots are proposed to be accessed via Bells Line of Road.

A subdivision plan has been prepared by North Western Surveys, a copy of which is attached to this correspondence as **Appendix 2**.

Potential Future Expansion

Whilst not forming part of the current development application, it is planned that the subdivision be subject to a second stage whereby, the subdivision be extended to the north, towards Kurmond Road. This expansion incorporates the provision of an additional 18 lots, totalling 45 lots.

The expansion is to be facilitated by the provision of a second 20m wide road running in an approximate north-south alignment, extending to the north from the abovementioned original subdivision access road. The new road is proposed to be provided in place of the abovementioned battle axe driveway servicing lots 21 and 22, and be extended approximately 260m to the north, prior to terminating under similar cul-de-sac arrangements as that presented for the primary subdivision access road.

A total of 16 of the additional 18 lots are proposed to be serviced by this second internal access road. The remaining 2 additional lots are proposed to be serviced by battle axe type driveways connecting with Kurmond Road.

An indicative expanded subdivision plan has been prepared by North Western Surveys, a copy of which is attached to this correspondence as **Appendix 3**.

Whilst this potential subdivision expansion does not form part of the subject application, this assessment is mindful of the potential traffic generation of the expanded subdivision with respect to likely impacts on Bells Line of Road and overall subdivision access considerations.

Subdivision Access

The new subdivision access road is proposed to form a T-junction with Bells Line of Road within the south-western corner of the site. Pavement widening is proposed within Bells Line of Road to provide a channelised right turn treatment with a short turn slot in accordance with a CHR(S) treatment specified by Figure 7.6 of AUSTROADS' *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections.*

The pavement widening is proposed to be undertaken on the north-eastern side of the existing Bells Line of Road pavement to ensure that there is no requirement to acquire land to the south-west.

This Practice has prepared a concept design of the CHR(S) type intersection treatment incorporating Bells Line of Road and the new subdivision road, a copy of which is attached to this correspondence as **Appendix 4**.

PROJECTED TRAFFIC CONDITIONS

Traffic Generation

The Roads & Maritime Services in their *Guide to Traffic Generating Developments* have established vehicular generation rates for a range of land-uses based on surveys of similar uses throughout the Sydney Metropolitan Area. This publication specifies that residential dwellings generate an average of 9 daily and 0.85 peak hour vehicle trips. These traffic generation rates however do not take into consideration the rural nature of the subject vicinity and the lack of available public transport. Accordingly, the rates generally underestimate the traffic generating potential of rural residential lots.

In consideration of the above, a peak hour traffic generation of 1.0 trip per lot has been applied to the subject proposal. The proposed 27 lot subdivision is therefore projected to generate in the order of 27 peak hour vehicle trips to and from the site.

Similarly, the potential future expanded subdivision is projected to generate in the order of 45 peak hour vehicle trips, 43 of which will be serviced by the proposed access road intersecting with Bells Line of Road (the remaining 2 trips are to be serviced by Kurmond Road via battle axe type driveways).

Trip Assignment & Future Traffic Volumes

The trip assignment of vehicle movements generated by any development is most commonly generated based on existing traffic distributions. The peak hour traffic surveys presented within **Figure 2** indicates that traffic demands are tidal during peak periods, with south-eastbound vehicle movements dominating during the morning peak and north-westbound vehicle movements dominating during the evening peak.

On the above basis and with consideration that the greater Sydney metropolitan area is located to the south-east, it is expected that 80% of vehicles exiting the site will travel to the south-east along Bells Line of Road, with the remaining vehicles exiting the site to the north-west. Similarly, 80% of entering vehicles are expected to travel from the south-east whilst the remaining 20% are envisaged to travel from the north-west.

A further consideration with respect to trip assignment is the split of incoming and outgoing movements. It is normal for residential properties to primarily generate outgoing movements during the morning peak and incoming movements during the evening peak. Accordingly, an 80% / 20% split of outbound / inbound vehicle movements is anticipated during the morning peak and the reverse condition is projected during the evening peak.

Figures 3 and **4** overleaf provides a graphical representation of the projected traffic volumes at the proposed T-junction of Bells Line of Road and the subdivision access road, incorporating the subject development application and the potential expanded subdivision respectively, based on the above considerations.

FIGURE 3
PROJECTED WEEKDAY PEAK TRAFFIC VOLUMES
JUNCTION OF BELLS LINE OF ROAD & SUBDIVISION ACCESS ROAD
INCORPORATING DEVELOPMENT APPLICATION TRAFFIC DEMANDS

