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Our Ref: 214394_LET_003A.docx

29 July 2015

The General Manager
Cabonne Council
PO Box 17
MOLONG NSW 2866

Attention: Heather Nicholls or Amanda Rasmussen

Dear Heather and Amanda

PLANNING PROPOSAL FOR AMENDMENT OF THE CABONNE LOCAL ENVIRONMENTAL PLAN 2012 IN RESPECT OF LAND AT 1099 OPHIR ROAD, SUMMER HILL CREEK

Please find attached to this correspondence such necessary information to inform submission of a planning proposal to amend the Cabonne Local Environmental Plan 2012 in respect of the zoning and minimum lot size of 1099 Ophir Road, Summer Hill Creek, Lot 2 DP794456.

The applicant, Ms Gwenda Sandrin, will make direct contact with Council to pay relevant fees once confirmed.

Should you require any additional information please do not hesitate to contact the undersigned or Andrew Brownlow in our Orange office.

Yours faithfully
Geolyse Pty Ltd

DAVID WALKER
Town Planner

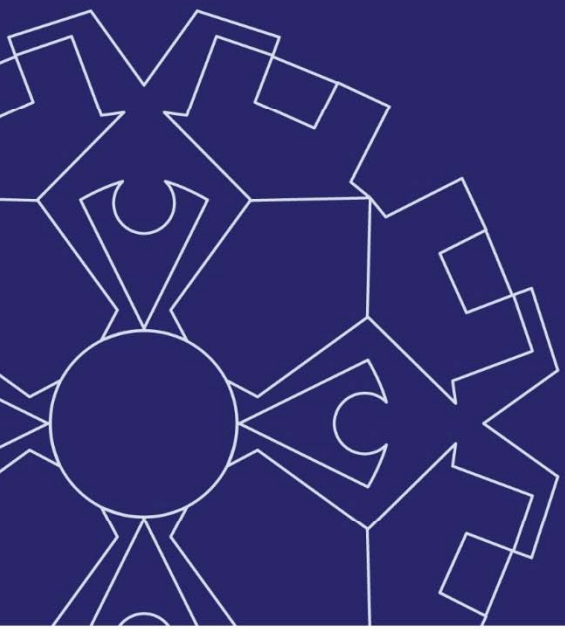
No. of Attachments – 2

1. 5 printed copies of the planning proposal and supporting documents
2. A CD containing a digital copy of all elements of the planning proposal

PLANNING PROPOSAL
AMENDMENT TO CABONNE LOCAL ENVIRONMENTAL PLAN 2012

PREPARED FOR
GWENDA SANDRIN

JULY 2015



• Civil, Environmental & Structural Engineering • Surveying • Environmental • Planning • Architecture

PLANNING PROPOSAL

AMENDMENT TO CABONNE LOCAL ENVIRONMENTAL PLAN 2012

PROPOSAL TO REZONE LAND AT SUMMER HILL ESTATE, 1099 OPHIR ROAD, SUMMER HILL CREEK (LOT 2 DP794456)

PREPARED FOR:

GWENDA SANDRIN

JULY 2015

GEOLYSE

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Report Title:	*Planning Proposal*
Project:	*Amendment to Cabonne Local Environmental Plan 2012*
Client:	*Gwenda Sandrin*
Report Ref.:	*214394_PP_001A.docx*
Status:	*Final*
Issued:	*29 July 2015*

Geolyse Pty Ltd and the authors responsible for the preparation and compilation of this report declare that we do not have, nor expect to have a beneficial interest in the study area of this project and will not benefit from any of the recommendations outlined in this report.

The preparation of this report has been in accordance with the project brief provided by the client and has relied upon the information, data and results provided or collected from the sources and under the conditions outlined in the report.

All information contained within this report are/is prepared for the exclusive use of Gwenda Sandrin to accompany this report for the land described herein and are not to be used for any other purpose or by any other person or entity. No reliance should be placed on the information contained in this report for any purposes apart from those stated therein.

Geolyse Pty Ltd accepts no responsibility for any loss, damage suffered or inconveniences arising from, any person or entity using the plans or information in this study for purposes other than those stated above.

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Executive Summary

Geolyse has been commissioned by Gwenda Sandrin to prepare a planning proposal to amend the *Cabonne Local Environmental Plan 2012* to rezone land from RU1 – Primary Production to R5 – Large Lot Residential and amend the minimum lot size to enable the future subdivision of the land/

The subject site is described as Lot 2 DP794456, 1099 Ophir Road, Summer Hill Creek. The site has an area of approximately 98 hectares, is largely cleared of vegetation and features an existing dwelling and associated outbuildings. The site is approximately 11 kilometres from the Orange central business district and is bounded by the Summer Hill Creek to the north and west, the Mullion Range State Conservation Area to the north and north-east and private land to the south. The site has a frontage to Ophir Road.

An assessment of the site has been undertaken in accordance with the relevant parameters of the planning proposal process. Various specialist reports including an ecological and bush fire assessment, Aboriginal heritage assessment, phase 1 contamination assessment and effluent management report have been completed and are appended to this proposal.

Overall it is considered that the site is suitable for the proposed purpose. Due to the presence of Aboriginal artefacts on site an Aboriginal Cultural Heritage Assessment will be required prior to subdivision occurring and it is likely that an Aboriginal Heritage Impact Permit will also be required.

ABBREVIATIONS

Abbreviation	Full Name
ACHA	Aboriginal Cultural Heritage Assessment
AHD	Australian Height Datum
AHIP	Aboriginal Heritage Impact Permit
APZ	Asset Protection Zone
CBD	Central Business District
CCA	Controlled Activity Approval
CSP	*Cabonne 2025 Community Strategic Plan*
D&PE	NSW Department of Planning & Environment
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
LEP	*Cabonne Local Environmental Plan 2012*
LGA	Local Government Authority
LUS	*Blayney Cabonne Orange Sub Regional and Industrial Land Use Strategy*
PBFP	*Planning for Bush Fire Protection 2006*
PCT	Plant Community Type
RMS	Roads and Maritime Services
SA4	LUS Strategic Area 4 (Spring Glen)
SEPP	State Environmental Planning Policy
TSC Act	*Threatened Species Conservation Act 1995*

Introduction

1.1 OVERVIEW

Gwenda Sandrin own land located at 1099 Ophir Road, Summer Hill Creek, and seek to subdivide for the purposes of large lot residential land use.

The site is currently zoned for RU1 – Primary Production and is occupied by the applicant for this purpose.

Permissible land uses on the site include extensive and intensive agriculture together with a range of other uses. Subdivision is permissible subject to achieving the applicable minimum lot size, which is 100 hectares.

As the site has an area of less than this minimum size no further subdivision is currently permissible. An amendment to the *Cabonne Local Environmental Plan 2012* (LEP) is required to rezone the land to a suitable zone that would enable the further subdivision of the land as desired by the applicant. The amendment would also amend the minimum lot size applying to the site.

The *Blayney Cabonne Orange Sub Regional and Industrial Land Use Strategy* (2008) (hereafter referred to as the LUS) was prepared to provide a strategic framework for future development within the three Council areas for the next 30 years. Chapter 6 of the LUS identified a number of areas across the three Council areas that were considered suitable for more intensive rural residential development.

The subject site is located in the northern extent of LUS Strategy Area SA4 (Spring Glen) which was considered suitable for rezoning from a rural land use zone to rural residential. The LUS was updated in 2012 via the release of the Rural Residential Update. This update identified a shortfall in the provision of rural residential lots across the three Council areas of approximately 119 lots over the 20 year forecast period.

Initial discussions with Cabonne Council's Director Environmental Services and Senior Town Planner have revealed a general acceptance of the principle of the amendment subject to the completion of necessary specialist investigations to determine the suitability of the site for subdivision and to inform the appropriate size of lots to be created.

Additionally, as the subject site represents the northern extent of a strategic land release area identified in the LUS, a concept development plan has been prepared to demonstrate the capacity for the remainder of the Strategy Area to be developed. This concept plan has been discussed with the other affected land owners within the area. The details of this consultation are provided in **Section 5**. An internal road would form part of the estate and this would provide the capacity for a future connection into the residue land to the south.

It is proposed to amend the zoning of the subject site from RU1 – Primary Production to R5 – Large Lot Residential. It is further proposed to amend the minimum lot size from 100 hectares to five hectares. Approximately 14 lots (subject to detailed design) would be developed ranging in size from 5 to 10 hectares. As no concept lots exceed 10 hectares in size, the proposed minimum lot size would ensure capacity for the further subdivision of created lots is not provided. Specific boundary locations and lot sizes would be confirmed at development application stage following amendment of the LEP but would not be expected to be radically different from the concept plan attached – refer **Drawing TP03**.

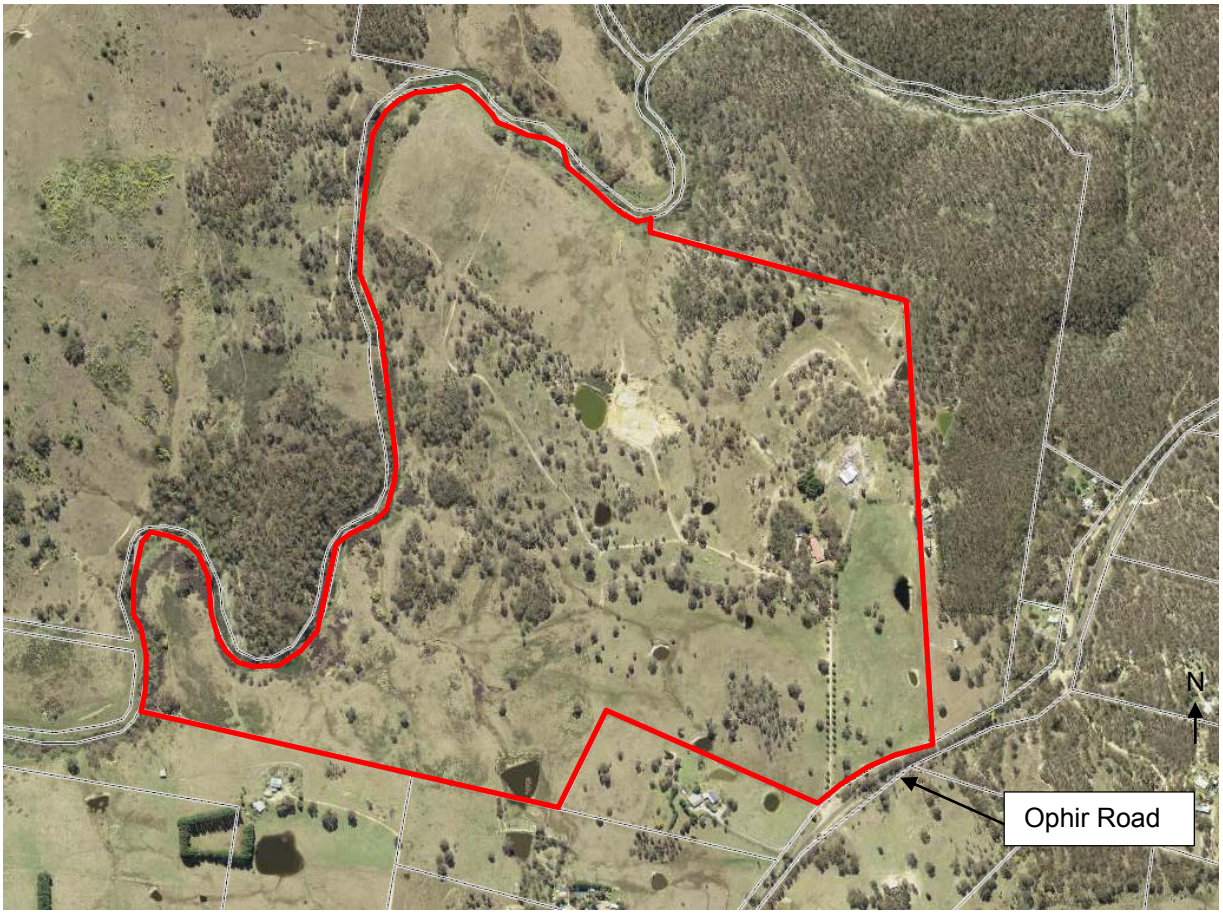


Figure 1: The subject site (Source: Six Maps)

1.2 SUBJECT SITE

The subject site is described as 1099 Ophir Road, Summer Hill Creek, Lot 2 DP794456.

The site is located approximately 11 kilometres north-east of Orange central business district (CBD).

1.3 SITE DESCRIPTION

The site has an area of approximately 98 hectares and a frontage to Ophir Road of approximately 260 metres – refer **Figure 1**.

The Mullion Range State Conservation Area is located to the north-east and east of the site, and Summer Hill Creek borders the site to the west and north-west. The fall of the land is generally from the east to the west, i.e. from the Mullion Range to Summer Hill Creek, at an approximate peak elevation of 840 metres Australian Height Datum (mAHD) in the east, falling to 780 mAHD in the west.

As a north-south aligned ridge line is present in the eastern portion of the site, the catchment of drainage gullies is not likely to extend beyond the site's eastern boundary. Some flow from beyond the site's southern boundary is anticipated.

Based on the regional and site topography, it is considered that the majority of site stormwater would be captured by drainage gullies across the site and discharge into various holding dams on the site or into Summer Hill Creek. General slopes at the site range from 6-8% at the site's north-west to 13-17% at the site's north-east, while gradients across the southern portion of the site approximately range between 6% and 13%.

The site is not generally low lying or is not mapped as flood prone by virtue of LEP mapping.

The site is largely cleared of vegetation and benefits from an existing dwelling and workshop, located generally in the eastern extent of the site. Access to the property is from Ophir Road via a gravel all-weather access track. Ophir Road is a sealed two lane, two way road. The access location from Ophir Road is located on a slight bend in the road but good sight lines are available in both directions, with generally clear sightlines for approximately 1 kilometre to the south-west and 300 metres to the north-east. The posted speed limit on this portion of Ophir Road is 80 kilometre per hour. The nearby Spring Glen rural residential subdivision (accessed from Spring Glen Road) is located approximately 300 metres to the south-west.

The site does not currently benefit from reticulated water or sewer services and none is proposed via this project. Proposed lots have been sized to ensure that sufficient capacity exists on site to enable on-site management effluent and the harvesting of rain water for potable water supplies.

The surrounding locality is characterised by a smaller quasi rural residential lots to the south and east with lots becoming larger to the west and north. Lots to the south located within SA4 range from 0.5 ha to 28 ha, with an average size of approximately 8.8 hectares

1.4 CONCEPT DEVELOPMENT

The proposed rural residential subdivision would consist of the following:

- Approximately 14 lots with lot sizes ranging from 5 to 10 hectares;
- A centrally located proposed access road connecting to Ophir Road would be provided to access proposed lots;
- Recessed access driveways would be provided from the proposed access road to each proposed lot in accordance with the Austroads standards;
- Each lot would feature a 50 metre by 60 metre building envelope setback from boundaries by at least 20 metres;
- On site water supply would be provided via on site harvesting and storage of roof water, augmented by bores, onsite farm storages and creek extraction for those properties with a creek frontage;
- Each lot would be supplied with an on-site system of effluent management typically supplied within the confines of the proposed building envelope – refer **Appendix D**;
- Provision of asset protection zones around building envelopes and access driveways/roads in accordance with the provisions of the Rural Fire Service *Planning for Bush Fire Protection* (2006) – refer **Appendix B**; and
- Provision of electricity and telecommunications connections in line with relevant requirements of service providers.

It is expected that the development would be staged to respond to market demand with lots closest to Ophir Road to be released initially.

A conceptual subdivision plan for the entirety of Strategy Area 4 is provided as **Drawing TP02**. The land the subject of this planning proposal is depicted in **Drawing TP04**.

Objectives and intended outcomes

2.1 OBJECTIVE

The objective of the planning proposal is to enable the rezoning of the subject site from RU1 – Primary Production to R5 – Large Lot residential to enable the further subdivision of the site. This would also require the amendment of the existing minimum lot size from 100 hectares to five hectares.

2.2 EXPLANATION OF PROVISIONS

This is a simple planning proposal to amend the *Cabonne Local Environmental Plan 2012* (LEP) in respect of Lot 2 DP794456. A future development application would be required to subdivide the land as proposed.

The planning proposal proposes:

- The amendment of LEP Map Sheet LZN_004 and LZN_004D to amend the site zoning from RU1 – Primary Production – R5 – Large Lot Residential; and
- The amendment of LEP Map Sheet LSZ_004 and LSZ_004D to amend the minimum lot size from 100 hectares to 5 hectares.

There would be no change to the text of the LEP on the basis that the objectives of the zone and the land uses permitted with and without consent and prohibited, by virtue of the land use table in relation to the R5 zone, would remain unchanged.

Justification

3.1 NEED FOR THE PLANNING PROPOSAL

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

This planning proposal is developed on the basis of the findings of the LUS. The LUS identified a number of areas within the sub-region for provision of additional rural residential (or lifestyle) lots. The subject site is located within LUS Strategy Area 4 (SA 4). The LUS made the following comments about SA 4:

> *This SA is an extension of the existing Spring Glen rural residential subdivision onto the western side of Ophir Road. SA 4 is located approximately 8 kilometres north west of the Orange CBD and a further 1.5-3 kilometres further along Ophir Road from SA 2. The cumulative weighted criteria assessment indicates that the site presents a low level of constraint to development, with all parts of the land falling within the Constraint Level 2 band. The only contributing environmental constraint is the designation of the land as bush fire prone. While the land itself contains no identified stands of remnant vegetation, such vegetation fringes the land in all directions and their statutory buffer areas fall across the site. However, the bushfire management measures provided in accordance with the PBP Guidelines, as discussed above in relation to SA 3, could equally enable a satisfactory and compliant rural lifestyle subdivision and development outcome for this site. This will need to be further investigated as part of the local environmental study required for rezoning.*
>
> *Also contributing to the constraint level score was the location of the site within a potential mineral resource area, as formally recognised by the DPI. While a legitimate constraint to future development, exploration for mineral resources in this area is unlikely given existing established residential development in this area. While the site falls outside a 5-kilometre distance of the Orange CBD and assigns the SA a middle ring location according to the weighted criteria assessment. However, its location on Ophir Road ensures that access to essential services is not too greatly constrained. The SA is already highly fragmented. No other environmental constraint used in the weighted criteria assessment has been detected within the SA 4 land. Future lifestyle development in this area would be subject to similar development controls that apply to the existing Spring Glen subdivision, in particular a 10 hectare minimum lot size.*

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

Given the current RU1 zoning of the land, the proposed outcome of providing additional rural residential lots within close proximity to Orange is not able to be achieved without first rezoning the land.

The proposed approach is considered the best means of achieving the desired outcome.

3.2 RELATIONSHIP TO STRATEGIC PLANNING FRAMEWORK

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

There is no regional strategy applying to the subject site. As outlined above, the planning proposal is consistent with the LUS and the subject site is identified as being located within SA4.

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

Cabonne 2025 is the relevant Community Strategic Plan (CSP) applying to the Cabonne LGA. CSP 4.1 is aimed at providing a successful balance of village and rural living. This planning proposal sits comfortably with this strategic aim in that it provides for additional opportunities for rural residential development within the LGA.

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

The planning proposal is broadly compliant with all relevant State Environmental Planning Policies (SEPPs). The following specific comments are made in relation to applicable SEPPs.

State Environmental Planning Policy No 44 – Koala Habitat Protection

State Environmental Planning Policy 44 - Koala Habitat Protection (SEPP44) aims to:

> *...encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas, to ensure permanent free-living populations over their present range and to reverse the current trend of population decline...*

This policy applies to all LGAs within the known state wide distribution of the Koala, including the Cabonne LGA. SEPP 44 defines 'potential koala habitat' as vegetation that incorporates a minimum of 15 percent of tree species (listed in Schedule 2 of SEPP 44) in the 'upper or lower strata of the tree component'.

An ecological assessment of the site including site survey has been completed and no tree species listed in Schedule 2 of SEPP44 as Koala feed tree species were located on site. In addition no Koalas were identified on site, nor any Koala scratches or scats.

On this basis, the planning proposal is considered to be considered to be consistent with the aims of SEPP44. Further consideration of the provisions of SEPP4 are not considered to be warranted.

State Environmental Planning Policy No 55 – Remediation of Lands

State Environmental Planning Policy 55– Remediation of Lands (SEPP55) aims to:

> *...promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment...*

This policy applies to the whole of the State, including the Cabonne LGA. SEPP55 defines 'contaminated land' as per the definition in Part 5 of the *Contaminated Land Management Act 1997 No 140* as the presence in, on or under the land of a substance a concentration above the concentration at which the substance is normally present in, on, or under (respectively) land in the same locality, being a presence that presents a risk of harm to human health or any other aspect of the environment.