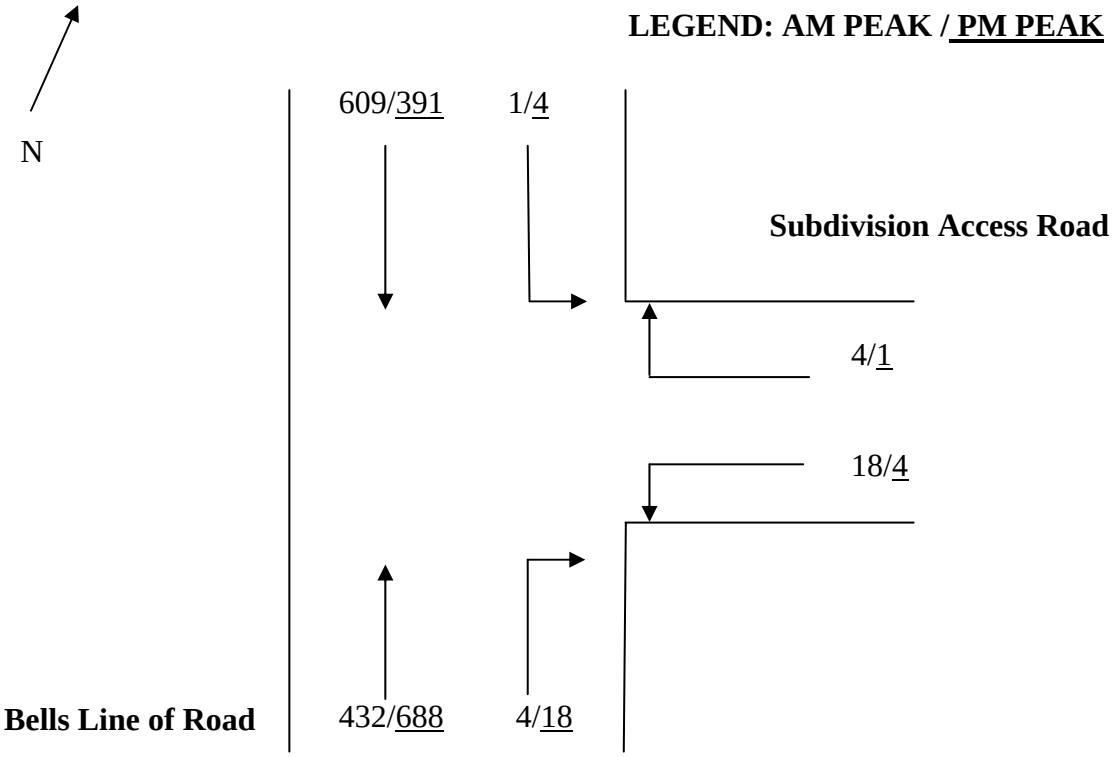
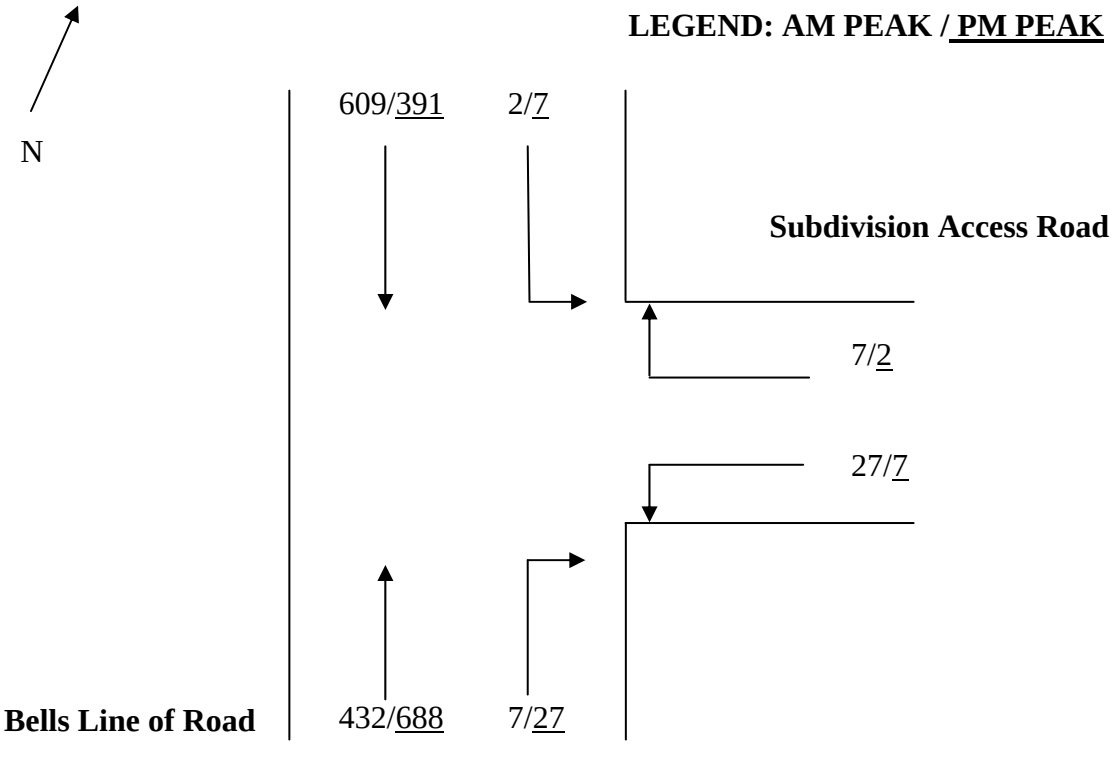


FIGURE 4
PROJECTED WEEKDAY PEAK TRAFFIC VOLUMES
JUNCTION OF BELLS LINE OF ROAD & SUBDIVISION ACCESS ROAD
INCORPORATING EXPANDED SUBDIVISION TRAFFIC DEMANDS



Traffic Efficiency Considerations

In order to estimate the projected operational efficiency of the junction of Bells Line of Road and the subdivision access road, an INTANAL analysis has been undertaken. INTANAL is an advanced analytical tool for evaluation of alternative intersection designs in terms of capacity, level of service, a wide range of performance measures including delay, queue length, and number of stops. Key indicators of INTANAL include level of service which is a summary indicator ranging from 'A' to 'F' with 'A representing optimum intersection performance, and degree of saturation which represents a ratio of the demand of an approach to its capacity.

INTANAL uses detailed analytical traffic models coupled with an iterative approximation method to provide estimates of the abovementioned key indicators of capacity and performance statistics. Other key indicators provided by INTANAL are average vehicle delay, the number of stops per hour and the degree of saturation. Degree of saturation is the ratio of the arrival rate of vehicles to the capacity of the approach. Degree of saturation is a useful and professionally accepted measure of intersection performance.

INTANAL provides analysis of the operating conditions that can be compared to the performance criteria set out in **Table 1** (adapted from the Roads & Maritime Services' *Guide to Traffic Generating Developments*).

TABLE 1
LEVELS OF SERVICE CRITERIA FOR INTERSECTION

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	Less than 14	Good Operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & Spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	> 70	Extra capacity required	Extreme delay, traffic signals or other major treatment required

The projected conditions have been modelled utilising the peak hour traffic volumes presented within **Figures 3** and **4**. In this regard, two scenarios have been modelled: one incorporates the development application subdivision and the second incorporating the planned expanded subdivision.

Both scenarios have been modelled whereby a short channelised right turn lane is provided within Bells Line of Road servicing the subdivision access road, in accordance with the concept junction design prepared by this Practice contained within **Appendix 4**.

Table 2 provides a summary of the INTANAL output data whilst **Appendix 5** contains full details.

TABLE 2 INTANAL OUTPUT – PEAK HOUR INTERSECTION PERFORMANCE JUNCTION OF BELLS LINE OF ROAD & SUBDIVISION ACCESS ROAD		
SCENARIO 1 – DEVELOPMENT APPLICATION SUBDIVISION		
	AM Peak	**PM Peak**
Average Vehicle Delay (sec/veh)	23.7	9.5
Number of Stops	2	1
Degree of Saturation	0.10	0.03
Level of Service	B	A
SCENARIO 2 – PLANNED EXPANDED SUBDIVISION		
	AM Peak	**PM Peak**
Average Vehicle Delay (sec/veh)	24.4	17.3
Number of Stops	4	1
Degree of Saturation	0.14	0.04
Level of Service	B	B

Table 2 indicates that the junction of Bells Line of Road and the subdivision access road to operate with a level of service 'A' / 'B' during the morning and evening peaks incorporating both the development application and planned expanded subdivisions, representing good operation with spare capacity. Accordingly, motorists are projected to be capable of entering and exiting the new subdivision access road with a good level of efficiency with minimal delay.

The impacts on the efficiency of existing through movements within Bells Line of Road are projected to be minimal as a result of right turn movements being provided with the exclusive right turn bay and the low volume of left turn movements. The impacts of left turning vehicles accessing the site on trailing south-eastbound through Bells Line of Road traffic are anticipated to be minimal given the low traffic volumes expected to access the site from the north-west.

In a broader context, it is acknowledged that somewhat congested traffic conditions prevail within the North Richmond town centre. This has recently been publicised as being associated with the limited capacity of the two lane North Richmond bridge however is, in the opinion of this Practice, a more direct result of the split approach phasing of the traffic signals at the Grose Vale Road and Terrace Road and the single lane northbound Bells Line of Road approach. In any case, the projected additional 22 peak hour vehicle trips through the North Richmond town centre (or approximately one vehicle movements every two traffic signal cycles) is not anticipated to have any noticeable impacts on existing traffic conditions.

Traffic Safety Considerations

The proposed access point is located on a section of Bells Line of Road where sight distance is acceptable with respect to the existing horizontal and vertical alignment. This is clearly demonstrated on a sight distance plan prepared by this Practice included as **Appendix 6**, in which sight lines are indicated for both entering and exiting traffic from the subject site and through traffic on Bells Line of Road.

In order to assess the suitability of the right turn lane treatment, reference is made to Austroads' *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* which outlines the fundamental types of right turn treatments for rural areas and depicts a graphical representation of warrants (Figure 4.9 of the publication), which clearly shows that the current through volumes and projected right turn volumes require a type CHR(S) treatment. This treatment involves pavement widening to create a channelised right turn lane whereby north-westbound vehicles can pass on decelerating and stationary vehicles turning right into the subdivision access road.

The plan included as **Appendix 3** indicates localised widening on Bells Line of Road in the vicinity of the proposed subdivision access road compliant with Figure 7.6 of the abovementioned AUSTROADS publication. Accordingly, the proposed right turn treatment design is considered to be satisfactory.

CONCLUSION

This correspondence provides an assessment of the traffic impacts in support of Council approval to the rezoning and subdivision of a parcel of land located on the north-eastern side (No. 396) of Bells Line of Road, Kurmond. Having regard to the findings of this assessment, the following conclusion is provided:

- Bells Line of Road currently provides motorists with a good level of service in the vicinity of the subject site;

- The proposed subdivision is projected to generate a minor level of additional traffic to and from the subject site;

- A significant majority of traffic associated with the subdivision is projected to travel to / from the south-east;

- In order to ensure that interruption to through traffic flows on Bells Line of Road are minimised (if not eliminated), localised widening is to be undertaken on the north-eastern side of the State Road in the vicinity of the proposed subdivision access road, in accordance with a type CHR(S) treatment as provided within Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*;

- The existing vertical and horizontal alignment of Bells Line of Road results in satisfactory sight distance provisions along the State Road to / from the proposed subdivision access road; and

- Incorporating the abovementioned CHR(S) access treatment, the surrounding road network is envisaged to be capable of accommodating the additional traffic generated by the subject development in a safe and efficient manner.

Based on the contents of this correspondence and above conclusion, this Practice is of the opinion that there are no traffic and parking related issues that should prevent approval of the subject application.

It would be appreciated if the information contained within this correspondence could be incorporated within Council's assessment of the subject application.