Geolyse has completed a stage 1 Contamination Assessment, attached to this planning proposal as **Appendix A**. This assessment involved confirmation of previous land uses known to have been undertaken, review of topographic maps, public notices, aerial photographs and historic parish maps and also included a site walkover.

This report identified the following recommendations and conclusions:

- *The site is located in a rural area and includes 2 main structures currently used as a residence and a workshop. Other smaller structures are present, ancillary to these main structures;*
- *The site and surrounding area generally falls from the east to the west, i.e. from the Mullion Range to Summer Hill Creek, at an approximate peak elevation of 840 mAHD in the east, falling to 780 mAHD in the west. It is considered that the majority of site stormwater would be captured by drainage gullies across the site and discharge into various holding dams on the site or into Summer Hill Creek.*
- *Based on the review of historic operations at the site, the site is considered to have only been utilised for agricultural purposes.*
- *Based on current operations at the site, and observations of the site during the inspection on 1 July 2015, it is considered that the site is suitable, or may be made suitable, for the proposed land uses permitted under 'large lot residential' zoning, with consideration to the following:*

1. *Stormwater flow onto the site from properties beyond the site's southern boundary may have resulted in contamination from agricultural and/or industrial chemicals (proposed Lots 20, 22 and 28);*
2. *Potential leaking of the septic waste water storage tank on-site may have resulted in biological and chemical contamination (proposed Lot 32);*
3. *Storage and use of chemicals associated with maintenance of farm machinery and refuelling of vehicles may have resulted in contamination from agricultural and/or industrial chemicals (proposed Lot 32);*
4. *Weathering of construction materials in structures potentially containing asbestos may have resulted in contamination (proposed Lot 32);*
5. *Landfilling of farm generated wastes may have resulted in biological and chemical contamination (proposed Lots 29 and 32);*
6. *Spent bullets and casings at the rifle range area may have resulted heavy metal contamination (proposed Lots 26, 27 and 31).*

- *In accordance with SEPP 55, as investigations have identified that potential contamination identified at some areas of the site may make those areas unsuitable for particular uses permitted under the proposed R5 large lot residential zoning (e.g. dwelling houses), provisions are required to ensure assessment and/or remediation of those areas occurs prior to those land uses being adopted.*
- *Further assessment and/or remediation of potentially contaminated areas of the site is not considered to be a requirement of rezoning the site from its current RU1 primary production zoning to R5 large lot residential zoning, based on the following:*
  - *Developments permitted under the R5 large lot residential zoning without development consent do not include uses considered likely to "increase the risk of harm to health or the environment from contamination"; and*
  - *SEPP 55 contains a general provision that requires consideration of contamination for all development proposals which require development consent, at which point assessment and/or remediation of specified items 1-6 above may be considered.*
- *Notation of the above items may be required to be recorded on Section 149(5) Planning Certificates to be prepared for the subdivided lots, as necessary.*

For the avoidance of doubt, the matters identified at points 1-6 above would be addressed in conjunction with preparation of a future development application to subdivide the land.

State Environmental Planning Policy (Rural Lands) 2008

In accordance with Clause 4 of Ministerial Direction 1.5 – Rural Lands, where a rezoning effects land located within a rural or environmental protection zone, the planning proposal must be consistent with the Clause 7 – Rural Planning Principles contained in the State Environmental Planning Policy (Rural Lands) 2008.

Below is a summary of the proposal's compliance with the Rural Planning Principles;

(a) The promotion and protection of opportunities for current and potential productive and sustainable economic activities in rural areas;

The portion of land proposed for rezoning is located within RU1 – Primary Production.

An ecological assessment completed in respect of the site (refer **Appendix B**) concludes that the impact resulting from the future subdivision would be minor (less than 5% of each vegetation within the study site would need to be cleared) and this clearing would be unlikely to substantially fragment fauna habitat either within the study site or the broader region. No threatened flora species were detected within the subject site however noting that targeted seasonal survey is necessary to determine whether two threatened flora species known to occur within the region might be located on site.

More broadly, the site has been identified via the LUS as being strategically suitable for industrial land use and therefore the loss of primary production land is considered generally acceptable.

(b) Recognition of the importance of rural lands and agriculture and the changing nature of agriculture and of trends, demands and issues in agriculture in the area, region or State;

The land is located within an area of Cabonne that has undergone transition over time from an area dominated by primary production to an area characterised by smaller, lifestyle blocks, attractive due to being within easy commuting distance of Orange. The LUS identifies that the fragmented subdivision pattern in the locality precludes highly productive agriculture.

(c) Recognition of the significance of rural land uses to the State and rural communities, including the social and economic benefits of rural land use and development;

The land is currently zoned RU1 – Primary Production under the LEP with a minimum lot size of 100 hectares, however it has been identified as future rural residential land by the LUS. This is a reflection of the changing nature of the agriculture and development trends and requirements in the area.

(d) In planning for rural lands, to balance the social, economic and environmental interests of the community;

Given the highly fragmented nature of the locality, and the lack of capacity to accommodate broad scale agriculture, the reallocation of the land use from primary production to rural residential represents a logical pattern of development that is consistent with the strategic plan for the broader sub-region.

(e) The identification and protection of natural resources, having regard to maintaining biodiversity, the protection of native vegetation, the importance of water resources and avoiding constrained land,

The ecological assessment prepared in respect of the site (refer **Appendix B**) concludes that the planning proposal would not result in significant impacts to threatened flora, fauna or communities. Some additional targeted seasonal survey would be required prior to preparation of a development application to ensure that a number of seasonal threatened species are not located on site.

(f) The provision of opportunities for rural lifestyle, settlement and housing that contribute to the social and economic welfare of rural communities

This planning proposal provides an opportunity for provision of additional rural residential lifestyle blocks, consistent with the strategic aims of the LUS and in line with the LUS Rural Residential Update 2012 which identifies a shortfall in blocks of this nature.

(g) The consideration of impacts on services and infrastructure and appropriate location when providing for rural housing

The planning proposal as conceived is serviceable with external services (such as electricity and telecommunications) being available to the site and other essential services (water and sewer) able to be accommodated on site.

(h) Ensuring consistency with any applicable regional strategy of the Department of Planning or any applicable local strategy endorsed by the Director-General.

As previously stated, the planning proposal is consistent with the provisions of the LUS, endorsed by the Director-General of the Department of Planning, and the Rural Residential Update to the LUS (2012).

Is the planning proposal consistent with applicable Ministerial Directions (s177 directions)?

Direction 1.2 – Rural Zones

This direction applies when a relevant planning authority prepares a planning proposal that will affect land within an existing or proposed rural zone. The objective of the direction is to protect the agricultural production value of rural land.

A planning proposal must not rezone land from a rural zone to a residential, business, industrial, village or tourist zone unless the relevant planning authority can satisfy the Director-General of the Department of Planning that the provisions of the planning proposal that are inconsistent are:

a) *justified by a strategy which:*

   i *gives consideration to the objectives of this direction,*

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

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

b) *justified by a study prepared in support of the planning proposal which gives consideration to the objectives of this direction, or (c) in accordance with the relevant Regional Strategy or Sub-Regional Strategy prepared by the Department of Planning which gives consideration to the objective of this direction, or*

c) *is of minor significance.*

The proposal demonstrates that whilst it would result in the loss of rural land, the development is acceptable due to its consistency with the LUS. Additionally, given the highly fragmented nature of the landscape, the use of the size for agriculture is largely restricted in the immediate locality.

The subject site does not border any properties that are currently in use for broad acre agriculture.

Direction 1.3 – Mining, Petroleum and Extractive Industries

This direction applies when a relevant planning authority prepares a planning proposal that would have the effect of:

(b) restricting the potential development of resources of coal, other minerals, petroleum or extractive materials which are of State or regional significance by permitting a land use that is likely to be incompatible with such development.

The site is not known to contain any resources that are of state or regional significance.

Direction 1.5 – Rural Lands

In accordance with the following Clause 3(a) of Ministerial Direction 1.5 – Rural Lands as follows:

"This direction applies when:

(a) "A relevant planning authority prepares a planning proposal that would affect land within an existing or proposed rural or environmental protection zone (including the alteration of any existing rural or environmental protection zone boundary)" or

(b) "A relevant planning authority prepares a planning proposal that changes the existing minimum lot size on land within a rural or environmental protection zone.

This direction is applicable to the planning proposal as the area of land proposed to be rezoned to R5 – Large Lot Residential is currently zoned as RU1 – Primary Production. Furthermore, the rezoning of the land to R5 would entail reducing the minimum lot size permissible for development from 100 hectares to 5 hectares.

As per Clause 4 of Ministerial Direction 1.5 – Rural Lands:

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

As Clause 3(a) of the Ministerial Direction 1.5 is applicable.

A proposal may be inconsistent with Direction 1.5 if any of the following applies;

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

(a) Justified by a strategy which:

- *gives consideration to the objectives of this direction,*
- *identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites, and*
- *is approved by the Director-General of the Department of Planning and is in force, or*

(b) Is of minor significance".

The planning proposal is consistent with the LUS. Additionally, an assessment has been undertaken against the Rural Planning Principles contained in the *State Environmental Planning Policy (Rural Lands) 2008* in **Section 3.2**. The proposal has been found to be consistent with the Rural Planning Principles.

Direction 2.3 – Heritage Conservation

Ministerial Direction 2.3 is applicable to a planning proposal when an item of local heritage significance is located on the site.

"A planning proposal must contain provisions that facilitate the conservation of:

(a) items, places, buildings, works, relics, moveable objects or precincts of environmental heritage significance to an area, in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item, area, object or place, identified in a study of the environmental heritage of the area,

(b) Aboriginal objects or Aboriginal places that are protected under the National Parks and Wildlife Act 1974, and

(c) Aboriginal areas, Aboriginal objects, Aboriginal places or landscapes identified by an Aboriginal heritage survey prepared by or on behalf of an Aboriginal Land Council, Aboriginal body or public authority and provided to the relevant planning authority, which identifies the area, object, place or landscape as being of heritage significance to Aboriginal culture and people".

Neither the LEP nor the State Heritage Register identifies the site as containing any items of local or state heritage significance.

A due diligence assessment of the site, including site walkover, to determine the likely existence of sites of Aboriginal heritage significance has been completed – refer **Appendix C**. As artefacts were identified to exist on site, further investigations in the form of an Aboriginal Cultural Heritage Assessment would be required to ensure that the artefacts and sites known to exist can either be avoided (preferred) or impacted (subject to gaining an Aboriginal Heritage Impact Permit). The due diligence assessment confirms that the site is suitable for the proposed land use and that the Aboriginal heritage values do not pose any constraint in regard to a rezoning and future subdivision proposal.

Direction 3.1 – Residential Zones

Ministerial Direction 3.1 – Residential Zones is applicable to existing or proposed residential zoned land.

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

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

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

(c) reduce the consumption of land for housing and associated urban development on the urban fringe, and

(d) be of good design.

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

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

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

A planning may be inconsistent with the terms of this direction only where:

(a) justified by a strategy which:

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

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

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

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

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

(d) of minor significance.

The planning proposal is consistent with the LUS and is therefore acceptable in the context of this Direction.

Direction 3.4 – Integrating Land Use and Transport

This direction applies when:

a relevant planning authority prepares a planning proposal that will create, alter or remove a zone or a provision relating to urban land, including land zoned for residential, business, industrial, village or tourist purposes.

The objectives of the direction is to:

ensure that urban structures, building forms, land use locations, development designs, subdivision and street layouts achieve the following planning objectives:

(a) improving access to housing, jobs and services by walking, cycling and public transport, and

(b) increasing the choice of available transport and reducing dependence on cars, and

(c) reducing travel demand including the number of trips generated by development and the distances travelled, especially by car, and

(d) supporting the efficient and viable operation of public transport services, and

(e) providing for the efficient movement of freight.

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

(a) justified by a strategy which:

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

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

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

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

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

(d) of minor significance.

The planning proposal is justified by the LUS and therefore inconsistency with this direction is acceptable.

Direction 4.4 – Planning for Bush Fire Protection

The objectives of this direction are:

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

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

In the event this direction applies the relevant planning authority must:

This direction is applicable to the subject site on the basis that parts of the site are mapped as bush fire prone land by reference to the Cabonne Bush Fire Prone land map.

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

(4) A planning proposal must:

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

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

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

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

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

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

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

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

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

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

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

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

The ecological assessment prepared to support the planning proposal (refer **Appendix B**) has completed an assessment of the proposed lots in accordance with provisions of the *Planning for Bush Fire Protection* and identified appropriate building envelopes and asset protection zones to ensure the safety of future residents. In addition, the following specific comments are provided:

(a) APZ's will be provided for each site as outlined in Section 5.5 and Table 4 of **Appendix B**. Specific measures for bush fire protection would be addressed in a bush fire assessment prepared to support a future subdivision development application
(b) Proposal does not relate to infill development;
(c) A two way access road is proposed that provides a connection to Ophir Road. No fire trails are proposed;
(d) Individual properties would be required to provide a minimum of 20,000 litres of dedicated water supply for fire-fighting purposes; to be addressed via a specific bush fire assessment in relation to a future subdivision development application
(e) Development density is proposed that is commensurate to the bush fire threat applying to the land;
(f) Controls would be imposed over the land in relation to a future development application via a section 88b instrument attached to the future land titles.

The planning proposal is considered to be consistent with the direction on this basis.

Direction 6.1 – Approval and Referral Requirements

Ministerial Direction 6.1 – Approval and Referral Requirements applies to all Planning Proposal's forwarded for Gateway Determination by a local authority.

To be compliant with Direction 6.1, a planning proposal must be consistent with the following provisions;

"A planning proposal must:

(a) Minimise the inclusion of provisions that require the concurrence, consultation or referral of development applications to a Minister or public authority, and

(b) Not contain provisions requiring concurrence, consultation or referral of a Minister or public authority unless the relevant planning authority has obtained the approval of:

- *The appropriate Minister or public authority, and*
- *The Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General), prior to undertaking community consultation in satisfaction of section 57 of the Act, and*

(a) Not identify development as designated development unless the relevant planning authority:

- *Can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the class of development is likely to have a significant impact on the environment, and*
- *Has obtained the approval of the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) prior to undertaking community consultation in satisfaction of section 57 of the Act".*

Those matters requiring concurrence are minimised by the undertaking of detailed site investigations at planning proposal stage. Outstanding matters deferred to the post Gateway phase are limited to the undertaking of an Aboriginal Cultural Heritage Assessment which would be completed prior to the gazettal of the amending LEP. This would ensure that the future development of the land is not limited by the need to gain further approvals or concurrence.

3.3 ENVIRONMENTAL, SOCIAL AND ECONOMIC IMPACTS

Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, would be adversely affected as a result of the proposal?

An ecological assessment of the site has been completed by DPM Envirosciences (refer **Appendix B**) which concludes:

> *Development of the proposed Summer Hill Estate would involve vegetation clearing, earthworks, construction of buildings, access roads and additional fencing. This would result in the loss of varying vegetation types including forest, woodland, open scrub and grassland. However, both the natural and rural values are key features of the study site that will be retained and promoted as part of any future development. As such, the development would aim to minimise disturbance to both the natural and rural amenity of the study site.*
>
> *The approximate extent of vegetation to be removed includes 0.61 ha of both mature and regrowth forest, 0.02 ha of woodland, 2.55 ha of grassland and approximately 30 planted conifers. This clearing is minor in terms of overall vegetation loss, considering the extent of vegetation remaining within the study site and broader locale, including the nearby Mullion State Conservation Area. The study site does however contain woodland remnants of the Yellow Box – Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion PCT. Parts of this PCT may include the Critically Endangered TEC (EPBC Act) identified as the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland or the Critically Endangered EEC (TSC Act) identified as the White Box Yellow Box Blakely's Red Gum Woodland. The precautionary principle has been applied in assuming that this PCT is both an EEC and a TEC. The refinement of this PCT and delineation of any EEC and / or TEC is subject to more detailed assessment, which should be undertaken if any proposed clearing (such as for final building envelopes, APZs, property access tracks or fences) intersects this PCT. It is noted, however, that building envelopes could be established on each lot without the need to clear this PCT. Potential realignment of the access road into Lot 25 from the southern to the northern side of Lot 24 would eliminate the need to clear this PCT between lots 21 and 24. Furthermore, access tracks to individual building envelopes could avoid this PCT. Where an EEC or TEC cannot be avoided, an Assessment of Significance should be undertaken in accordance with section 5A the EP&A Act and / or the EPBC Act to determine whether it is appropriate for the clearing to proceed.*
>
> *No threatened flora species (listed under either the EPBC Act or TSC Act) were detected within the study site. However, seasonal conditions were not appropriate for the detection of two of these species: Austral toadflax (Thesium australe) and silky swainson-pea (Swainsona sericea). As the study site provides potential habitat for these species, the precautionary principle must be applied in assuming their presence until targeted survey can be undertaken in more favourable conditions (ie spring / summer).*

On the basis of the above, and subject to further investigations to be completed in conjunction with the preparation of a development application to subdivide the land, it is considered that the planning proposal may proceed.

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

There is the potential for impacts associated with the development of the land and these are discussed in detail as follows:

<u>Supply and Demand</u>

The 2012 Rural Residential update to the LUS identified a predicted shortfall of 119 lots within the twenty year time frame to 2032.

This development would assist in meeting this shortfall and would provide additional options for residents looking for rural residential blocks within commuting distance of Orange.

The release of lots would be staged to ensure that market saturation does not occur.

Given the generally low number of lots to be released and the gradual nature of any release, it is anticipated that the project would have a limited impact on the market.

Traffic and Access

The proposed development would generate approximately 13 additional lots on the land (14 in total), based on the concept lot arrangement depicted in **Drawing TP03**.

The subject site is located on the western side of Ophir Road, which is a sealed two way, two lane road in this location. Ophir Road connects with the Northern Distributor Road to the south providing access to the Orange central business district and to regions beyond.

By reference to the *RTA Guide to Traffic Generating Development* (2002) it is anticipated that each additional proposed lot would generate approximately nine additional vehicle movements per day, amounting to approximately 117 vehicle movements per day (13 new lots * 9 movements) on to the local road network. As lot release would be staged, this would be a gradual increase. Given the already developed nature of the locality it is considered that this low number of additional traffic movements can be comfortably accommodated within the environmental capacity of the existing road network.

The proposed access road and all property accesses would be designed to ensure compliance with Austroads standards together with the engineering standards of Cabonne Council. Detailed assessment would be required at development application stage to ensure that the specific driveway locations provide adequate safe sight distances.

Water Quality

The proposal has the potential to impact water quality in a number of ways, including the installation of on-site effluent management systems, changes to stormwater management as a result of increased impervious areas, the potential for sedimentation or erosion as a result of construction activities and potential impacts to groundwater to as a result of increased development.

On-site effluent management

An effluent management report has been completed to assess the soil environment of the site and to determine adequacy of the site to accommodate on-site effluent management systems – refer **Appendix D**. Based on a review of the site soil environment and the predicted levels of discharge it is concluded that there are no major constraints that would prevent sustainable on-site effluent management and the proposed lots are considered to provide sufficient area available to install an on- site effluent management system in accordance with the current guidelines and Australian Standard.

Building envelopes of 50 metres by 40 metres are provided which provides sufficient capacity to accommodate a proposed dwelling together with a required irrigation area of at least 1,400 square metres or an effective trench area of 144 square metres (depending on the approach taken on a lot by lot basis).

Stormwater Management

Given the proposed rural residential nature of the future subdivision of the land, it is not anticipated that a minor increase in impervious areas would be significant in the context of the overall size of the subject site. The following general mitigation measures in relation to stormwater management are noted:

- All proposed dwelling developments would be undertaken in accordance with the requirements of BASIX;
- Roof water would be harvested and stored on site to provide a secure potable water supply as well as a secure fire-fighting resource;

- Drainage for impervious areas would be provided including scour protection to ensure erosion is minimised;
- Standard erosion and sediment controls would be implemented during construction activities to minimise the impacts of sedimentation.

Erosion

The impacts of erosion during construction would be managed through preparation and implementation of an erosion and sediment control plan (or soil and water management plan if the area of disturbance exceeds 2,500 square metres) in accordance with the requirements of the Landcom. Standard measure to be incorporated would include but not be limited to:

- Minimise area of disturbance to the maximum necessary.
- Install erosion and sediment control devices where necessary; only to be removed once the area is stabilised.
- Prompt revegetation of areas exposed by construction.

Groundwater

A review of available data identifies two groundwater bores located in close proximity to the subject site. A review of the bore logs shows standing water levels between 3 - 15 metres and the highest water bearing zone to between 43-43.1 metres and 65-75 metres.