Yours faithfully,

David Thompson
Transport Planner

APPENDIX 1

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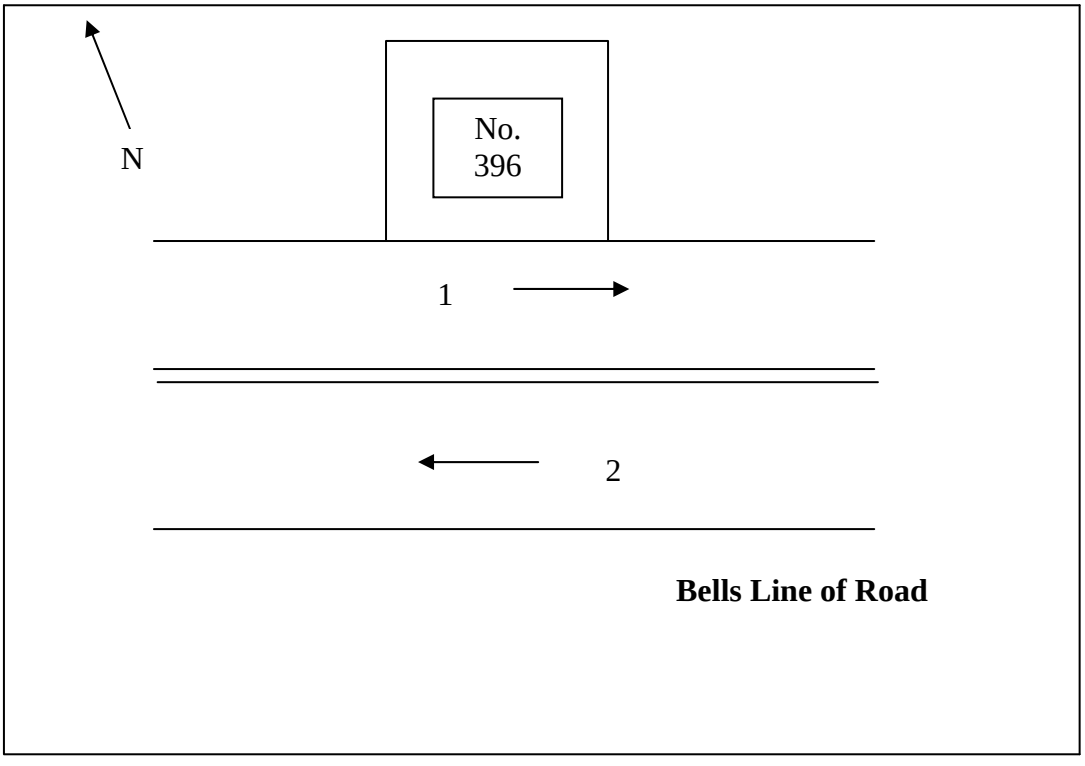
THOMPSON STANBURY ASSOCIATES

ABN: 79 943 737 368

TRAFFIC COUNTS AT: 396 Bells Line of Road, Kurmond
DATE: 3 September 2012
TIME: 7am – 9am and 4pm – 6pm
WEATHER: Fine

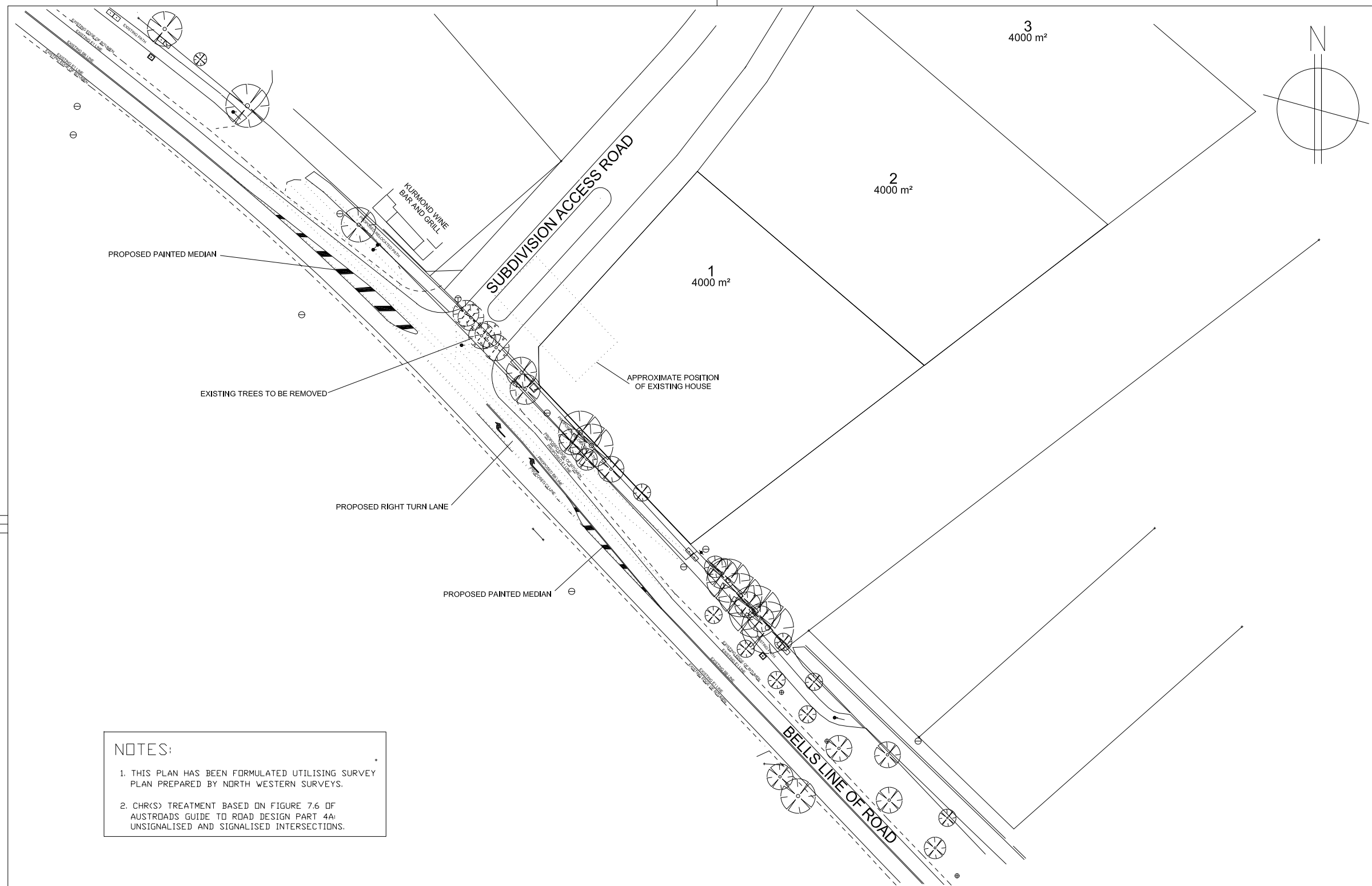
Time	Direction of Vehicular Traffic	
	1	**2**
7.00 – 7.15am	111	75
7.15 – 7.30am	129	111
7.30 – 7.45am	144	91
7.45 – 8.00am	171	114
TOTAL	**555**	**391**
8.00 – 8.15am	132	109
8.15 – 8.30am	155	121
8.30 – 8.45am	169	115
8.45 – 9.00am	153	87
TOTAL	**609**	**432**
4.00 – 4.15pm	**91**	**151**
4.15 – 4.30pm	**100**	**159**
4.30 – 4.45pm	**88**	**162**
4.45 – 5.00pm	**112**	**166**
TOTAL	**391**	**638**
5.00 – 5.15pm	80	162
5.15 – 5.30pm	102	161
5.30 – 5.45pm	95	150
5.45 – 6.00pm	104	138
TOTAL	**381**	**611**



APPENDIX 2

APPENDIX 3

APPENDIX 4



NOTES:

1. THIS PLAN HAS BEEN FORMULATED UTILISING SURVEY PLAN PREPARED BY NORTH WESTERN SURVEYS.
2. CHR(S) TREATMENT BASED ON FIGURE 7.6 OF AUSTROADS GUIDE TO ROAD DESIGN PART 4A: UNSIGNALISED AND SIGNALISED INTERSECTIONS.

THOMPSON STANBURY ASSOCIATES
Transport Planning, Town Planning
and Environmental Consultants

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Internet: www.thompsonstanbury.com.au

THOMPSON STANBURY ASSOCIATES

CONCEPT DESIGN
PROPOSED CHR(S) TREATMENT
SERVICING ACCESS ROAD ASSOCIATED WITH
PROPOSED RESIDENTIAL SUBDIVISION
396 BELLS LINE OF ROAD, KURMOND

SCALE: 1: 1000 @ A3 OR 1: 500 @ A1

FILE: 12-025

SUPERSEDES SHEET/ISSUE -

DATE: OCTOBER 2012

ISSUE A

SHEET 1

APPENDIX 5

INTANAL DATA FILE
ACCBEL01

INTANAL Program Version: 3.19 Date: 22-OCT-12 Time: 10:05:49
Registered User Name. - THOMPSON STANBURY ASSOCIATES
Registered User No. - 1050

BELLS LINE & SUBDIVISION ACC
PROJECTED CONDITIONS - STAGE 1

VOLUME DATA SCREEN

	AM PEAK				PM PEAK				BUSINESS			
AM	Vol	Sat	Phse	Yval Utrn	Vol	Sat	Phse	Yval Utrn	Vol	Sat	Phse	Yval Utrn
1L												
1T	432	1874	AB	0.24	688	1870	AB	0.39	392	1874	AB	0.22
1R	4	1850	B	0.00	18	1850	B	0.01	8	1850	B	0.00
2L	18	1446	BC	0.01	4	44	S	0.09	8	1400	BC	0.01
2T												
2R	4	304	C	0.01	0		C		2	350	C	0.01
3L	1	41	A	0.02	4	44	A	0.09	2	42	A	0.05
3T	609	1747	A	0.37	391	1733	A	0.24	350	1741	A	0.21
3R												
4L												
4T												
4R												

A	Min	ELT	H%AM	H%PM	H%B	L/S	PD-L	PD-R	Sign	Hold	LKph
1	5	4.0	5	5	5	0'		0			
2	5	4.0	5	5	5		0	0	G	N	25
3	5	4.0	5	5	5	0'	0				25
4											

File = ACCBEL01
Type = T2

PLATOON DATA			PEDESTRIAN VOLUME			WALK-CLEARANCE	
App	P%AM	P%PM	P%B	P#AM	P#PM	P#B	Walk	Clear
1	R0	R0	R0	0	0	0	0	0
2	R0	R0	R0	0	0	0	0	0
3	R0	R0	R0	0	0	0	0	0
4	R0	R0	R0	0	0	0	0	0

LANES DATA SCREEN

	Approach 1			Approach 2			Approach 3			Approach 4		
	Down	Lanes	Grade	Down	Lanes	Grade	Down	Lanes	Grade	Down	Lanes	Grade
Type	0	2	0		1	0	0	1	0			
T2												

Lane	Type	Lngth	Sat	Type	Lngth	Sat	Type	Lngth	Sat	Type	Lngth	Sat
1	T	9999	1900	LR	9999	1750	LT	9999	1750			
2	R	30	1850									
3												
4												
5												
6												
7												
8												