Given the depth to standing water and the low density nature of the ultimately proposed development, it is considered that the likelihood of detrimental impacts to groundwater resources is low. As noted, the effluent management report confirms that the site soil environment can accommodate the proposed level of development.

Riparian Corridors

Mapping associated with the LEP identifies that the site is bounded to the north and west by a sensitive waterway (Summer Hill Creek) and is also intersected in the southern extent by a tributary of Summer Hill Creek – refer **Figure 2**.

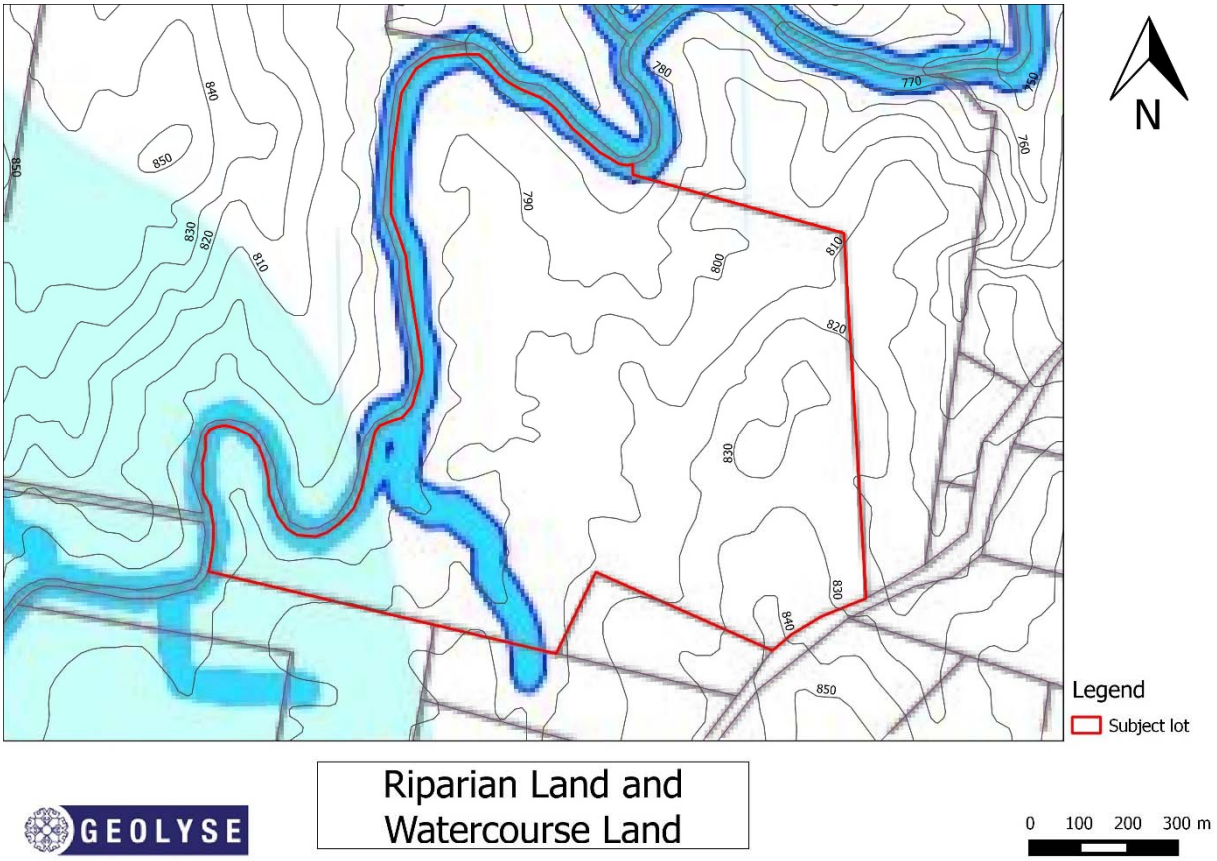


Figure 2: Riparian Land and Watercourse Land (Cabonne Local Environmental Plan 2012)

Both creeks are identified by the Department of Primary Industries (Fisheries) as key fish habitat.

Any work conducted within forty metres of these creeks would require a controlled activity approval (CCA) in accordance with Section 91 of the *Water Management Act 2000*. Any dredging and reclamation within waterland (ie, the confines of either creek) would require a Part 7 permit from Department of Primary Industries (Fisheries) in accordance with the *Fisheries Management Act 1994*. These matters would be addressed in conjunction with a future subdivision development application.

The building envelope in proposed Lot 21 has been sited to ensure that impacts to the tributary to Summer Hill Creek are minimised. It is also noted that development of a domestic dwelling within 40 metres of a waterway does not require a CCA. The only work requiring a CCA and Part 7 permit would therefore be the construction of the southern extent of the access road, and this would only be required in order to develop Lot 20, which would be the final lot to be released.

Flooding

The site is not identified as flood prone. Given the undulating nature of the land scape, the distance of proposed building envelopes from Summer Hill Creek and the proposed location of the access road it is not expected that any short term flood impacts associated with the creek would present any detrimental impacts to future land owners or occupants.

Bush Fire Hazard

The site is mapped as bush fire prone by reference to the Cabonne Bush Fire Prone Land Map (refer Figure 7 of **Appendix B**).

An assessment of impacts associated with the bush fire prone nature of the land, completed in the context of PBFP, has been completed at Section 5.5 of **Appendix B**. This assessment concludes that appropriate asset protection zones and building construction standards can be achieved, with a

minimum of vegetation clearance, whilst still ensuring the safety of future occupants. A summary of required asset protection zones are provided in Table 4 of **Appendix B**.

Additional assessment against the provisions of PBFP would be required in relation to development application for those future dwellings located on mapped bush fire prone land (Lots 20, 21, 24, 25, 26, 27, 28, 30, 31, 32 and 33) to ensure that house siting and construction standards are acceptable.

The existing dwelling (on proposed Lot 32) is noted to be located on bushfire prone land and the development application to subdivide the land would need to take account of the siting of the dwelling and make provision for an appropriate asset protection zone.

Heritage

A review of available resources, including *Cabonne Local Environmental Plan 2012*, confirms that the site does not contain and is not located in the vicinity of any items of mapped non-Aboriginal heritage significance. It is considered that the likelihood of unearthing previously undiscovered items of heritage significance in relation to site works is low.

An assessment of the likelihood of encountering items or sites of Aboriginal heritage significance on the site was completed NSW Archaeology – refer **Appendix C**. This assessment included a field survey which identified eleven Aboriginal object locals across the site. These were all low density, highly disturbed stone artefact distributions of generally low archaeological heritage significance. The report concluded that the Aboriginal heritage values do not pose any constraint in regards to the proposed rezoning and the future rural residential subdivision.

It is acknowledged that an Aboriginal Cultural Heritage Assessment and formal Aboriginal consultation would need to be undertaken prior to the subdivision proceeding and it is highly likely that an Aboriginal Heritage Impact Permit (AHIP) would be required, although noting that avoidance would be the preferred approach. As per Figure 2 of **Appendix C**, none of the identified sites are located in the area of the proposed road, two were located close to proposed building envelopes and a number were located close to concept property boundaries. The opportunity exists at subdivision stage to adjust boundaries and building envelope locations to avoid artefacts in preference to disturbance. Where avoidance cannot be achieved, an AHIP would be required. The gaining of this approval is not considered a major impediment to the project.

Contamination

A Phase 1 contamination assessment including site walkover has been completed by Geolyse – refer **Appendix B**. The assessment concluded that the site is generally suitable for the future proposed rural residential land use however identified some additional sampling is to be completed prior to the subdivision proceeding.

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

Social and economic effects associated with the planning proposal are considered to be generally positive. The *Draft Centres Policy 2009* (Policy) provides a number of questions that should be considered in determining whether to proceed with a rezoning; referred to as the Net Community Benefit Test. These questions together with a response are provided in **Table 1**.

The Policy identifies that if it is judged that the rezoning would produce a net community benefit, the proposal should proceed through the rezoning process. If no benefit is identified, the proposed rezoning should not proceed.

The outcome of the discussion provided in **Table 1** confirms that the rezoning would have a net community benefit and accordingly it is considered that the rezoning should proceed.

Table 3.1 – Net Community Benefit Test

EVALUATION CRITERIA	COMMUNITY COSTS AND BENEFITS			
	BASE CASE – CURRENT SITUATION	PLANNING PROPOSAL	QUALITATIVE COMMUNITY BENEFIT PER CRITERIA	QUANTITATIVE COMMUNITY BENEFIT PER CRITERIA
Would the LEP be compatible with agreed State and regional strategic direction for development in the area (eg land release, strategic corridors)?	There are no State or regional strategic plans or directions that address. The The LUS identifies the subject land being suitable for rural residential land use.	The LEP seeks to rezone the subject land from RU1 – Primary Production to R5 – Large Lot Residential	The qualitative benefits of the proposal are: • The creation of additional rural residential lots ensures adequate supply of lots to meet demand; • The supply of additional lots satisfies the needs of the region	No external cost to the community as all services would be provided by the developer.
Is the LEP located in a global/regional city, strategic centre or corridor nominated within the Metropolitan Strategy or another regional/sub-regional strategy? Is the LEP likely to create a precedent or create or change the expectations of the landowner or other landholders?	The area is not a regional hub and is not identified in any Regional/Subregional study	The proposed LEP applies to a 98 hectare portion of land that has been identified as being a logical and suitable expansion of rural residential land. The land is physically bounded by Summer Hill Creek and the Ophir Road. Land to the south is already fragmented.	It would be difficult to establish a precedent from support for the LEP based on the characteristics of the proposal and the subject land. Other landowners in SA4 have expressed an interest in rezoning to enable further subdivision however consolidation between land owners would be required to facilitate this	No external cost to the community
Have the cumulative effects of other spot rezoning proposals in the locality been considered? What was the outcome of these considerations?	Cabonne Council released its comprehensive LEP in 2012. A recent rezoning in the locality gained concept for 11 concept lots although it is unknown whether subdivision consent for these lots has been sought. The lots within this rezoning are much smaller than proposed via this proposal and therefore inhabit a different part of the market.	The proposed LEP has been prepared on behalf of the land owner to facilitate further subdivision of the land.	No external cost to the community	No external cost to the community
Would the LEP facilitate a permanent employment generating activity or result in a loss of employment lands?	No employment lands created.	No employment lands created.	No employment lands created.	No external cost to the community

Table 3.1 – Net Community Benefit Test

EVALUATION CRITERIA	COMMUNITY COSTS AND BENEFITS			
	BASE CASE – CURRENT SITUATION	PLANNING PROPOSAL	QUALITATIVE COMMUNITY BENEFIT PER CRITERIA	QUANTITATIVE COMMUNITY BENEFIT PER CRITERIA
Would the LEP impact upon the supply of residential land and therefore housing supply and affordability?	The planning proposal would result in 14 rural residential lots being created. The LUS Update (2012) identified a shortfall in rural residential land in the remaining 20 year timeframe of the LUS. This planning proposal responds to that shortfall.	The planning proposal provides for approximately 13 additional dwelling opportunities.	No external cost to the community	No external cost to the community
Is the existing public infrastructure (roads, rail, utilities) capable of servicing the proposed site? Is there good pedestrian and cycling access? Is public transport currently available or is there infrastructure capacity to support future public transport?	Telecommunication, electricity and roads are available to the site. Water and sewer services are not available.	Existing services would be extended to service the site. Water and sewer services would be accommodated on site	No external cost to the community	No external cost to the community
Would the proposal result in changes to the car distances travelled by customers, employees and suppliers? If so, what are the likely impacts in terms of greenhouse gas emissions, operating costs and road safety?	Not applicable	An increase in rural residential land would not affect customers, employees or suppliers.	customers, employees and suppliers	No external cost to the community
Are there significant Government investments in infrastructure or services in the area whose patronage would be affected by the proposal? If so, what is the expected impact?	The proposal would not affect any significant Government investments in infrastructure or services	Minor changes to traffic generation is predicted but this is within the capacity of the road network	No external cost to the community	No external cost to the community
Would the proposal impact on land that the Government has identified a need to protect (eg land with high biodiversity values) or have other environmental impacts? Is the land constrained by environmental factors such as flooding?	No protected land.	The various specialist studies conclude that the land is suitable for the proposed use.	No external cost to the community	No external cost to the community

Table 3.1 – Net Community Benefit Test

EVALUATION CRITERIA	COMMUNITY COSTS AND BENEFITS			
	BASE CASE – CURRENT SITUATION	PLANNING PROPOSAL	QUALITATIVE COMMUNITY BENEFIT PER CRITERIA	QUANTITATIVE COMMUNITY BENEFIT PER CRITERIA
Would the LEP be compatible/ complementary with surrounding land uses? What is the impact on amenity in the location and wider community? Would the public domain improve?	Surrounding land is largely fragmented into smaller lots/	The planning proposal is consistent with surrounding land uses and lot sizes	No external cost to the community	No external cost to the community
Would the proposal increase choice and competition by increasing the number of retail and commercial premises operating in the area?	No current commercial or retail land use.	The LEP would not increase retail or commercial function.	No external cost to the community	No external cost to the community
If a stand-alone proposal and not a centre, does the proposal have the potential to develop into a centre in the future?	Not relevant to this planning proposal.			No external cost to the community
What are the public interest reasons for preparing the draft plan? What are the implications of not proceeding at that time?	Provision of additional rural residential lots would ensure demand for these lot types is satisfied.	Further subdivision and dwelling development would be permitted via this LEP.	Public Interest is best served by increasing supply of rural residential land within the locality before demand becomes problematic.	Potential external cost to community if LEP does not proceed due to identified shortfall of rural residential land.
		Net Community Benefit =	**Positive**	**Positive**

The outcome of the above analysis confirms that the planning proposal would have a net community benefit to the local area.

The social effect of the planning proposal would be best gauged during the period of Community Consultation (refer **Section 4**). Initial consultation completed on behalf of the applicant has revealed no in-principle objections to the planning proposal with some nearby residents expressing an interest in pursuing similar projects in the future.

3.4 STATE AND COMMONWEALTH INTERESTS

Is there adequate public infrastructure for the planning proposal?

The planning proposal applies to land that is generally fragmented by historical subdivision into quasi-rural residential land uses, with lot sizes (excluding the subject site) in the range of 0.5 to 28 hectares, with an average of 8.8 hectares. It is considered that the proposed lot minimum lot size is generally consistent with this current size

Additionally nearby rural residential subdivisions such as Strathnook Lakes, Ironbark Estate, Spring Glen and Clifton Grove are subdivided to lots that of a generally consistent size with what is proposed.

Electricity and telecommunications services are available in the locality and would be extended as required to service the proposed development. More detailed assessment would be completed at subdivision stage, and once staging/release is confirmed, to determine upgrade requirements.

It is not proposed to extend reticulated water and sewer services to the site and the needs of future dwellings in terms of water and sewer would be provided on site.

What are the views of state and commonwealth public authorities consulted in accordance with the Gateway determination?

The views of state and commonwealth public authorities would be ascertained in accordance with the comments contained in the Gateway Determination.

Mapping

4.1 GENERAL

There are two necessary mapping changes resulting from the planning proposal.

- The amendment of LEP Map Sheet LZN_004 and LZN_004D to amend the site zoning from RU1 – Primary Production – R5 – Large Lot Residential. Existing and proposed zoning is demonstrated on **Figure 3** and **Figure 4**; and
- The amendment of LEP Map Sheet LSZ_004 and LSZ_004D to amend the minimum lot size from 100 hectares to 5 hectares Existing and proposed minimum lot size is demonstrated on **Figure 5** and **Figure 6**.