	No Parking			No Parking			No Parking			No Parking		
	AM	PM	BUS	AM	PM	BUS	AM	PM	BUS	AM	PM	BUS
Apprch	0	0	0	0	0	0	0	0	0			
Depart	0	0	0	0	0	0	0	0	0			

	Roundabout			Roundabout			Roundabout			Roundabout		
TCS#	Ent	Cir	Wdth	Ent	Cir	Wdth	Ent	Cir	Wdth	Ent	Cir	Wdth
0	1	1	4	1	1	4	1	1	4			

File = ACCBEL01

DELAY - STOPS - CYCLE LENGTH - PHASE SPLITS DATA SCREEN

	AM PEAK			PM PEAK			BUSINESS		
Phse	PT%o	CLo	Yo	PT%o	CLo	Yo	PT%o	CLo	Yo
A	87.1	140	0.40	89.0	140	0.37	87.1	140	0.23
B	6.4			8.2			6.4		
C	6.4			2.9			6.4		
D	Peds	@ CLm=	140	Peds	@ CLm=	140	Peds	@ CLm=	140
E	Delo	DSm=	0.43	Delo	DSm=	0.82	Delo	DSm=	0.25
F	0	Ym=	0.40	0	Ym=	0.37	0	Ym=	0.23
G		Delaym=	1.41		Delaym=	0.96		Delaym=	0.85

Seq	ABC			ABC			ABC		
	Signals	Signs	Round	Signals	Signs	Round	Signals	Signs	Round
Delo	1.4	0.1	0.9	1.0	0.1	0.9	0.8	0.0	0.6
Stpo	215	2	17	149	1	4	125	0	7
D/So	0.43	0.10	0.36	0.82	0.03	0.53	0.25	0.03	0.30
L/So	A	B	A	A	A	A	A	B	A

File = ACCBEL01

Required Bays

	A RHT Lanes		LHT Lanes	
	Length	No.	Length	No.
1	10	1		
2	10	1	10	1
3			10	1
4				

SIGNS DELAY - STOPS DATA SCREEN

File = ACCBEL01 TCS = 0 Type = T2

AM Peak NormalSIgns

A	M	DS	Total Entry Capac	Delay Geom Rate	Delay Geom Sec/V	Delay Rate	Gap Accept	Delay Total Rate	Delay Averge Sec/V	Queued Veh's	Queue Length Metres	Stops Total Hour
1	L											
1	T											
1	R	0.01		0.0	5.3	0.0	5.3	0.0	8.7	1	6	1
2	L	0.10	194	0.0	4.6	0.1	8.0	0.1	15.2	1	6	2
2	T											
2	R	0.02	161	0.0	5.5	0.0	6.0	0.0	23.7	1	6	1
3	L			0.0	4.3			0.0	4.3			
3	T											
3	R											
4	L											
4	T											
4	R											
TOT		0.10		0.0	4.8	0.1		0.1	15.1			2

TOTal Average Delay = (Seconds Delay) / (Vehicles on Movements with Delay)

SIGNS DELAY - STOPS DATA SCREEN

File = ACCBEL01 TCS = 0 Type = T2

PM Peak NormalSIgns

A	M	DS	Total Entry Capac	Delay Geom Rate	Delay Geom Sec/V	Delay Rate	Gap Accept	Delay Total Rate	Delay Averge Sec/V	Queued Veh's	Queue Length Metres	Stops Total Hour
1	L											
1	T											
1	R	0.03		0.0	5.3	0.0	5.3	0.0	7.4	1	6	1
2	L	0.01	288	0.0	4.4	0.0	8.0	0.0	9.5	1	6	1
2	T											
2	R											
3	L			0.0	4.3			0.0	4.3			
3	T											
3	R											
4	L											
4	T											
4	R											
TOT		0.03		0.0	5.0	0.0		0.1	7.2			1

TOTal Average Delay = (Seconds Delay) / (Vehicles on Movements with Delay)

END OF FILE

INTANAL DATA FILE
ACCBEL02

INTANAL Program Version: 3.19 Date: 22-OCT-12 Time: 10:06:02
Registered User Name. - THOMPSON STANBURY ASSOCIATES
Registered User No. - 1050

BELLS LINE & SUBDIVISION ACC
PROJECTED CONDITIONS - STAGE 1

VOLUME DATA SCREEN

	AM PEAK				PM PEAK				BUSINESS			
AM	Vol	Sat	Phse	Yval Utrn	Vol	Sat	Phse	Yval Utrn	Vol	Sat	Phse	Yval Utrn
1L												
1T	432	1891	AB	0.24	688	1874	AB	0.39	392	1874	AB	0.22
1R	7	1850	B	0.00	27	1850	B	0.02	11	1850	B	0.01
2L	27	1400	BC	0.02	7	1361	S	0.01	11	1400	BC	0.01
2T												
2R	7	350	C	0.02	2	389	C	0.01	3	350	C	0.01
3L	2	42	A	0.05	7	47	A	0.15	3	43	A	0.07
3T	609	1745	A	0.37	391	1721	A	0.24	350	1736	A	0.21
3R												
4L												
4T												
4R												

A	Min	ELT	H%AM	H%PM	H%B	L/S	PD-L	PD-R	Sign	Hold	LKph
1	5	4.0	5	5	5	0'		0			
2	5	4.0	5	5	5		0	0	G	N	25
3	5	4.0	5	5	5	0'	0				25
4											

File = ACCBEL02
Type = T2

PLATOON DATA			PEDESTRIAN VOLUME			WALK-CLEARANCE	
App	P%AM	P%PM	P%B	P#AM	P#PM	P#B	Walk	Clear
1	R0	R0	R0	0	0	0	0	0
2	R0	R0	R0	0	0	0	0	0
3	R0	R0	R0	0	0	0	0	0
4	R0	R0	R0	0	0	0	0	0