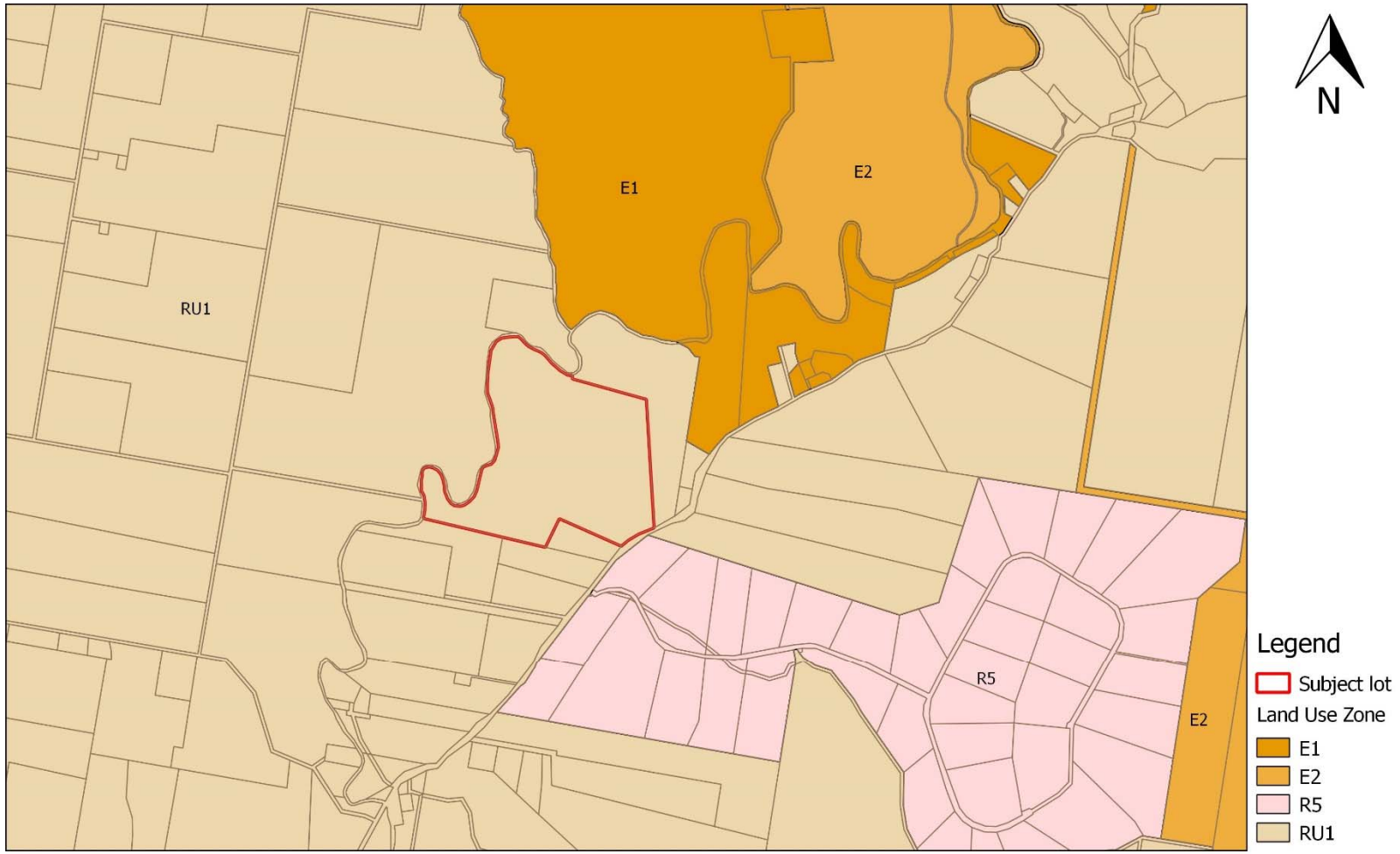


Figure 3: Existing Land Use Zoning

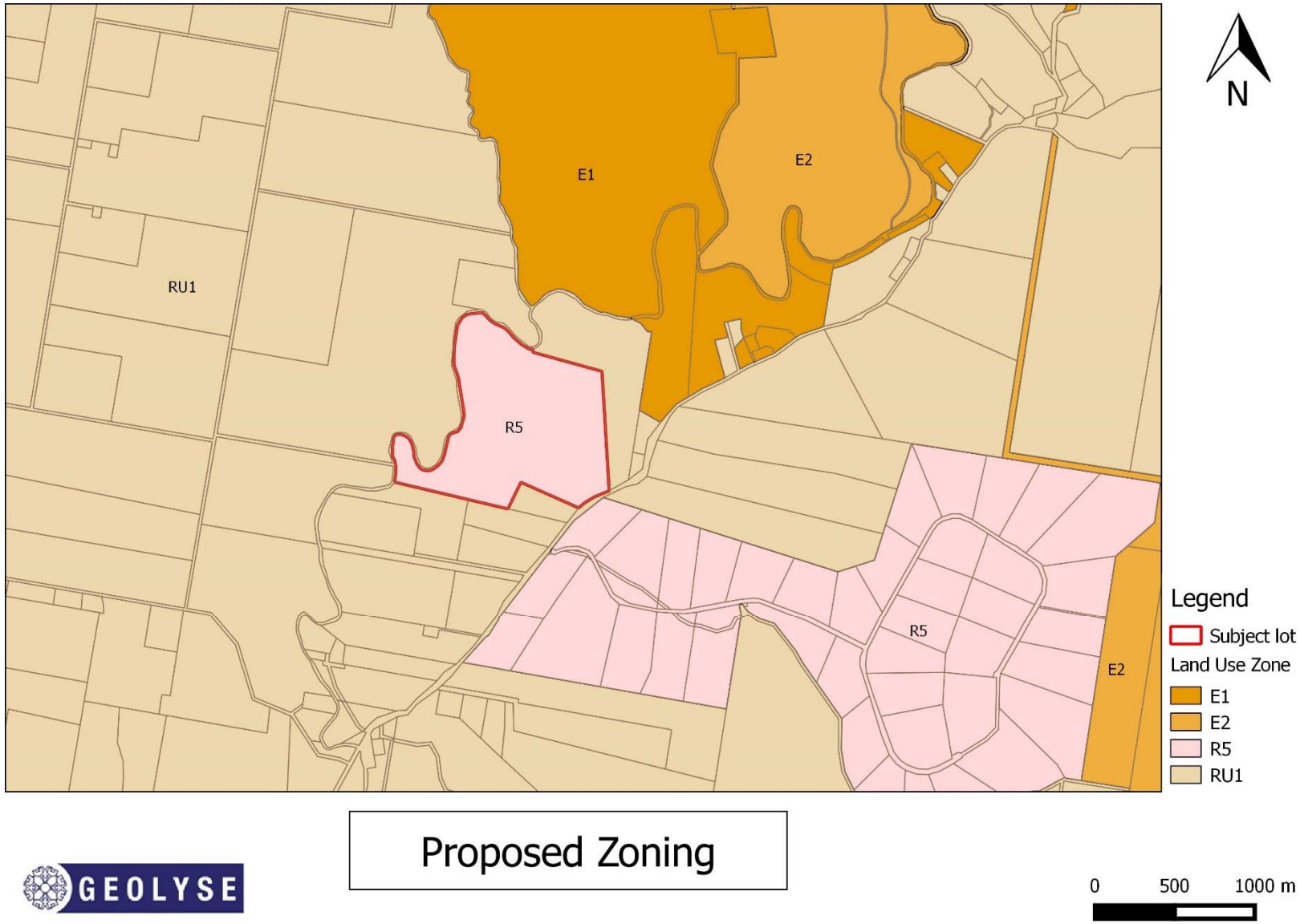


Figure 4: Proposed Land Use Zoning

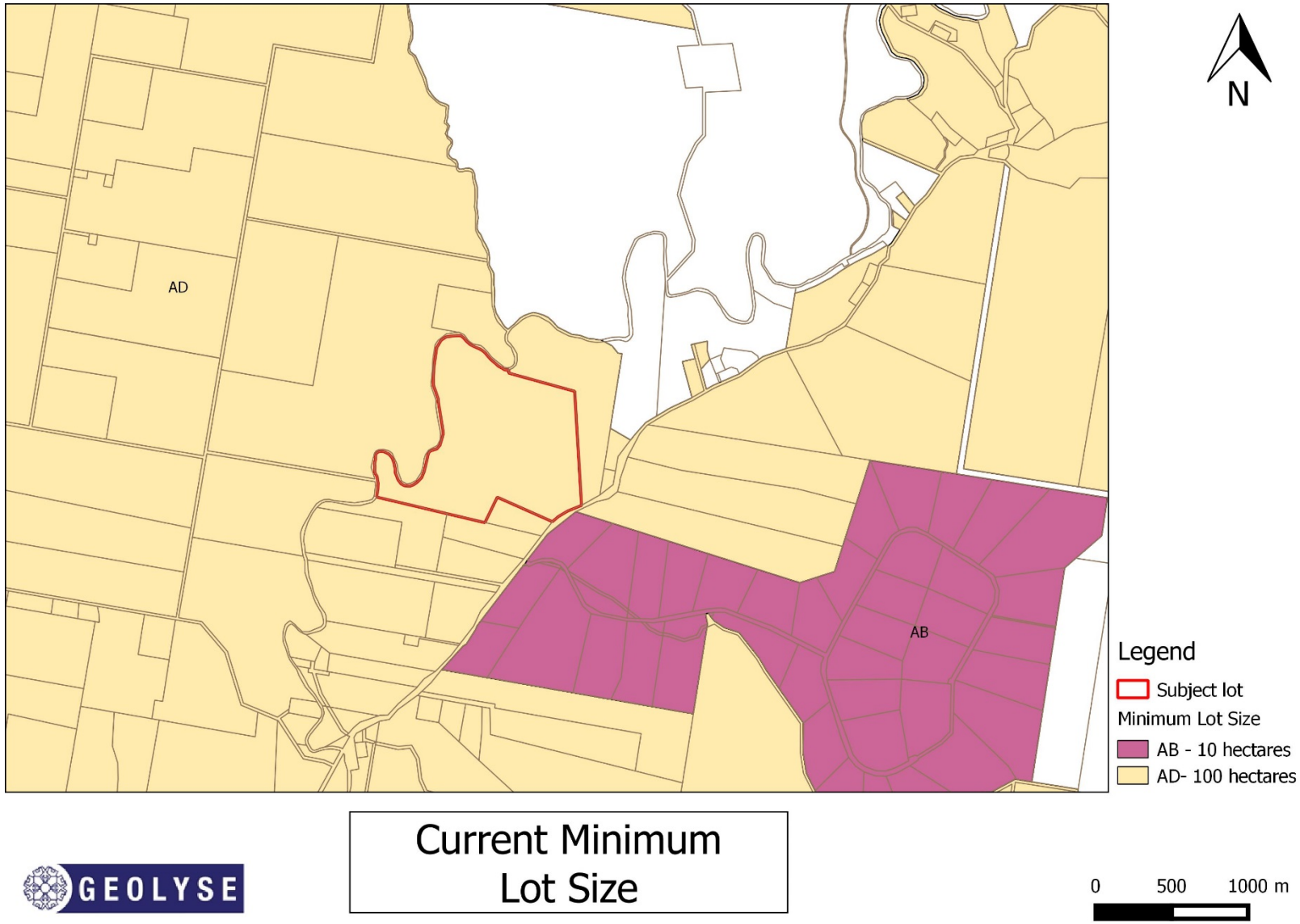


Figure 5: Existing Minimum Lot Size

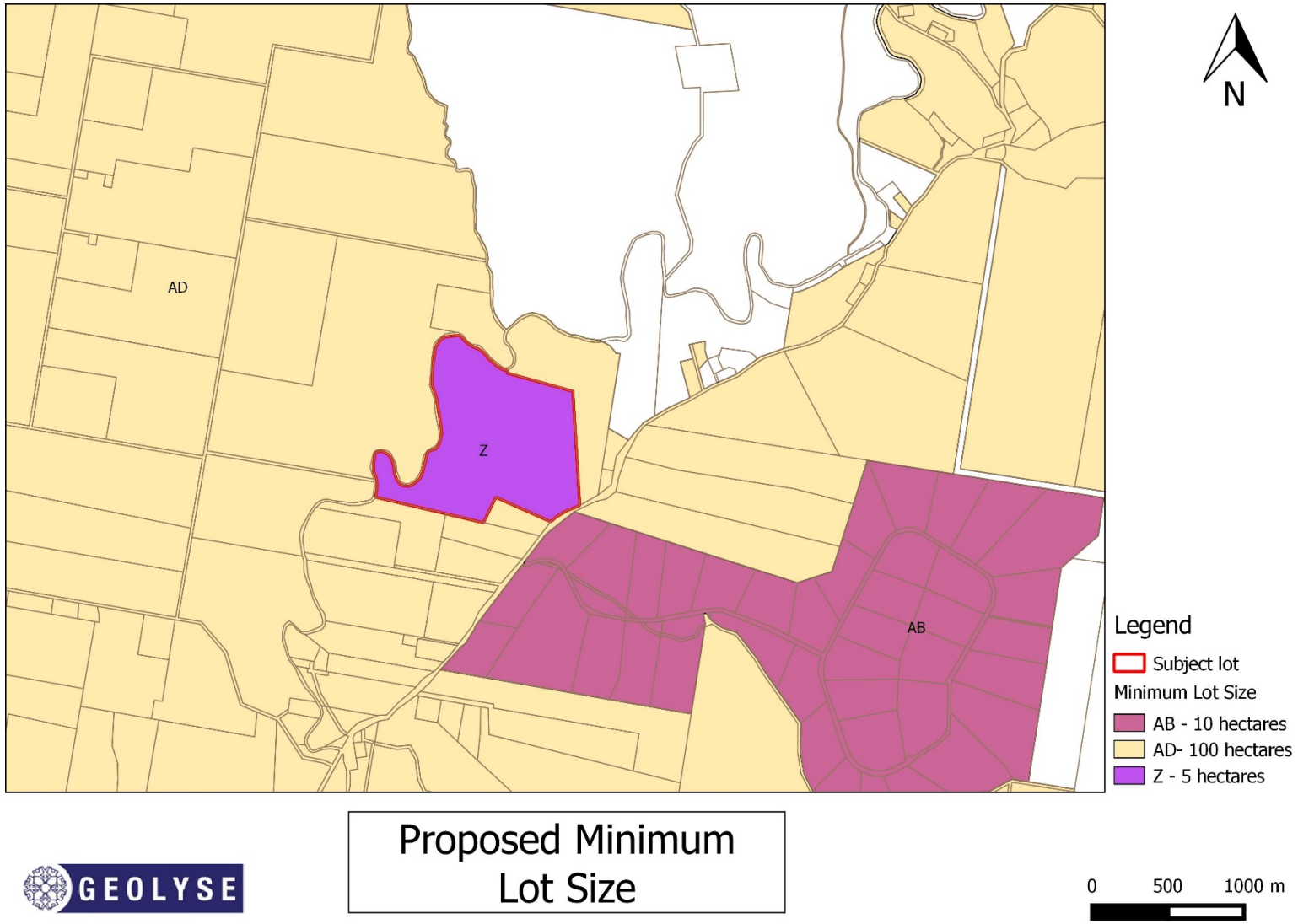


Figure 6: Proposed Minimum Lot Size

Community Consultation

5.1 TYPE OF COMMUNITY CONSULTATION REQUIRED

Section 5.5.2 of 'A Guide to Preparing Local Environmental Plans' identifies two different exhibition periods for community consultation;

- Low Impact Proposals – 14 days; and
- All other planning proposal (including any proposal to reclassify land) – 28 days.

The Guide describes low impact proposals as having the following attributes;

- *A 'low' impact planning proposal is a planning proposal that, in the opinion of the person making the gateway determination, is;*
    - o *Consistent with the pattern of surrounding land use zones and/or land uses;*

The proposed rezoning of the parcel of land to R5 – Large Lot Residential would be consistent with the zoning of nearby land and is consistent with the prevailing quasi-rural residential use of the land within the nearby locality.

- o *Consistent with the strategic planning framework;*

Responses have been provided detailing the proposal's compliance with local and regional planning strategies, SEPPs, and ministerial directions.

- o *Presents no issues with regard to infrastructure servicing;*

Capacity exists to provide electricity and telecommunications services from existing services in the area. Potable water and effluent management would be provided on site and the size of the proposed lots is considered sufficient to ensure that future dwellings are self-sufficient.

- o *Not a principle LEP; and*

The planning proposal is not for a principle LEP.

- o *Does not reclassify public land.*

The planning proposal does not seek to reclassify public land.

In accordance with the responses to the above points, the planning proposal is considered to be of low impact. It is therefore considered that a community consultation period of 14 days is applicable.

In addition to the formal consultation required through the planning proposal process, initial consultation has been carried out with other residents/land owners within the SA4 area. Letters were hand delivered to all properties seeking comments within 21 days. A number of telephone enquiries were received and one meeting was held at the Geolyse office with an adjacent land owner. No written responses were received. The prevailing comments were received generally offered no in principle objections and a number of responders indicated an interest in pursuing a similar course of action for their land, noting that some coordination of property owners was likely to be required due to the generally small size of remaining lots within SA4 (excluding the subject site).

References

NSW Department of Planning (DoP). 2009a, A Guide to Preparing Local Environmental Plans, DoP, Sydney.

NSW Department of Planning (DoP). 2009a, A Guide to Preparing Planning Proposals, DoP, Sydney.

Drawings

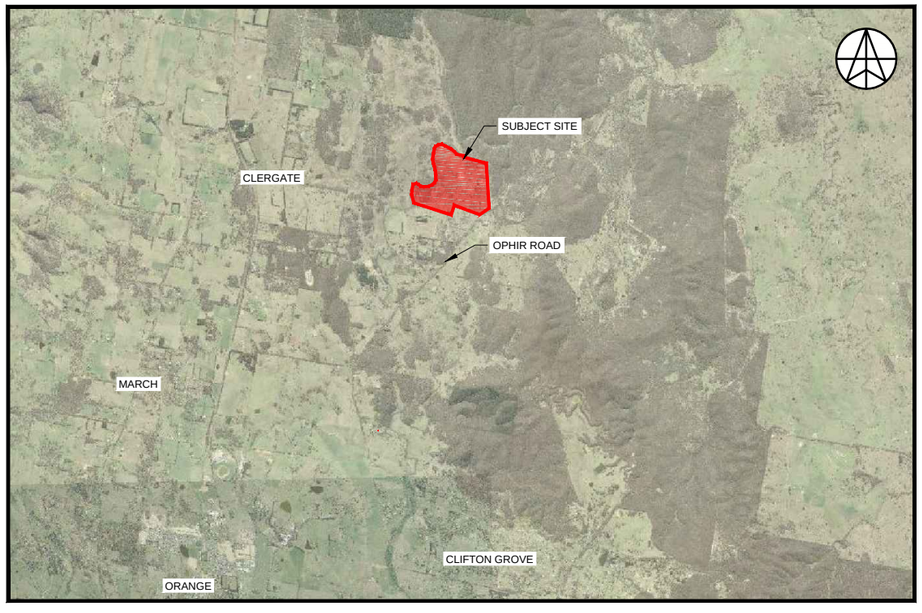
"SUMMER HILL ESTATE"

LOT 1 & 2 DP794456, OPHIR ROAD

GWENDA SANDRIN

PLANNING PROPOSAL

SCHEDULE OF DRAWINGS	
SHEET	TITLE
TP01	TITLE SHEET, DRAWING LIST AND SITE LOCALITY
TP02	CONCEPT LOT LAYOUT
TP03	CONCEPT LOT LAYOUT - SOUTHERN EXTENT
TP04	CONCEPT LOT LAYOUT - NORTHERN EXTENT



SITE LOCALITY

NOT TO SCALE

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ORANGE, NSW 2800
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No	DATE	DRAFTING CHECK	APPROVED BY	DETAILS
A	23/07/15	BH	AB	ISSUED TO CLIENT

PROJECT: PLANNING PROPOSAL "SUMMER HILL ESTATE"

FILE REFERENCE: 214394_03A_TP01-TP04.dwg

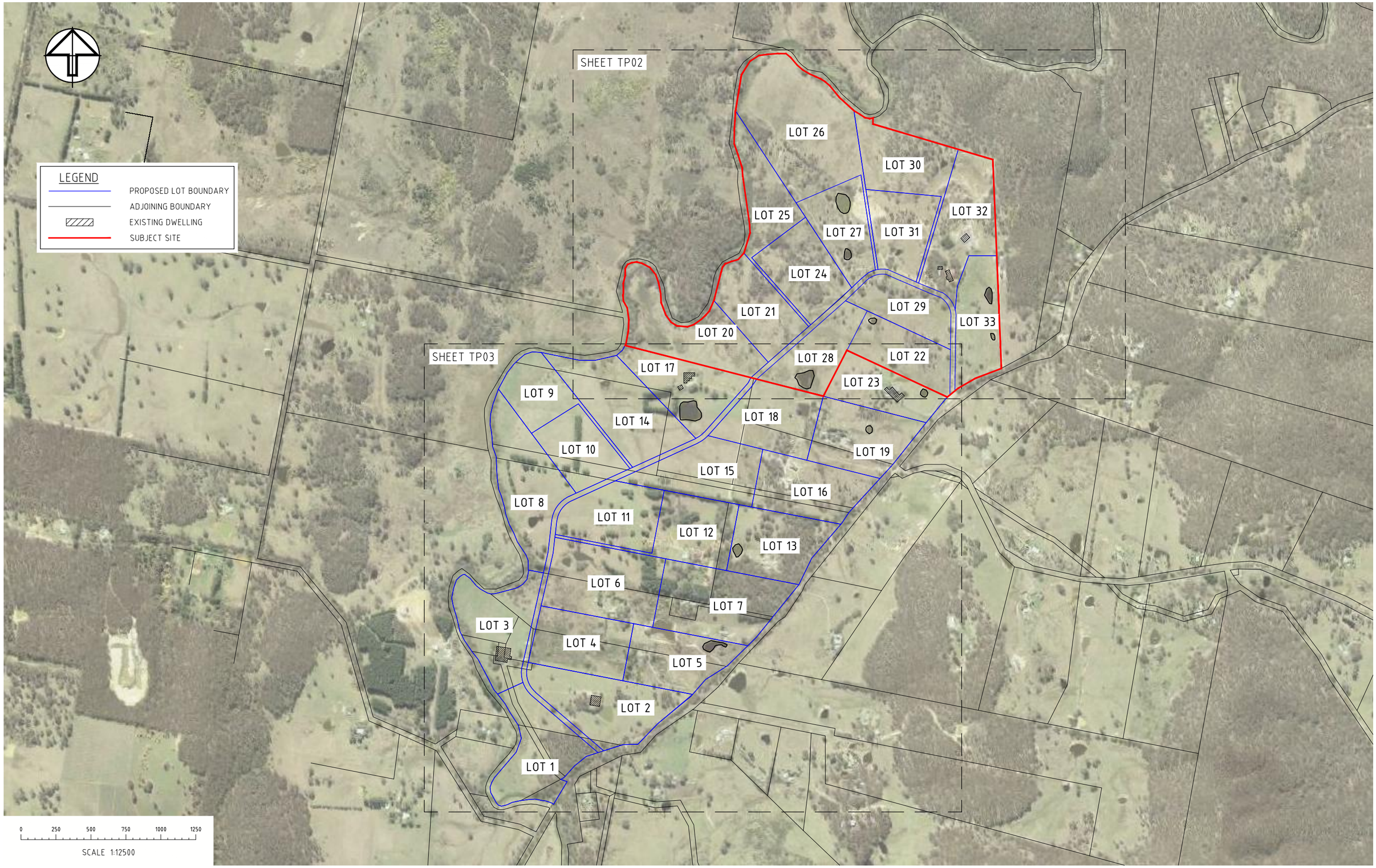
APPROVAL AUTHORITY: CABONNE SHRIE COUNCIL

CLIENT: GWENDA SANDRIN

DRAWING: TITLE SHEET, DRAWING LIST AND SITE LOCALITY

PROJECT NUMBER: 214394 DRAWING NUMBER: 03A_TP01 REV. A

SOURCE:



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A	23/07/15	BH	AB	ISSUED TO CLIENT

PROJECT
PLANNING PROPOSAL
"SUMMER HILL ESTATE"
FILE REFERENCE: 214394_03A_TP01-TP04.dwg

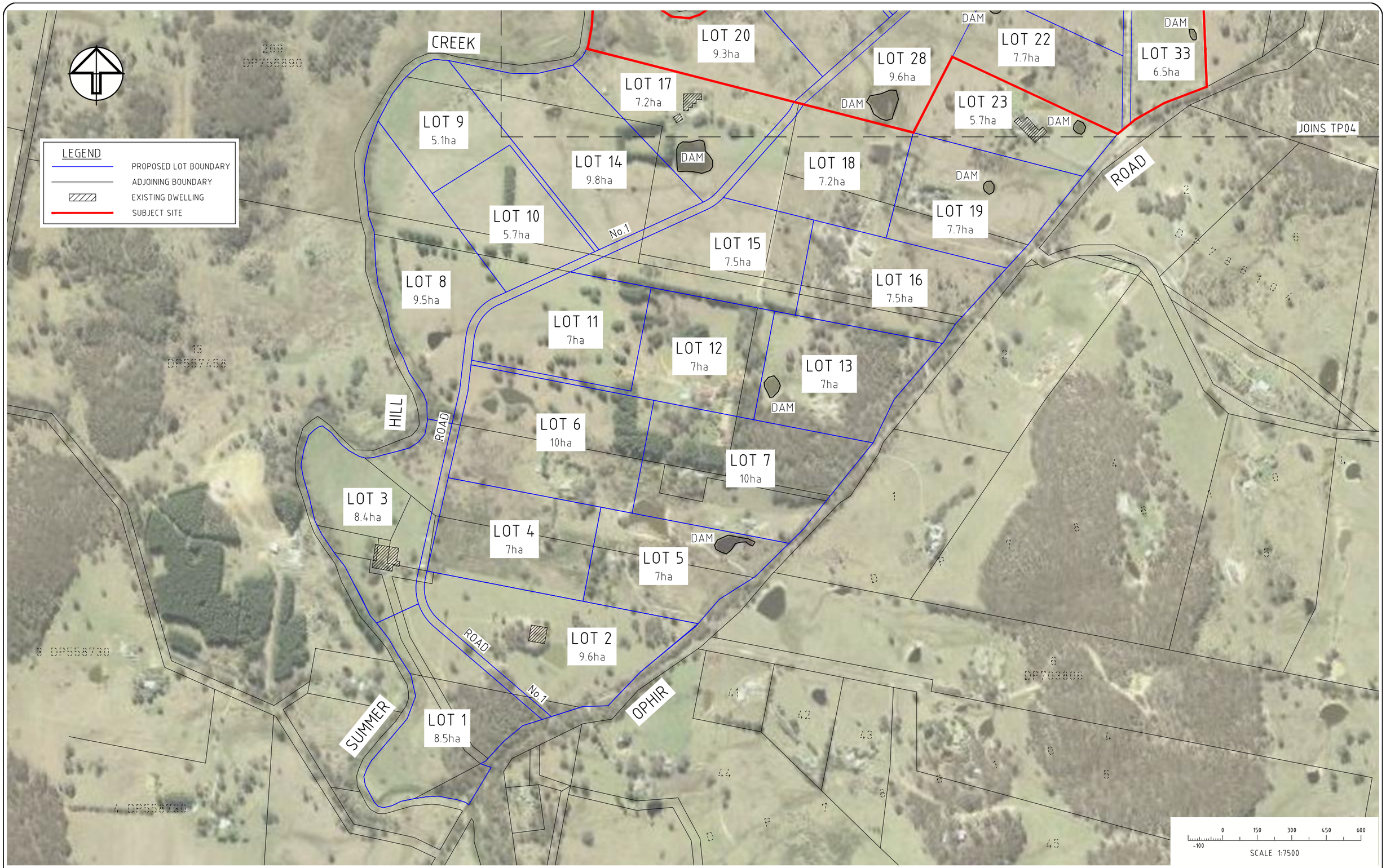
APPROVAL AUTHORITY
CABONNE SHRIE COUNCIL

CLIENT
GWENDA SANDRIN

DRAWING
CONCEPT LOT LAYOUT

PROJECT NUMBER: 214394
DRAWING NUMBER: 03A_TP02
REV. A

SOURCE:



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PROJECT
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"SUMMER HILL ESTATE"
FILE REFERENCE: 214394_03A_TP01-TP04.dwg

APPROVAL AUTHORITY
CABONNE SHRIE COUNCIL

CLIENT
GWENDA SANDRIN

DRAWING
CONCEPT LOT LAYOUT
SOUTHERN EXTENT

PROJECT NUMBER: 214394
DRAWING NUMBER: 03A_TP03
REV. A

SOURCE:

LEGEND

PROPOSED LOT BOUNDARY

ADJOINING BOUNDARY

EXISTING DWELLING

SUBJECT SITE

CREEK

LOT 26
9ha

3
DP794456

LOT 30
7.3ha

238
DP756890

7001
DP1030466

LOT 25
6ha

DAM

LOT 27
6ha

LOT 31
6ha

LOT 32
8.7ha

HILL

DAM

LOT 24
6.8ha

DAM

No.1

LOT 21
6.6ha

LOT 29
5.2ha

ROAD

DAM

LOT 33
6.5ha

103
DP750372

ROAD

DAM

209
DP756890

LOT 20
9.3ha

SUMMER

LOT 28
9.6ha

LOT 22
7.7ha

ROAD

LOT 14
9.8ha

LOT 17
7.2ha

DAM

LOT 23
7.7ha

DAM

No.1

OPHIR

JOINS TP03

JOINS TP03

0 100 200 300 400
-100 -50
SCALE 1:5000

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PROJECT
PLANNING PROPOSAL
"SUMMER HILL ESTATE"

FILE REFERENCE: 214394_03A_TP01-TP04.dwg

APPROVAL AUTHORITY
CABONNE SHRIE COUNCIL

CLIENT
GWENDA SANDRIN

DRAWING
CONCEPT LOT LAYOUT
NORTHERN EXTENT

PROJECT NUMBER: 214394
DRAWING NUMBER: 03A_TP04
REV. A

SOURCE:

Plates

Plate 1: Representative view of the site

Plate 2: Existing development on site

Plate 3: Cleared area of the site

Plate 4: Vegetated area of the site

Appendix A

STAGE 1 CONTAMINATION ASSESSMENT

PHASE 1 PRELIMINARY SITE INVESTIGATION

ASSESSMENT OF POTENTIAL SITE CONTAMINATION

LOT 2, DP 794456
1099 OPHIR ROAD, SUMMER HILL CREEK
(SUMMER HILL ESTATE)

PREPARED FOR:

G SANDRIN

JULY 2015

GEOLYSE

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Report Title:	*Phase 1 Preliminary Site Investigation*
Project:	*Assessment of Potential Site Contamination – LOT 2, DP 794456*
Client:	*G Sandrin*
Report Ref.:	*214394_REP_001B.docx*
Status:	*Final*
Issued:	*28 July 2015*

Geolyse Pty Ltd and the authors responsible for the preparation and compilation of this report declare that we do not have, nor expect to have a beneficial interest in the study area of this project and will not benefit from any of the recommendations outlined in this report.

The preparation of this report has been in accordance with the project brief provided by the client and has relied upon the information, data and results provided or collected from the sources and under the conditions outlined in the report.

All information contained within this report is prepared for the exclusive use of 'G Sandrin' to accompany this report for the land described herein and are not to be used for any other purpose or by any other person or entity. No reliance should be placed on the information contained in this report for any purposes apart from those stated therein.

Geolyse Pty Ltd accepts no responsibility for any loss, damage suffered or inconveniences arising from, any person or entity using the plans or information in this study for purposes other than those stated above.

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Introduction

1.1 BACKGROUND

Geolyse was engaged by G Sandrin to conduct a Phase 1 Environmental Site Assessment (Phase 1 ESA) for the site at 1099 Ophir Road, Summer Hill Creek NSW 2800, New South Wales, (the site) to support a planning proposal to amend the zoning and minimum lot size of the site pursuant to the *Cabonne Local Environmental Plan 2012* (LEP).

The Phase1 ESA is recommended by the *Managing Land Contamination – Planning Guidelines* 1998 under the *NSW State Environmental Planning Policy* (SEPP) *No 55 – Remediation of Land* 1998. As the proposed rezoning "allows a change of use that may increase the risk to health or the environment from contamination", the planning authority is required to consider whether "the land is suitable for the proposed use or can be remediated to make it suitable".

The site is located in a rural use area and includes 2 main structures currently used as a residence and an agricultural workshop. Other smaller structures are present, proximal to the homestead and the workshop. The remainder of the site is generally used for agricultural purposes, with approximately 10 dams of varying capacities present on the site.

The objective of the Phase 1 ESA was to identify the potential for land contamination at the site prior to subdivision of this land to enable creation of rural residential lots with sizes ranging from 5 to 9 hectares. A concept site plan showing 13 lots ranging in size from 5 to 9 hectares together with an internal access road with a future connection with land to the south has been prepared, as demonstrated in **Figure 1**.

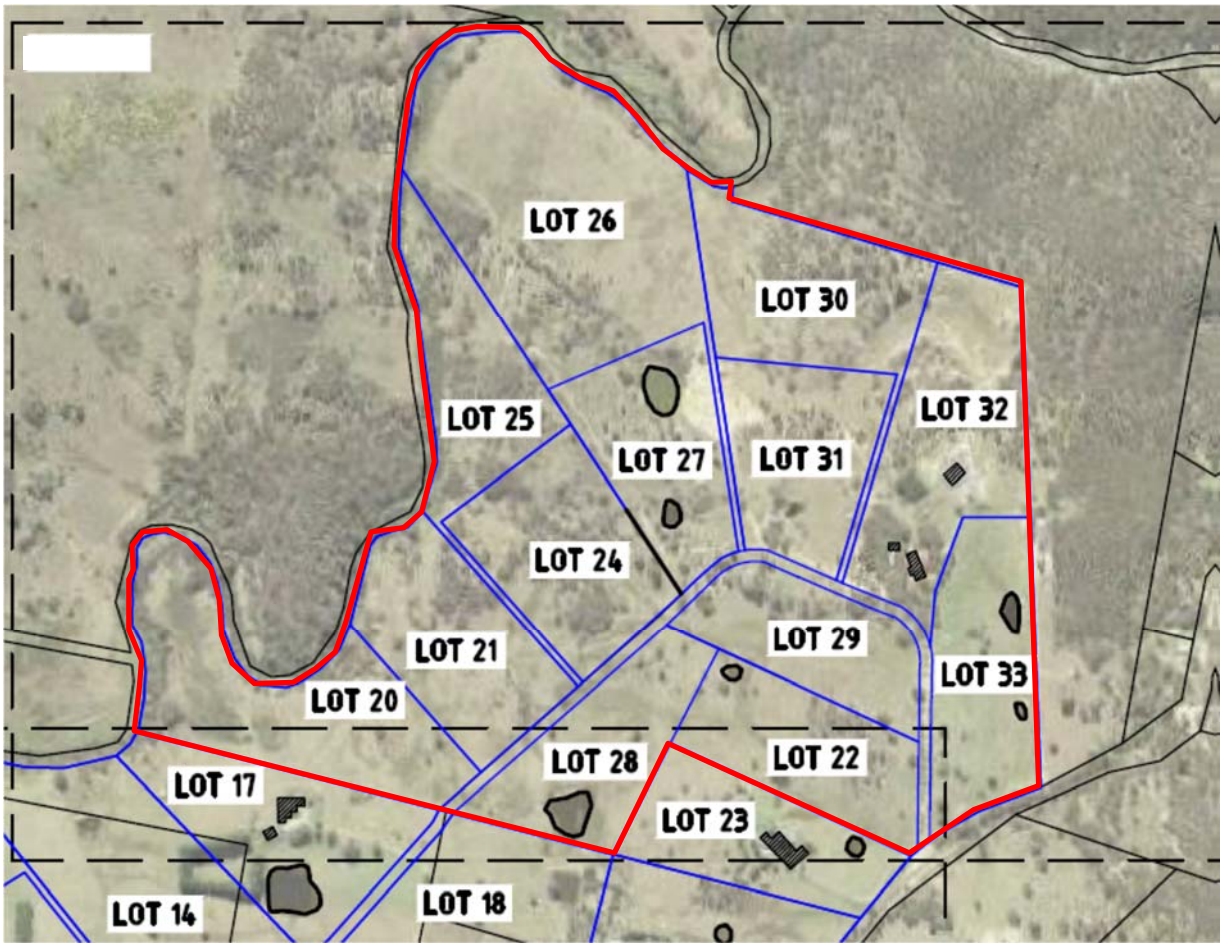

Figure 1: Site Subdivision Concept Site Plan

This Phase 1 ESA is based on a desktop review of available information, a site walkover reconnaissance and a search of historical records. Access was provided to the ground level of each structure on the site. Intrusive Phase 2 investigations involving soil or groundwater sampling were not conducted as part of this ESA.

1.2 SCOPE OF WORK

The scope of work for this Phase 1 ESA consisted of the following components:

- Review of the following third party documents:
  - Published topographical, geological and soil maps of the area; and
  - Details of groundwater bores located within 500 m of the site and registered on the groundwater bore database, maintained by the NSW Office of Water (http://allwaterdata.water.nsw.gov.au/water.stm);
  - The public register managed by the NSW EPA for information on scheduled activities and penalty notices issued under the Protection of the Environment Operations Act.
  - The database managed by the NSW Environment Protection Authority (EPA) for information on notices issued under the Contaminated Land Management Act 1997.
  - Historical parish charting maps (1882 to 1960), as well as regional charting maps, status branch charting maps and the NSW Land Titles Office (LTO) charting maps.
  - Aerial photographs – selected historical aerial photographs of the site available for review from NSW Land and Property Information (LPI) to provide evidence of the history of development of the site and indications of potential sources of contamination;
- Review of site records, where available.
- Site inspection – A site inspection by Geolyse personnel of the site and surrounding areas was undertaken to provide further information, via visual inspection, of potential sources and areas of significant environmental liability. The site inspection focused on the following:
  - Areas of operational processes including waste management, water management, the condition of the site surfaces and buildings and the presence of electrical transformers on site.
  - Areas of potential landfilling.
  - Potential impacts of neighbouring land uses.
  - Sensitivity of the receiving environment.
  - Other relevant information which could be provided by the site operator.
- Preparation of this factual report detailing the Phase 1 ESA findings in accordance with the NSW EPA publication *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (EPA, November 1997).

An overview of neighbouring properties was also conducted to identify the presence and proximity of sensitive receptors which could be significantly impacted upon by the site, and off-site operations which could have a significant impact on land contamination at the site.

The scope of the Phase 1 ESA did not include an assessment of compliance with environmental licences / permits held by the site or with other environmental regulatory requirements. The Phase 1 ESA did not include any sampling and analysis of soil or groundwater, which would be required to verify the existence (or otherwise) of soil and groundwater contamination.

1.3 PERSONNEL

The site visit was conducted on 1 July 2015 by Brendan Stuart of Geolyse. Reconnaissance at the site was generally conducted unescorted.

Site Description

2.1 SITE DEFINITION

Table 2.1 – Summary of Property Description Details

Feature	Details
Facility Address[1]	1099 Ophir Road, Summer Hill Creek, NSW 2800
Title Identification Details[1]	Lot 2 in Deposited Plan (DP) 794456
Current Ownership	G Sandrin
Current Site Use and Zoning[2]	Land Use: Agriculture (farming), with residence Zoning: Primary Production (RU1)
Proposed Future Site Use	Rural Residential (large lot)
Previous Environmental Reports	• nil
Site Area[1]	97 hectares (approximately)

Sources:
1: SIX Maps Website developed by NSW Government, Land and Property Information. http://maps.six.nsw.gov.au/ (accessed June 2015).
2: Cabonne Local Environmental Plan, 2012, under the Environmental Planning and Assessment Act 1979.

2.2 SITE SETTING

2.2.1 Regional Setting

The site is located within a predominantly rural area along Ophir Road, approximately 11 kilometres (km) north-east of the Orange town centre. The general setting of the site is shown in **Plates 1** and **2**.

The following sensitive receptors are located within 1 km of the site:

- Summer Hill Creek, located adjacent to the western and north-western boundaries of the site;
- Residents of dwellings on the site, as well as off-site dwellings to the east and south of the site.
- Livestock utilising rural land in the vicinity of the site;
- Groundwater present in aquifer(s) underlying the site.

2.2.2 Local Setting

Land uses and properties adjacent to the site, including those across adjacent roads were obtained from the site inspection conducted by Geolyse personnel on 1 July 2015. The local area surrounding the site is displayed in **Figure 1**. Identified adjacent land uses are summarised in **Table 2.2**:

Table 2.2 – Adjacent Properties Descriptions

Direction From Site	Site Use (Nature of Activity)[1]
North	Unimproved / Undeveloped bushland of the Mullion Range State Conservation Area
South	Farmland, with single-storey residences
East	Unimproved / Undeveloped bushland; single-storey residences; minor farming activities west of Ophir Road
West	Summer Hill Creek; Farmland beyond (no residences)

[1] Distances are relative to site boundary

2.3 TOPOGRAPHY

Topographical site information was obtained from the:

- Ophir 8731-4-S, 1:25,000 Scale, Topographic Map, Second Edition (New South Wales Land and Property Management Authority, 2009); and
- Site visit on 1 July 2015

The Mullion Range State Conservation Area is located to the north-east and east of the site, and Summer Hill Creek borders the site to the west and north-west. The fall of the land is generally from the east to the west, i.e. from the Mullion Range to Summer Hill Creek, at an approximate peak elevation of 840 metres Australian Height Datum (mAHD) in the east, falling to 780 mAHD in the west.

2.4 SURFACE WATER RECEPTORS

As a north-south aligned ridge line is present in the eastern portion of the site, the catchment of drainage gullies is not likely to extend beyond the site's eastern boundary. Some flow from beyond the site's southern boundary is anticipated, however.

Based on the regional and site topography, it is considered that the majority of site stormwater would be captured by drainage gullies across the site and discharge into various holding dams on the site or into Summer Hill Creek which borders the site to the west and north-west. General slopes at the site range from 6-8% at the site's north-west to 13-17% at the site's north-east, while gradients across the southern portion of the site approximately range between 6% and 13%.

2.5 REGIONAL AND SITE GEOLOGY

Mapped soil landscapes around the site are shown on **Diagram 1**. The site lies entirely on the Mookerawa soil landscape as defined in Kovac et al (1990).

The Mookerawa soil landscape consists of rolling low hills to rolling hills with red podzolic soils on crests and upper slopes, and yellow soloths and yellow solodic soils on lower slopes and in drainage depressions. The proposed subdivision is located on the lower slopes of this soil landscape, given the proximity to Summer Hill Creek which borders the site to the west and north-west and generally comprises yellow soloths and yellow solodic soils. These soils types have soil profiles extending greater than 1.5 m to bedrock, with fine dark brown to yellow brown sandy loam topsoils to 0.6 m depth, overlying yellow brown heavy clay subsoil.

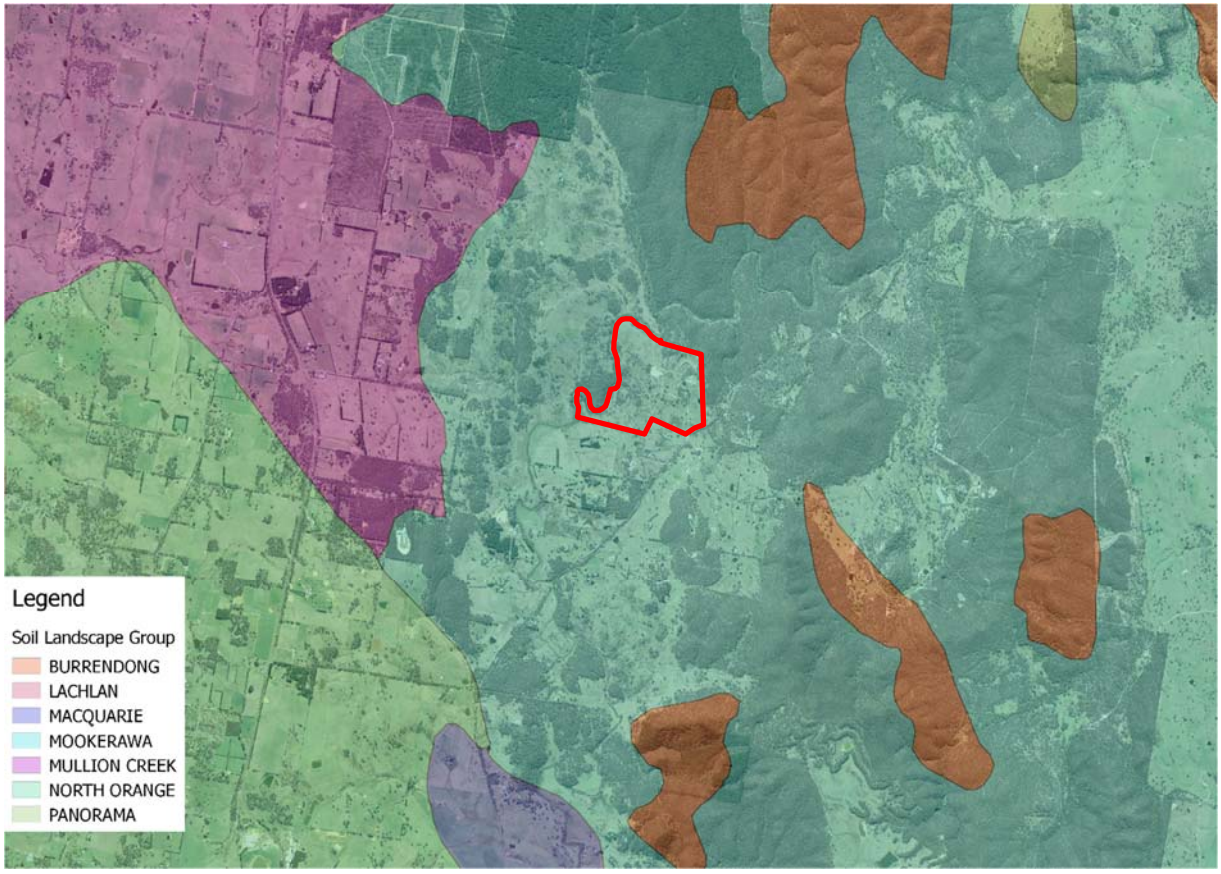

Figure 2: Soil Landscape Groups

The Orange Geological 1 : 100,000 Series Sheet 8731 (Geological Survey of NSW, 1997) indicates the site geology is expected to comprise 'Mullions Range Volcanics' consisting of *rhyolite, tuffaceous mudstone, rhyolite braccia, volcanic conglomerate, dacite and limestone*, of the Late Silurian age Mumbil Group.