LANES DATA SCREEN

	Approach 1			Approach 2			Approach 3			Approach 4		
	Down	Lanes	Grade	Down	Lanes	Grade	Down	Lanes	Grade	Down	Lanes	Grade
Type	0	2	0		1	0	0	1	0			
T2												

Lane	Type	Lngth	Sat	Type	Lngth	Sat	Type	Lngth	Sat	Type	Lngth	Sat
1	T	9999	1900	LR	9999	1750	LT	9999	1750			
2	R	30	1850									
3												
4												
5												
6												
7												
8												

	No Parking			No Parking			No Parking			No Parking		
	AM	PM	BUS	AM	PM	BUS	AM	PM	BUS	AM	PM	BUS
Apprch	0	0	0	0	0	0	0	0	0			
Depart	0	0	0	0	0	0	0	0	0			

	Roundabout			Roundabout			Roundabout			Roundabout		
TCS#	Ent	Cir	Wdth	Ent	Cir	Wdth	Ent	Cir	Wdth	Ent	Cir	Wdth
0	1	1	4	1	1	4	1	1	4			

File = ACCBEL02

DELAY - STOPS - CYCLE LENGTH - PHASE SPLITS DATA SCREEN

	AM PEAK			PM PEAK			BUSINESS		
Phse	PT%o	CLo	Yo	PT%o	CLo	Yo	PT%o	CLo	Yo
A	85.0	123	0.40	85.4	140	0.39	87.1	140	0.23
B	7.3			8.1			6.4		
C	7.7			6.4			6.4		
D	Peds	@ CLm=	140	Peds	@ CLm=	140	Peds	@ CLm=	140
E	Delo	DSm=	0.44	Delo	DSm=	0.42	Delo	DSm=	0.25
F	0	Ym=	0.40	0	Ym=	0.39	0	Ym=	0.23
G		Delaym=	1.80		Delaym=	1.48		Delaym=	1.02

Seq	ABC			ABC			ABC		
	Signals	Signs	Round	Signals	Signs	Round	Signals	Signs	Round
Delo	1.8	0.2	1.0	1.5	0.1	1.0	1.0	0.1	0.7
Stpo	260	4	23	213	1	14	133	1	9
D/So	0.45	0.14	0.36	0.42	0.04	0.53	0.25	0.04	0.30
L/So	A	B	A	A	B	A	A	B	A

File = ACCBEL02

Required Bays

A	RHT Lanes		LHT Lanes	
	Length	No.	Length	No.
1	10	1		
2	10	1	10	1
3			10	1
4				

SIGNS DELAY - STOPS DATA SCREEN

File = ACCBEL02 TCS = 0 Type = T2
AM Peak NormalSIgns

A	M	DS	Total Entry Capac	Delay Geom Rate	Delay Geom Sec/V	Delay Rate	Gap Accept	Delay Total Rate	Delay Averge Sec/V	Queued Veh's	Queue Length Metres	Stops Total Hour
1	L											
1	T											
1	R	0.01		0.0	5.3	0.0	5.3	0.0	8.8	1	6	1
2	L	0.14	194	0.0	4.7	0.1	8.0	0.1	15.9	1	6	4
2	T											
2	R	0.04	160	0.0	5.5	0.0	6.0	0.0	24.4	1	6	1
3	L			0.0	4.3			0.0	4.3			
3	T											
3	R											
4	L											
4	T											
4	R											
TOT		0.14		0.1	4.9	0.1		0.2	15.6			4

TOTal Average Delay = (Seconds Delay) / (Vehicles on Movements with Delay)