The geology of the site, based on drilling data from installation of a groundwater bore constructed in 2010 approximately 50 m east of the site (NSW Office of Water Licence Reference 80BL245578), is described as 7.0 m of shale, overlying 58.0 m of granite.

Rocky outcrops are present across the site, from the upper slopes in the east to the river flats in the west. Rocky outcrops are displayed in **Plates 3** to **5**. Soils at the site are anticipated to be shallow, however some areas of the site where cuttings were observed (see **Plate 6**) showed a soil profile exceeding 2 m.

The Australian Soil Resource Information System (ASRIS) on-line database, maintained by CSIRO Land and Water, indicates there is an extremely low probability of occurrence of acid sulphate soils in the area of the site (compiled 2008, accessed June 2015).

2.6 REGIONAL HYDROGEOLOGY

2.6.1 Groundwater Bore Records Search

A search for registered groundwater users located within a 1 km radius of the site was undertaken using the NSW Office of Water on-line database (http://realtimedata.water.nsw.gov.au/water.stm), in June 2015. The results indicated that there are two registered groundwater bores within 1 km of the site, registered for stock and domestic purposes.

Table 2.3 – Groundwater Bores within 1 km of Site

Licence Reference	Location	Year Installed	Depth	Water Bearing Zone(s)	Standing Water Level
70BL142586	80 m south	Unknown	105.3 m	43.0 m to 43.1 m 46.0 m to 46.1 m 105.0 m to 105.3 m	3.0 m
80BL245578	50 m east	2010	84.0 m	65.0 m to 75.0 m	15.0 m

Source: NSW Office of Water on-line database (http://realtimedata.water.nsw.gov.au/water.stm)

Geolyse has considered the surrounding agricultural land uses and notes the potential for unregistered bores for irrigation purposes proximal to the site.

2.6.2 On-site Groundwater Bores

A single groundwater monitoring well was identified to the south of the homestead. Anecdotal advice received during the site inspection indicated the extracted water to be of 'high quality'.

Site Reconnaissance

3.1 WASTE MANAGEMENT

No waste disposal occurs at the site. All waste is taken to Ophir Road Resource Recovery Centre as required.

3.2 STORMWATER AND WASTE WATER

The majority of site stormwater is captured by drainage gullies across the site and discharge into various holding dams on the site or into Summer Hill Creek to the west and north-west. Stormwater from the area east of the ridge in the site's east would flow (via dams and drainage gullies) off-site to the north and north-east through neighbouring properties, before discharging into Summer Hill Creek further downstream.

Some stormwater from the properties neighbouring the site's southern boundary currently flows onto the site, mostly via drainage gullies and into dams. The land use of these properties to the south is currently identical to the site (i.e. farming), however a change in land use at the site to rural residential may result in an increased risk of exposure to contaminants migrating onto the site.

Waste water from the site is currently contained by a septic system which is pumped out and disposed off-site, as required.

3.3 CHEMICAL AND FUEL STORAGE

Some storage of fuels and oils occurs at the site in drums and other transportable containers, mostly around the homestead and workshop (refer to **Plates 7** and **8**). No spill containment controls (e.g. bunding) was observed to be present surrounding these storage areas.

No observations were made during the site inspection or from historic aerial photography (refer to **Section 4.3**) that would indicate the presence (historic or otherwise) of bulk chemical storage infrastructure at the site.

No generators are understood to be present at the site. No sheep dips or cattle dips are understood to be present at the site.

3.4 ASBESTOS

Geolyse did not conduct an asbestos survey during the site inspection. One structure at the site, to the north of the homestead (refer to **Plate 9**), appeared to be constructed of fibrous cement cladding and may warrant further investigation. Geolyse notes the construction of this structure likely dates to the mid-1980s, at a time when the use of asbestos in construction materials in Australia was being scaled down.

Weathering of this structure, if identified to contain asbestos, may result in release of asbestos fibres into the soil, air and waterways.

3.5 POLYCHLORINATED BIPHENYLS (PCBs)

PCBs are known to have been used in electrical and hydraulic equipment, and were produced commercially in large quantities until the late 1970s until their phasing out in Australia in the 1970s (Department of the Environment, National Pollutant Inventory). Australia banned the importation of PCBs in 1975.

A hazardous materials survey was not conducted during the site inspection, however the age of structures at the site, dating to the mid-1980s, likely precludes the presence of PCB containing materials.

3.6 LANDFILLING

Areas of potential landfilling were observed during the site inspection. Generally these areas consisted of reworked earthen material, with minor contaminants of little consequence (e.g. concrete, timber, etc.), however a semi-buried steel drum of unknown contents was observed in a filled area to the west of the workshop (Filled Area 3). Potentially landfilled areas are displayed in **Plates 10** to **13**, and **Figure 2**.

3.7 SOIL AND GROUNDWATER CONTAMINATION

An informal rifle range is present on the site in the earthworks area, east of the large central dam. Spent casings and bullets (refer to **Plate 14**) were observed scattered over the ground in this area. Leaching of heavy metals, e.g. lead and copper, may be a potential source of soil and groundwater contamination.

No evidence of stressed vegetation, which may be indicative of soil and/or groundwater contamination, was observed during the site inspection.

Site Historical Review

A review of the site history was undertaken to assess historical use of the site, and in particular to identify activities with the potential to contaminate soil and/or groundwater at the site.

4.1 NSW EPA RECORDS

4.1.1 Scheduled Activities and/or Penalty Notices

A search of the NSW EPA on-line register (http://www.epa.nsw.gov.au/prpoeoapp/) was undertaken in June 2015 for scheduled activity licenses and/or penalty notices issued under the Protection of the Environment Operations Act (POEO) 1997. The search indicated that the NSW EPA has not issued any licenses or penalty notices relating to the site or properties within 1 km of the site.

4.1.2 Contaminated Sites Register

A search of the NSW EPA on-line register (http://www.environment.nsw.gov.au/prclmapp/) was undertaken in June 2015 for contaminated land notices issued or regulated under the Contaminated Land Management Act 1997. The search indicated that the NSW EPA holds no contaminated land records relating to the site and properties within 1 km of the site.

4.2 HISTORICAL PARISH CHARTING MAPS

Editions of the 'Parish of Clinton' map, help by the NSW LPI, were reviewed by Geolyse, and information relevant to the site is summarised below:

- The 1882 edition indicates the area encompassing the site was notified on 24 December 1961 as 'VR', understood to indicate 'Village Reserve'.
- The 1907 edition indicates an area of 522 acres (211 ha) encompassing the site was 'notified' as a Crown Lease on 30 April 1913. The designated lease holder was 'Enoch Gazzard'.
- The 1936 edition indicates the area encompassing the site was 'C P' to 'Enoch Gazzard', understood to be indicative of a 'Conditional Purchase'.
- The 1962 edition indicates a change of ownership to 'E.F & J.A Gazzard & L.J Dwyer'.
- The 1970 regional charting map, status branch charting map and the Land Titles Office (LTO) charting map do not indicate any changes in land use or ownership at the site.

4.3 HISTORICAL AERIAL PHOTOGRAPHY SURVEY

An historical aerial photography survey was undertaken for the site, with a total of six (6) photographs identified and reviewed. The historical aerial photographs that were reviewed spanned a period of approximately 59 years, with the most recent from 2013, to the earliest in 1954. Aerial photographs, as attached in **Appendix A**, were reviewed to track changes in use of the site and surrounding properties over time. Key observations made during the review of aerial photos are summarised in **Table 4-1** as follows:

Table 4.1 – Summary of Aerial Photo Information

Date	Site Activity	Surrounding Land Use
10 Jan 1954	Approximately 60% of the site is cleared of vegetation, mainly in the southern portion. No structures are present.	Land to the west (beyond Summer Hill Creek) and south of the site is cleared of vegetation. Ophir road, to the site's east, is present in its current alignment.

Table 4.1 – Summary of Aerial Photo Information

Date	Site Activity	Surrounding Land Use
Dec 1963	The area encompassing the site is generally unchanged.	The surrounding area is generally unchanged.
17 May 1973	Land clearing, possibly including earthworks, has occurred in the site's north-west, adjacent to Summer Hill Creek.	Land clearing, possibly including earthworks, has occurred to the south of the site. The remainder of the surrounding area is generally unchanged.
30 Apr 1982	The entire site has been subject to extensive land clearing, possibly including earthworks.	Further land clearing, possibly including earthworks, has occurred to the south of the site. The remainder of the surrounding area is generally unchanged.
27 Sep 1993	Improvement works at the site, including construction of at least 2 structures and 8 dams, have occurred. Unpaved access roads are present from the Ophir Road frontage to the structures and the large central dam. Grass cover is generally present across the site, with the exception of an area to the east of the large central dam, where earthworks appear to be occurring.	Additional structures, presumably residences, are present to the south of the site on the neighbouring 2 properties, as well as to the south-east of the site, along Ophir Road. A subdivision is present to the south-east of the site, along Spring Glen Road, Broken Shaft Close and Rowlands Close.
2013	All structures present on the site reflect the current layout of the site. An unpaved access road extends from the centre of the site to the site's north-west	Ophir Road is now sealed. The remainder of the surrounding area is generally unchanged.

4.4 SUMMARY OF SITE HISTORY INFORMATION

The site has been operated from 1913 and owned from 1936 to the present by private individuals. Based on historical aerial photographs, the site has been used for farming land since prior to 1954 to the present.

Various chemicals such as arsenic and organochlorine pesticides (OCPs) associated with sheep and cattle grazing activities are potential contaminants at the site from the historic use of the site for livestock grazing purposes. Anecdotal evidence did not indicate the presence of livestock dips being located on or near the site.

No search for NSW WorkCover Dangerous Goods licences was conducted to determine the potential presence (historic or otherwise) of above-ground or underground chemical storage tanks. Anecdotal evidence did not indicate the presence of any chemical storage facilities on the site, and any facilities would pre-date the NSW WorkCover Dangerous Goods license database.

Given the distance of the site from urban areas, disposal of farm-generated waste by landfilling may have been undertaken on the site. Such waste may include animal carcasses, domestic refuse, empty chemical containers, etc.. Disposal of these wastes by incineration may also have occurred. Some evidence of landfilling was evident during the site inspection conducted in July 2015 (refer to **Section 3.6**).

Storage of chemicals associated with maintenance of farm machinery, e.g. lubricants, hydraulic fluids, etc., as well as refuelling of vehicles, can potentially result in contamination of soil and/or groundwater by petroleum hydrocarbons. Storage of chemicals was observed during the site inspection in July 2015, however no evidence of spills was apparent.

Conclusions

Geolyse make the following conclusions regarding the potential for land contamination at the site, based on a desktop review of available information, a site walkover reconnaissance and a search of historical records.

- The site is located in a rural area and includes 2 main structures currently used as a residence and a workshop. Other smaller structures are present, ancillary to these main structures;
- The site and surrounding area generally falls from the east to the west, i.e. from the Mullion Range to Summer Hill Creek, at an approximate peak elevation of 840 mAHD in the east, falling to 780 mAHD in the west. It is considered that the majority of site stormwater would be captured by drainage gullies across the site and discharge into various holding dams on the site or into Summer Hill Creek.
- Based on the review of historic operations at the site, the site is considered to have only been utilised for agricultural purposes.
- Based on current operations at the site, and observations of the site during the inspection on 1 July 2015, it is considered that the site is suitable, or may be made suitable, for the proposed land uses permitted under 'large lot residential' zoning, with consideration to the following:
    1. Stormwater flow onto the site from properties beyond the site's southern boundary may have resulted in contamination from agricultural and/or industrial chemicals (Lots 20, 22 and 28);
    2. Potential leaking of the septic waste water storage tank on-site may have resulted in biological and chemical contamination (Lot 32);
    3. Storage and use of chemicals associated with maintenance of farm machinery and refuelling of vehicles may have resulted in contamination from agricultural and/or industrial chemicals (Lot 32);
    4. Weathering of construction materials in structures potentially containing asbestos may have resulted in contamination (Lot 32);
    5. Landfilling of farm generated wastes may have resulted in biological and chemical contamination (Lots 29 and 32);
    6. Spent bullets and casings at the rifle range area may have resulted heavy metal contamination (Lots 26, 27 and 31).
- In accordance with SEPP 55, as investigations have identified that potential contamination identified at some areas of the site may make those areas unsuitable for particular uses permitted under the proposed R5 large lot residential zoning (e.g. dwelling houses), provisions are required to ensure assessment and/or remediation of those areas occurs prior to those land uses being adopted.
- Further assessment and/or remediation of potentially contaminated areas of the site is not considered to be a requirement of rezoning the site from its current RU1 primary production zoning to R5 large lot residential zoning, based on the following:
    - Developments permitted under the R5 large lot residential zoning without development consent do not include uses considered likely to "increase the risk of harm to health or the environment from contamination"; and
    - SEPP 55 contains a general provision that requires consideration of contamination for all development proposals which require development consent, at which point assessment and/or remediation of specified items 1-6 above may be considered.
- Notation of the above items may be required to be recorded on Section 149(5) Planning Certificates to be prepared for the subdivided lots, as necessary.

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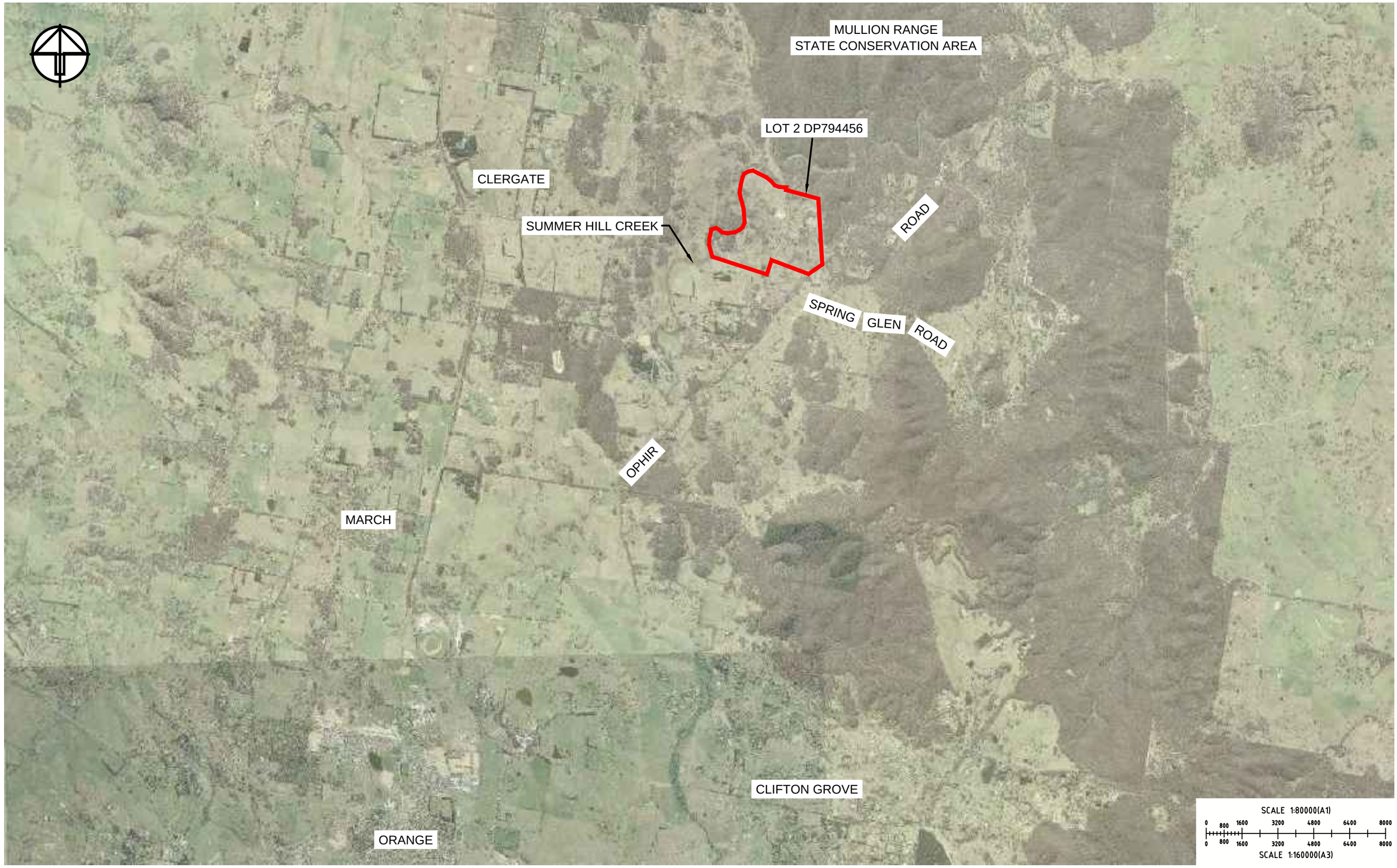
Drawings

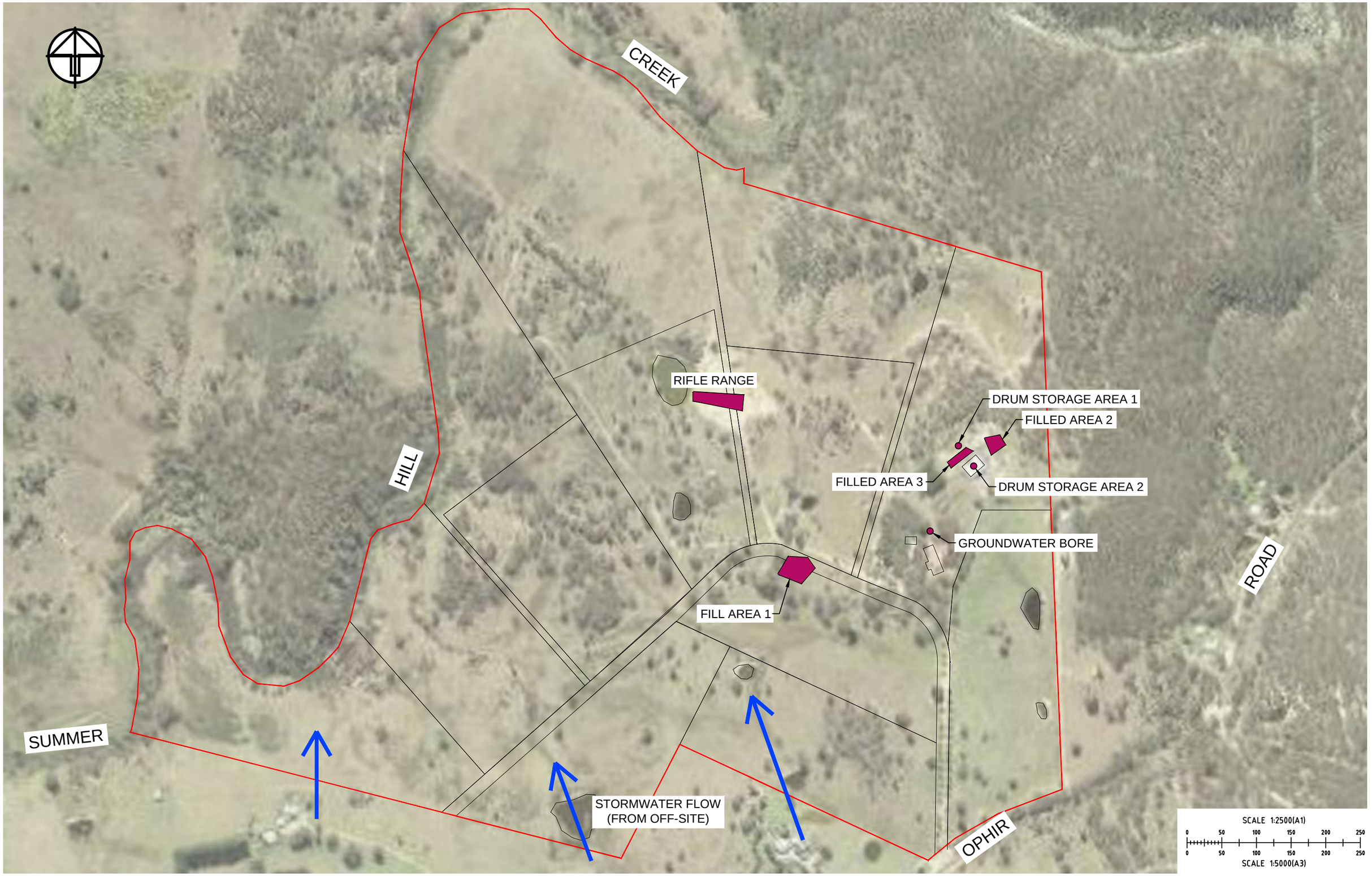


GEOLYSE

PROJECT:
PHASE 1 PRELIMINARY SITE INVESTIGATION
ASSESSMENT OF POTENTIAL SITE CONTAMINATION

DATE: 02/07/2015
REF: 214394_02A_FIG01-FIG02.dwg

FIGURE 1
SITE LOCALITY
LOT 2 IN DP794456
G SANDRIN



GEOLYSE

PROJECT:
PHASE 1 PRELIMINARY SITE INVESTIGATION
ASSESSMENT OF POTENTIAL SITE CONTAMINATION

DATE: 02/07/2015
REF: 214394_02A_FIG01-FIG02.dwg

FIGURE 2
SITE LAYOUT
LOT 2 IN DP794456
G SANDRIN

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Plate 12: Filled Area 3

Plate 13: Buried Drum, present in Filled Area 3

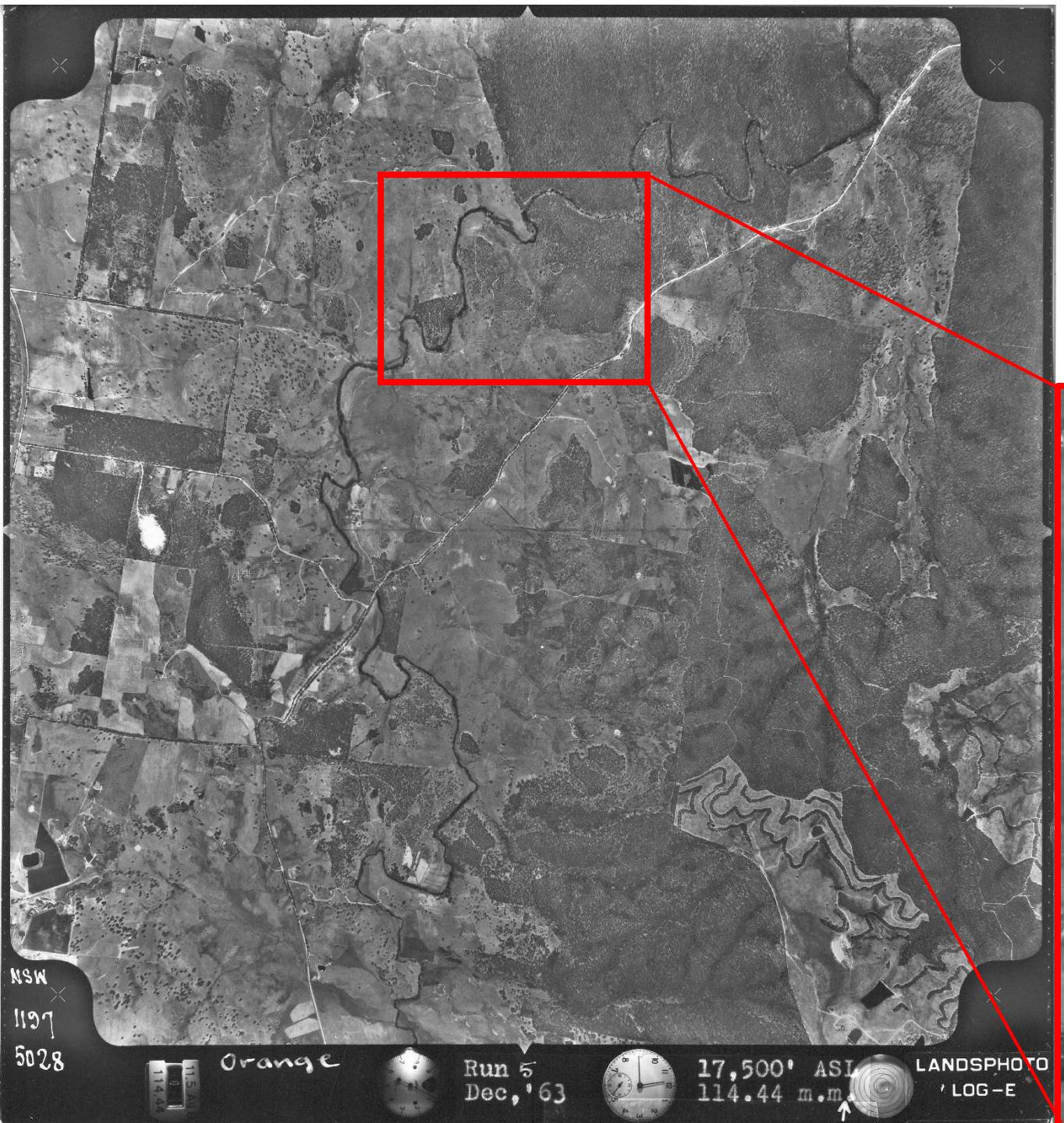
Plate 14: Spent Bullet Casings, in Earthworks Area

Appendix A

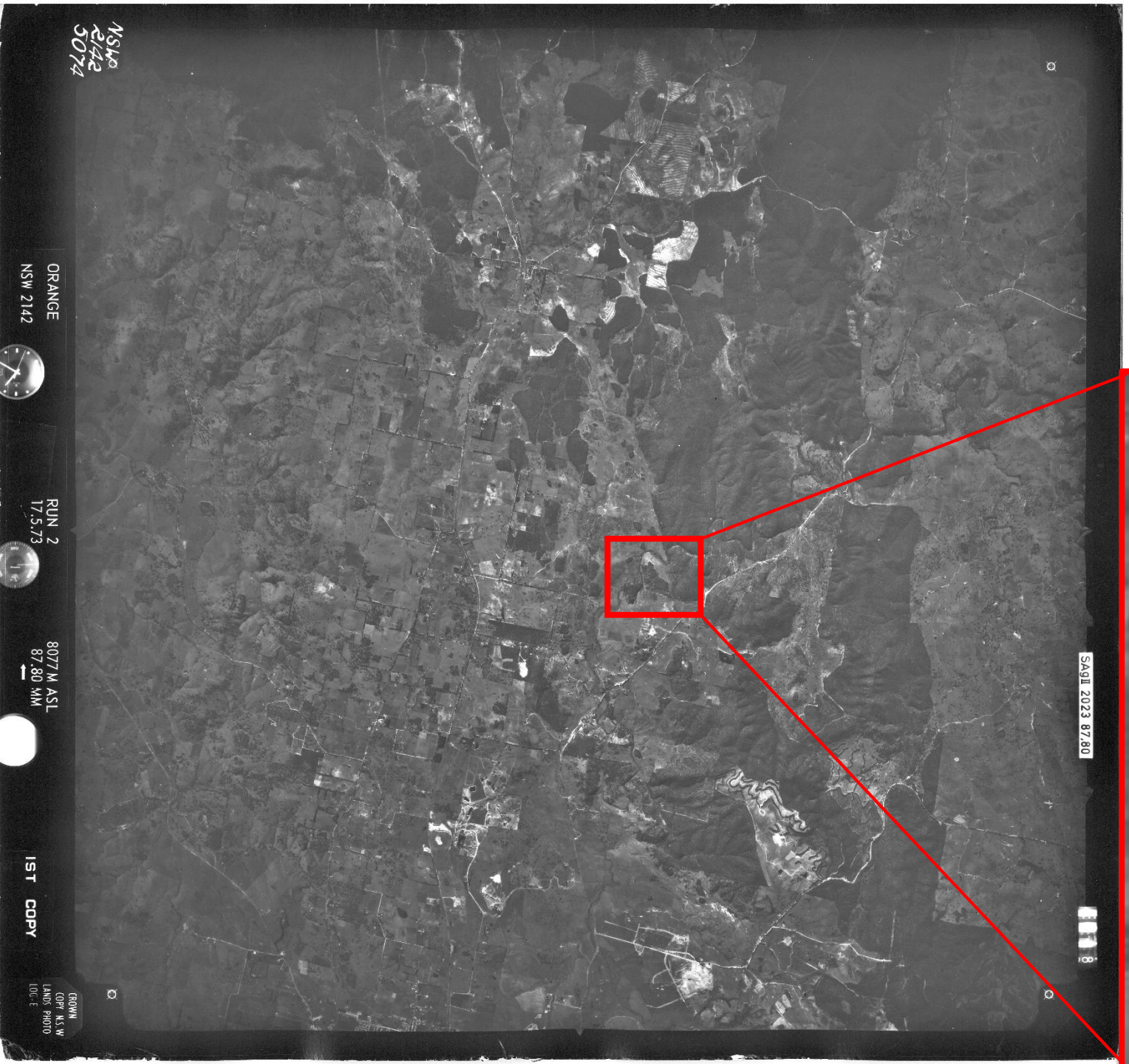
HISTORIC AERIAL PHOTOGRAPHY

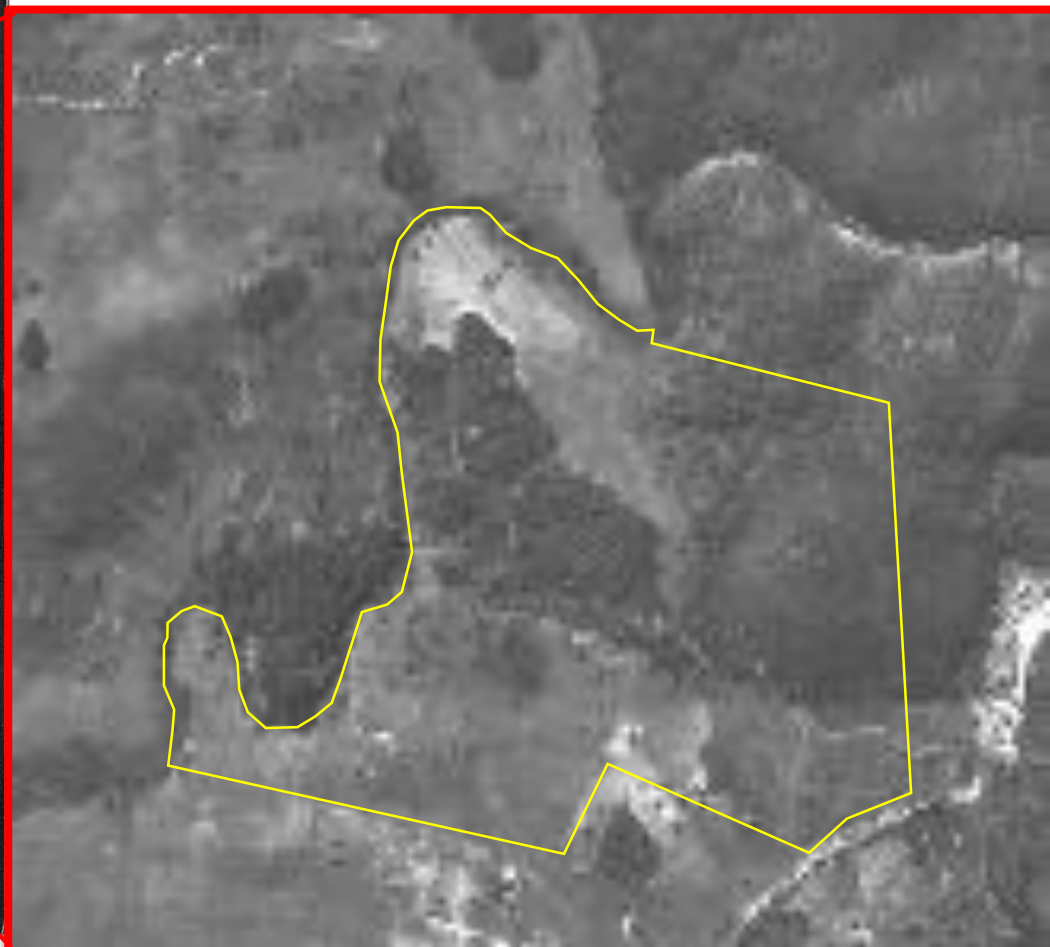
1954 Aerial Photography

1963 Aerial Photography



1973 Aerial Photography

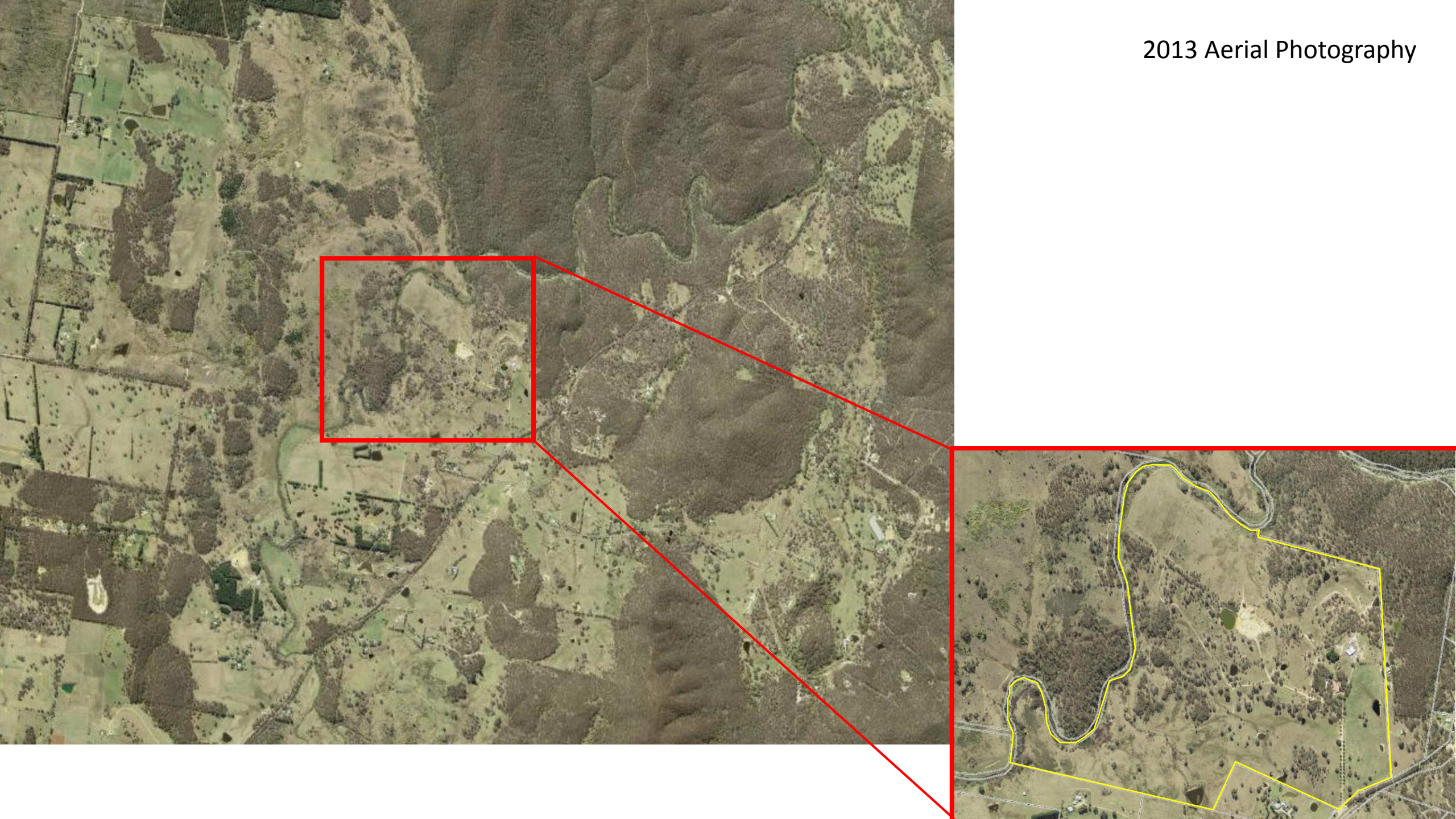




1982 Aerial Photography

1993 Aerial Photography

2013 Aerial Photography



Appendix B

ECOLOGICAL AND BUSH FIRE ASSESSMENT

DPM ENVIROSCIENCES

Proposed Summer Hill Estate – Flora, Fauna and Bushfire Assessment

July 2015

Proposed Summer Hill Estate – Flora, Fauna and Bushfire Assessment

29 July 2015

Prepared for:
Geolyse Pty Ltd
154 Peisley Street
PO Box 1963
Orange NSW 2800

Prepared by:
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DPM Ref: DPM15004_RPTFinal

DISTRIBUTION

Proposed Summer Hill Estate – Flora, Fauna and Bushfire Assessment

29 July 2015

Copies	Recipient	Copies	Recipient
1 ecopy	David Walker Town Planner Geolyse Pty Ltd		
1 ecopy	DPM Files		

By

DPM Envirosciences Pty Ltd
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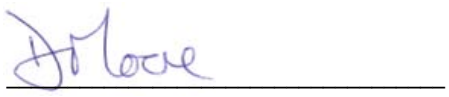
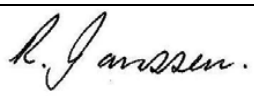


David Moore
Principal Environmental Scientist

Technical Peer Reviewer: Date:

	29 July 2015
Rob Janssen Principal, Land and Environment Consultants	

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FIGURES

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APPENDICES

1 INTRODUCTION

DPM Envirosciences Pty Ltd (DPM) was commissioned by Geolyse Pty Ltd (Geolyse) to undertake a flora, fauna and bushfire assessment for the proposed rezoning of land identified as Lot 2 DP794456 at 1099 Ophir Road, Orange (hereafter referred to as the study site) (Figure 1). Geolyse is preparing a planning proposal to rezone this land from primary production to R5 – large lot residential. Specialist studies are required to inform the planning proposal, including flora, fauna and bushfire risk assessments of the study site.

This report describes the ecological values of the study site, assesses the potential impacts that may arise as a result of the proposed rezoning and subsequent subdivision, and recommends management measures to avoid or minimise these impacts. Results discussed in this report are based on a desktop assessment of readily available information for the study site supplemented by field survey undertaken 17-18 June 2015.