SIGNS DELAY - STOPS DATA SCREEN

File = ACCBEL02 TCS = 0 Type = T2
PM Peak NormalSIgns

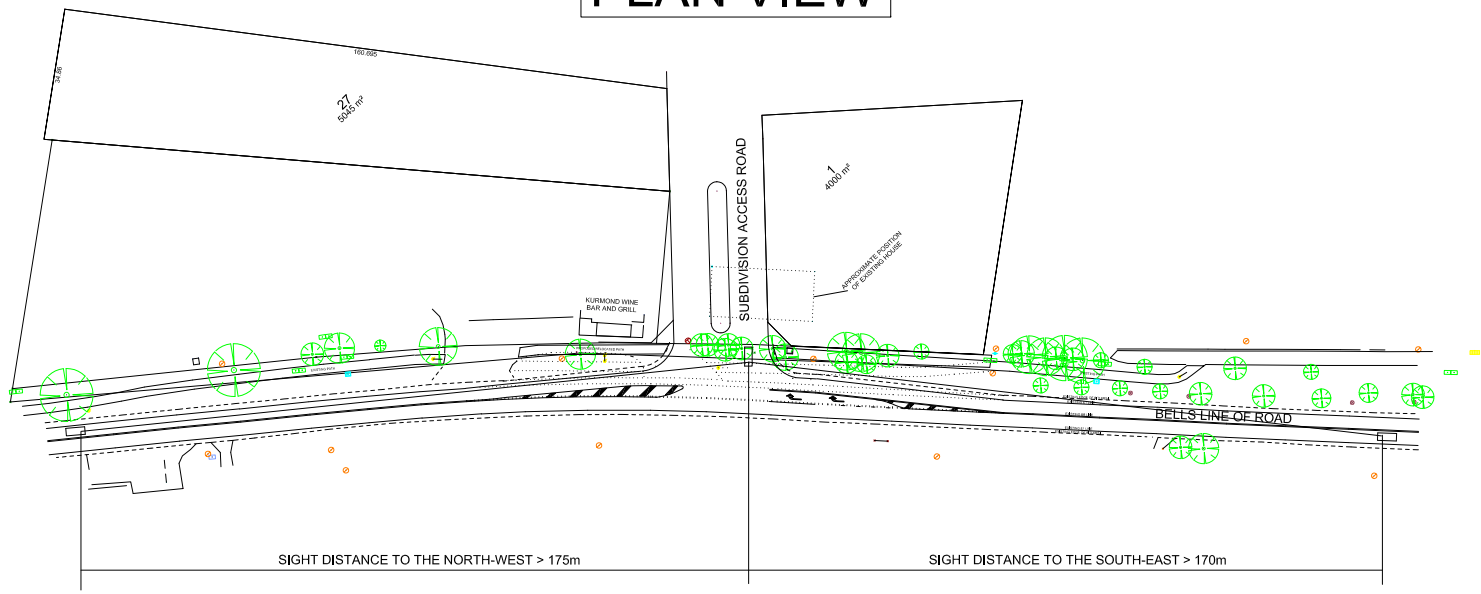
A	M	DS	Total Entry Capac	Delay Geom Rate	Delay Geom Sec/V	Delay Rate	Gap Accept	Delay Total Rate	Delay Averge Sec/V	Queued Veh's	Queue Length Metres	Stops Total Hour
1	L											
1	T											
1	R	0.04		0.0	5.3	0.0	5.3	0.1	7.4	1	6	1
2	L	0.02	288	0.0	4.4	0.0	8.0	0.0	9.6	1	6	1
2	T											
2	R	0.01	178	0.0	5.4	0.0	6.0	0.0	17.3	1	6	1
3	L			0.0	4.3			0.0	4.3			
3	T											
3	R											
4	L											
4	T											
4	R											
TOT		0.04		0.1	5.0	0.0		0.1	7.7			1

TOTal Average Delay = (Seconds Delay) / (Vehicles on Movements with Delay)

END OF FILE

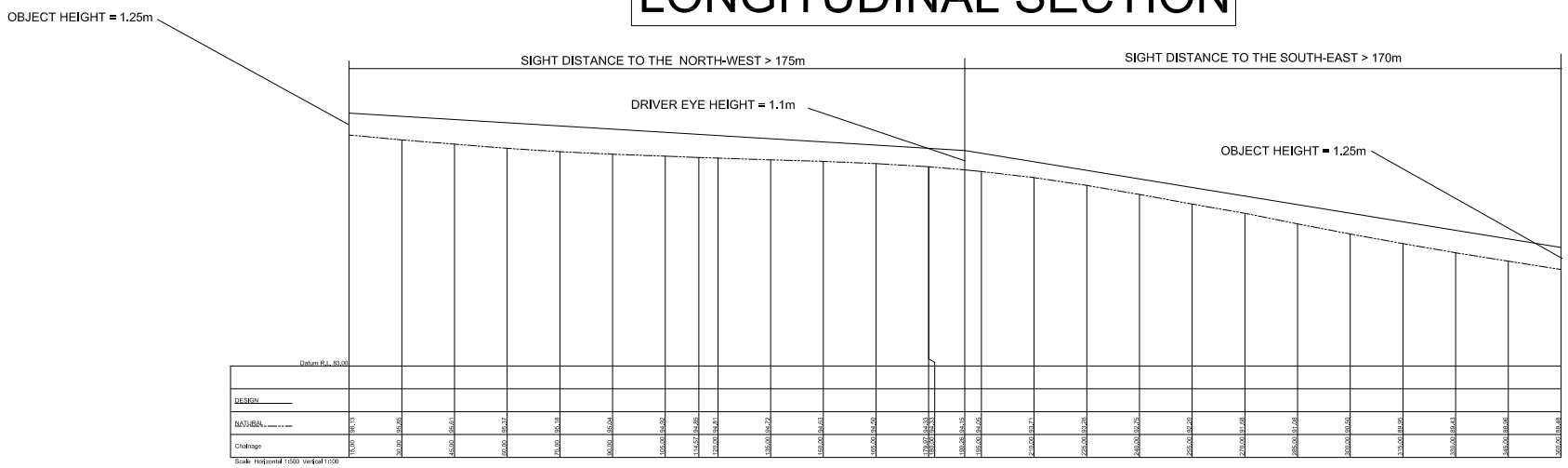
APPENDIX 6

PLAN VIEW



HORIZONTAL SIGHT DISTANCE AVAILABLE	
NORTH-WEST	SOUTH-EAST
>175m	>170m

LONGITUDINAL SECTION



VERTICAL SIGHT DISTANCE AVAILABLE	
NORTH-WEST	SOUTH-EAST
>175m	>170m

NOTES:

1. THIS PLAN HAS BEEN FORMULATED UTILISING SURVEY PLAN PREPARED BY NORTH WESTERN SURVEYS.
2. SAFE INTERSECTION SIGHT DISTANCE FOR 60KM/H = 114m (AUSTROADS GUIDE TO ROAD DESIGN PART 4A: UNSIGNALISED AND SIGNALISED INTERSECTIONS).

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THOMPSON STANBURY ASSOCIATES

SIGHT DISTANCE DIAGRAM
ACCESS ROAD SERVICING
PROPOSED RESIDENTIAL SUBDIVISION 396
BELLS LINE OF ROAD, KURMOND

HORIZONTAL SCALE: 1: 2000 - VERTICAL SCALE: 1:400 (AT A3)

ISSUE: A

FILE: 12-025-2

SUPERSEDES SHEET/ISSUE: -

DATE: OCTOBER 2012

SHEET: 2