1.1 Scope of work

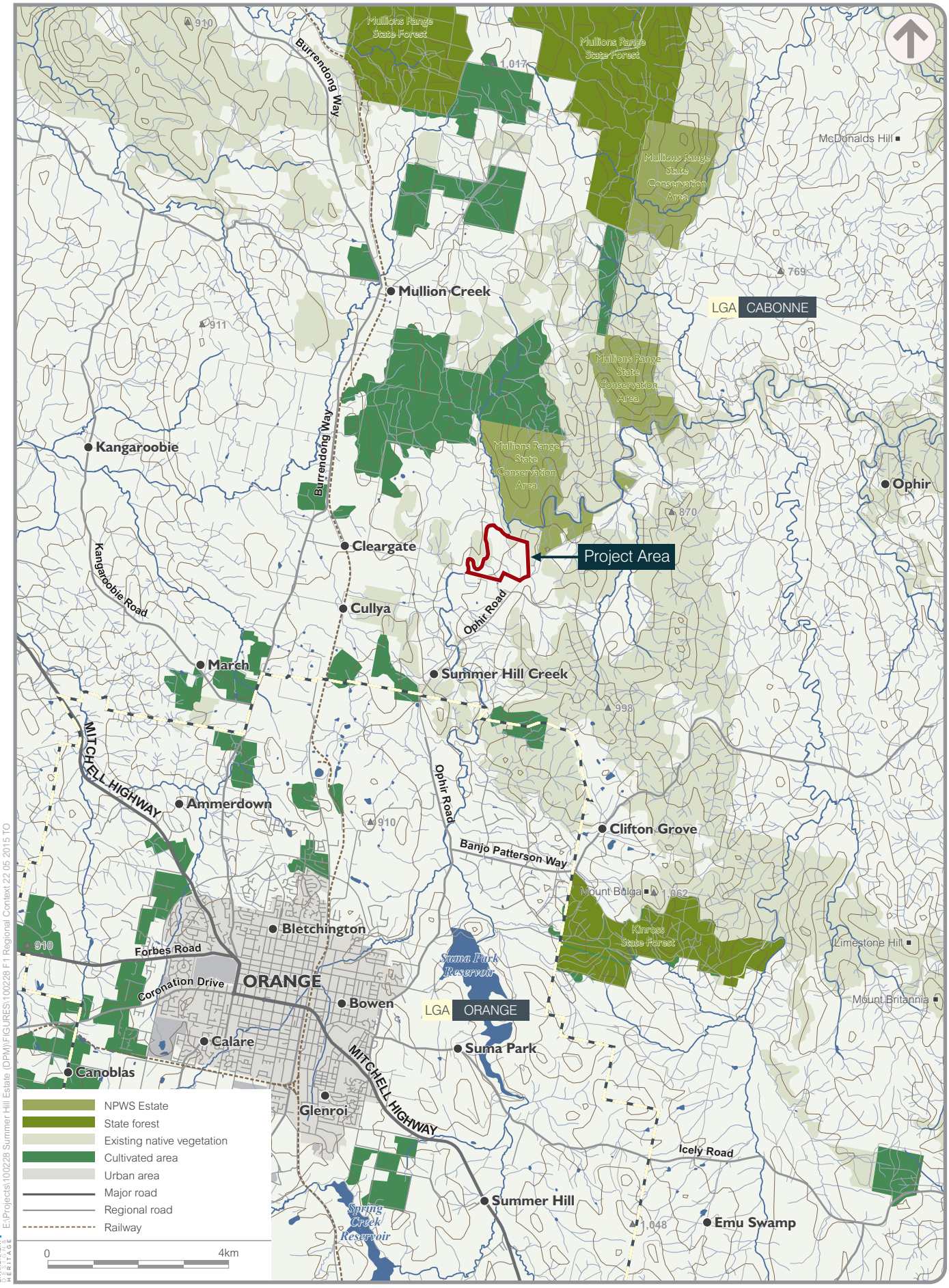
The scope of work undertaken for this report included flora, fauna and bushfire assessments at the study site sufficient to inform the planning proposal. Specifically, the assessments aim to address the following sections of *A guide to preparing planning proposals* (NSW Department of Planning and Infrastructure 2012):

- *Q7. 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?*
- *Q8. Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed* (in relation to bushfire hazard)

The scope of flora, fauna and bushfire assessments of the study site consisted of the following tasks:

- Flora assessment
  - conduct a desktop review of available literature and previous studies in the vicinity of the study site, and conduct database searches for threatened flora species and ecological communities
  - survey the study site to identify the flora species that occur, to map vegetation communities and threatened flora species, and to gain an understanding of the biodiversity values and ecological constraints relevant to the planning proposal.
- Fauna assessment
  - conduct a desktop review of available literature and previous studies in the vicinity of the study site, and conduct database searches for threatened fauna species
  - survey the study site to identify and map potential habitat for threatened species, and to gain an understanding of the biodiversity values and ecological constraints relevant to the planning proposal.
- Preliminary bushfire assessment
  - conduct a desktop review of available bushfire prone area mapping
  - conduct a preliminary assessment for bushfire management at proposed or suggested building envelopes.

- Prepare a flora, fauna and bushfire assessment report that identifies the methods and results of the desktop and field studies, assesses ecological and bushfire hazard constraints of the study site in the context of the planning proposal, and suggests appropriate impact mitigation measures where necessary.



E:\Projects\100228 Summer Hill Estate (DPM)\FIGURES\100228 F1 Regional Context 22 05 2015.TO

DPM ENVIROSCIENCES

REGIONAL CONTEXT

Summer Hill Estate
Summer Hill Creek, New South Wales

FIGURE 1

2 BACKGROUND

2.1 Project description

The proponent engaged Geolyse to prepare a planning proposal to rezone the study site from primary production to R5 – large lot residential under the *Cabonne Local Environmental Plan 2012* (Cabonne LEP). The study site is approximately 98 ha and would be divided into 13 lots, ranging in size from 5.2 ha (Lot 29) to approximately 16 ha (Lot 26). The proposed estate would be known as the Summer Hill Estate. Access to the proposed estate would be via Ophir Road, with a dual lane internal common access road linking proposed lots to Ophir Road (Figure 2).

2.2 Regional Setting

The study site is within the Cabonne Local Government Area (LGA) in the Central West region of NSW (Figure 1). The nearest urban centre is Orange (Orange LGA), approximately 10 km (direct line) south-south-west of the study site. The primary land use of the Cabonne LGA is dryland agriculture. National Parks, Nature Reserves and other protected areas represent 6.4 % of land use in the LGA (ABS 2015).

The study site falls within the South Eastern Highlands Bioregion, which covers the dissected ranges and plateau of the Great Dividing Range that are topographically lower than the Australia Alps (OEH 2011). This bioregion extends to the Great Escarpment in the east, to the western slopes of the inland drainage basins, and south into Victoria. The South Eastern Highlands Bioregion exhibits a temperate climate characterised by warm summers and no dry season. Due to the higher elevation of the Orange region, the study site experiences mild summers and cold winters.

There are 88 flora species listed in the schedules of the NSW *Threatened Species Conservation Act 1995* (TSC Act) in the South Eastern Highlands Bioregion (OEH 2011). Of these, 36 are listed as endangered, 50 are listed as vulnerable, and two species (*Stammacantha australis* and *Galium australe*) are considered extinct.

There are 88 fauna species listed in the schedules of the TSC Act in the South Eastern Highlands Bioregion (OEH 2011). Of these, 25 are listed as endangered and 63 as vulnerable. A general trend of decline in woodland bird species such as robins, treecreepers and many small honeyeaters has been reported in this bioregion (OEH 2011).

The western boundary of the study site fronts Summer Hill Creek, which is part of the Macquarie River Catchment and the broader Murray Darling Basin. This creek has semi-permanent flow and is largely regulated by releases from Orange's Suma Park Dam, as well as receiving treated effluent discharge from the Orange Sewage Treatment Plant. The aquatic habitat within Summer Hill Creek consists primarily of riffle-pool sequences under base flow discharges from Suma Park Dam and upstream tributaries (Entura 2013). It is generally characterised by large pools with woody debris and low abundance of macrophytes, with riparian vegetation being tree dominated, either by willows or native vegetation (Entura 2013).

3 LEGISLATIVE FRAMEWORK AND RELEVANT GUIDELINES

3.1 Commonwealth legislation

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Department of the Environment (DotE) and regulates any action that will, or is likely to, have an impact on any Matter of National Environmental Significance (MNES). MNES relevant to biodiversity include:

- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and threatened ecological communities (TECs)
- migratory species protected under international agreements
- Commonwealth marine areas.

Pursuant to the EPBC Act, a person must not undertake any action that will have, or is likely to have, a significant impact on any MNES. According to the MNES *Significant Impact Guidelines 1.1* (DotE 2013), a significant impact is an impact which is important, notable or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. A significant impact is considered likely if it is real or does not have a remote chance or possibility.

MNES have been considered in Section 5. Further assessment is necessary to determine if the proposal triggers a referral to the DotE. This includes:

- conducting targeted flora searches for austral toadflax (*Thesium australe*) in spring / summer (Section 6.1.2)
- in-field refinement of the plant community types (PCT) mapping (Figure 5) for 'Yellow Box – Blakely's Red Gum grassy woodland' and delineation of any 'White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland' TEC that occurs within the study site (Section 6.1.3), where any disturbance to this PCT is proposed
- conducting searches for threatened and migratory fauna, or their habitat, in areas subject to direct impacts (e.g. final building envelopes, asset protection zones [APZs] and access roads), once impact areas have been defined, or across the broader area in conjunction with the flora searches in spring / summer (Section 6.2.3); this would include searches for the vulnerable pink-tailed worm-lizard (*Aprasia parapulchella*)
- in the instance that a MNES is identified, establishing whether potential impacts can be avoided through the redesign or refinement of the proposed layout
- in the instance that a MNES cannot be avoided, undertaking an Assessment of Significance in accordance with the MNES Significant Impact Guidelines 1.1 (DotE 2013) to determine whether it is appropriate for the works to proceed.

3.2 State legislation

3.2.1 Environmental Planning and Assessment Act 1979

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and the NSW *Environmental Planning and Assessment Regulation 2000* provide the framework for environmental planning in NSW and include provisions to ensure that proposals which have the potential to impact the environment are subject to detailed environmental assessment.

Section 55 of the EP&A Act sets out the requirements for planning proposals, including the responsibilities of relevant planning authorities. The requirements of the EP&A Act pertaining to biodiversity impacts have been considered throughout this document.

3.2.2 Threatened Species Conservation Act 1995

The TSC Act provides for the conservation of threatened species, populations and ecological communities of plants and animals. It provides a framework to ensure that the impact of any action affecting threatened species is assessed. Schedule 1 of the TSC Act lists endangered species, populations and ecological communities; Schedule 2 lists vulnerable species; and Schedule 3 lists key threatening processes. Part 3 of the TSC Act defines critical habitat.

This report considers the potential impacts to all threatened species, populations and endangered ecological communities (EECs) listed under the TSC Act that are known or considered likely to occur within the study site. Further assessment is necessary to determine whether a significant impact is likely. This includes:

- conducting targeted flora searches for austral toadflax (*Thesium australe*) and silky swainson-pea (*Swainsona sericea*) when these species are detectable in spring / summer (Section 6.1.2)
- in-field refinement of the PCT mapping (Figure 5) for 'Yellow Box – Blakely's Red Gum grassy woodland' and delineation of any 'White Box Yellow Box Blakely's Red Gum Woodland' EEC that occurs within the study site (Section 6.1.3), where any disturbance to this PCT is proposed
- conducting searches for state-listed threatened fauna, or their habitat, in areas subject to direct impacts (e.g. final building envelopes, APZs and access roads), once impact areas have been defined, or across the broader area in conjunction with the flora searches in spring / summer (Section 6.2.3); this would include searches for the vulnerable pink-tailed worm-lizard (*Aprasia parapulchella*)
- in the instance that a threatened species, population or EEC is identified, establishing whether impacts can be avoided through the redesign or refinement of the proposed layout
- in the instance that a threatened species, population or EEC cannot be avoided, undertaking an Assessment of Significance in accordance with the EP&A Act to determine whether it is appropriate for the works to proceed.

3.2.3 National Parks and Wildlife Act 1974

The NSW *National Parks and Wildlife Act 1974* (NP&W Act) governs the establishment, preservation and management of national parks, historic sites, and the protection of certain fauna, native plants and Aboriginal relics.

Under the NP&W Act all fauna is protected, threatened or otherwise. Schedule 13 of the NP&W Act lists protected plants, which shall not be harmed or picked on any land either on or off National Park estate without prior approval. No such species were identified during the field survey conducted 17-18 June 2015.

3.3 State Planning Policies

3.3.1 NSW State Environmental Planning Policy No. 44 (SEPP 44) – Koala Habitat Protection

The SEPP 44, prepared under the EP&A Act, aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for the koala (*Phascolarctos cinereus*) to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.

The Cabonne LGA is listed in Schedule 1 of the SEPP 44. As such, this SEPP applies to the proposal.

Schedule 2 of the SEPP 44 lists koala feed tree species. None of these species were detected during field surveys of the study site, nor were any koala scratches or scats detected. These surveys included 11 survey plots covering six Environmental Sampling Units (ESU) pre-determined for the study site (Section 4.5.2) and were considered to provide adequate representation of the study site. Although koalas have been recorded from the broader search area, the nearest being approximately 5 km north of the study site in 2012 (Section 5.3), the study site itself is unlikely to constitute koala habitat.

3.3.2 NSW State Environmental Planning Policy (Exempt and Complying Development Code) 2008 (the Codes SEPP)

The Codes SEPP, prepared under the EP&A Act, streamlines assessment processes for development that complies with specific development standards. This policy provides exempt and complying development codes that have State-wide application. It identifies types of development that are of minimal environmental impact that may be carried out without the need for development consent, as well as types of development that may be carried out in accordance with a complying development certificate as defined in the EP&A Act.

The bushfire assessment (Section 5.5) provides information relevant to the Codes SEPP. For potential structures on building envelopes identified to be low risk bushfire prone land (BAL-12.5, BAL-19 or BAL-29), a Bushfire Attack Level Risk Assessment Certificate could be sought for endorsement as complying development under the Codes SEPP (Section 5.5). For building envelopes identified to be high risk bushfire prone land (BAL-40), the Codes SEPP would not apply. Instead, bushfire risk and mitigation would need to be assessed through the lodgement of a Development Application with Council.

3.4 Relevant guidelines

3.4.1 Planning for Bushfire Protection

All development on Bushfire Prone Land in NSW must satisfy the aim and objectives of *Planning for Bush Fire Protection* (PBP) (NSW RFS 2006). The aim of the PBP is to use the NSW development assessment system to provide for the protection of human life and to minimise impacts on property from the threat of bushfire, while having regard to development potential, on-site amenity and protection of the environment (NSW RFS 2006).

The objectives of PBP are to:

- afford occupants of any building adequate protection from exposure to a bushfire
- provide for a defendable space to be located around buildings
- provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition
- ensure that safe operational access and egress for emergency service personnel and residents is available
- provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the asset protection zone (APZ), and
- ensure that utility services are adequate to meet the needs of firefighters and others assisting in bushfire fighting.

The preliminary bushfire assessment conducted in conjunction with the ecological surveys has calculated the Bushfire Attack Levels and minimum required APZs for potential building envelopes in accordance with PBP (Section 5.5).

4 METHODS

4.1 Study site

The study site considered in this report is the perimeter of the proposed lot boundaries encapsulating proposed Lots 20-22 and Lots 24-33 on existing Lot 2 DP 794456 in the LGA of Cabonne, provided by Geolyse (Figure 3 in Geolyse reference 214394_01A_FIG01-03.dwg).

4.2 Taxonomic nomenclature

Scientific names of fauna used in this report follow the CSIRO List of Australian Vertebrates (Clayton et al. 2006). Scientific names of flora used in this report follow the Australian Plant Census (CHAH 2014).

4.3 Determination of species significance level

The significance of vegetation communities is described as per their listings in the EPBC Act and / or the TSC Act as Critically Endangered (CE), Endangered (E) or Vulnerable (V).

Listed threatened flora and fauna species are defined as those taxa listed in the EPBC Act and / or the TSC Act as CE, E or V.

4.4 Desktop assessment

Desktop searches were undertaken in June 2015 to determine whether threatened biota were previously recorded from, or are likely to occur within, the study site and if targeted surveys for specific species would be required. This included a review of the following:

- DotE Protected Matters Search Tool (DotE 2015a), to identify MNES within approximately 10 km of the study site. The search area was centred on the GDA 1994 coordinates: -33.19376; 149.15041.
- NSW Office of Environment and Heritage (OEH 2015a) Atlas of NSW Wildlife database, to identify threatened flora and fauna records within approximately 10 km of the study site. The search area was defined by the GDA 1994 coordinates:
    - -33.10; 149.26
    - -33.28; 149.26
    - -33.28; 149.04
    - -33.10; 148.04
- The Royal Botanic Gardens and Domain Trust (2011) NSW Flora Online Search – Rare or Threatened Australian Plants (ROTAP) species, to identify ROTAP records within approximately 10 km of the study site. The search area was defined by the GDA 1994 coordinates:
    - -33°06’; 149°15’
    - -33°17’; 149°15’
    - -33°17’; 149°03’
    - -33°06’; 149°03’
- DotE EPBC Act Species Profiles and Threats Database (SPRAT)
- NSW OEH Threatened Species Profiles

- Atlas of Living Australia
- NSW OEH spatial datasets of vegetation mapping
- Cabonne Council spatial datasets of bushfire prone land mapping

4.5 Field survey

Desktop investigations were used to plan targeted field surveys. Field surveys for fauna habitat focussed on areas of better habitat value, such as potential habitat for threatened species, watercourses and areas with apparent habitat connectivity. The majority of the study site was traversed on foot and incidental observations of flora and fauna values were recorded.

4.5.1 Survey timing

The ecological survey was conducted during early winter from 17 to 18 June 2015.

Conditions at the time of survey were cold and wet (Figure 2). Summer Hill Creek exhibited moderate to high flow and farm dams within the study site contained water. The mean minimum and maximum temperatures during the two days of survey were 7.8 °C and 10.2 °C, respectively. These conditions were adequate for surveying fauna, with a focus on habitat attributes to infer habitat potential throughout an entire year.

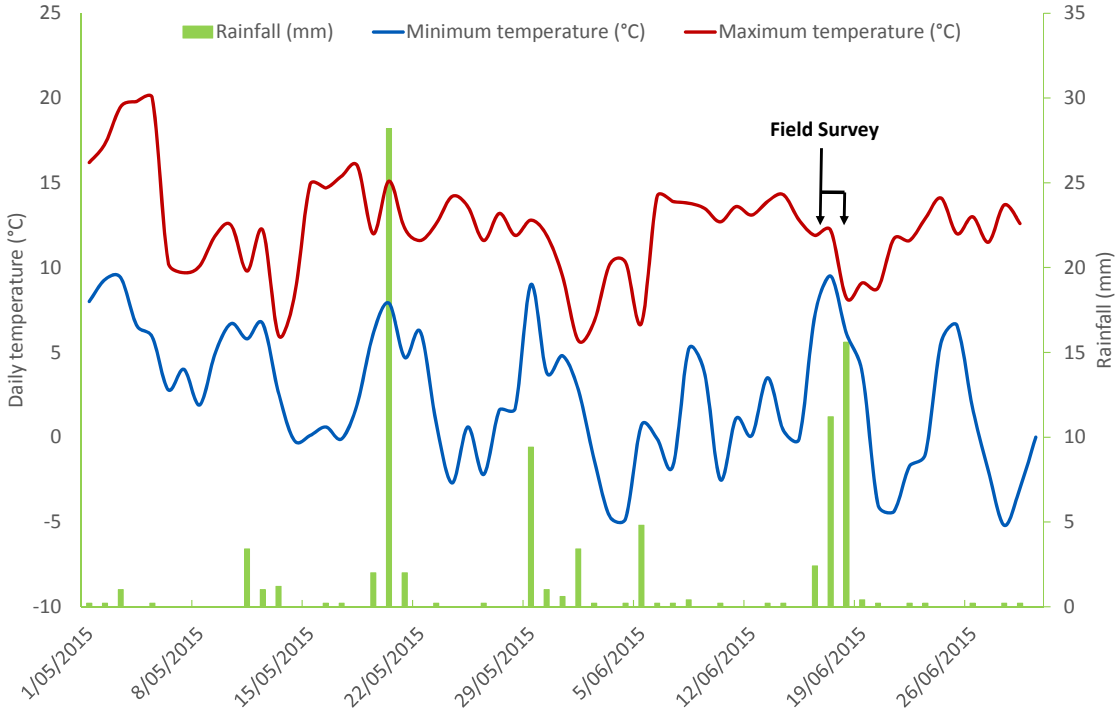


Figure 2 Daily rainfall, minimum and maximum temperatures at the Orange Airport meteorological station 063303 in May-June 2015

4.5.2 Flora

Plant communities

The NSW Vegetation Information System (VIS) Plant Community Type Identification Tool (OEH 2012) was used to identify PCTs based on field data collected using the DECCW Vegetation Field Survey Forms – Module 1 and 2. This tool aligns with the NSW VIS Classification (VIS Classification) database to produce a hierarchical vegetation classification of approximately 1500 NSW plant community types (OEH 2015b), derived from 99 NSW Vegetation Classes (Keith 2004) and 16 broader NSW Vegetation Formations (Keith 2004) (Figure 3).

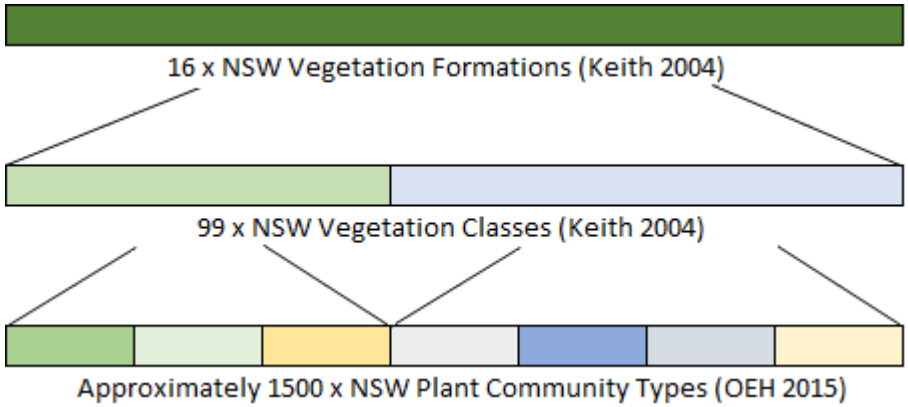


Figure 3 NSW vegetation classification hierarchy (based on OEH 2015b)

Broad vegetation types (including vegetation formations and vegetation classes) were first reviewed using the Broad Vegetation Types (BVTs) identified in the Combined Extant Vegetation for the Central West Catchment (CWLach08_VIS_3813) vegetation mapping (OEH 2008) (Figure 4). The accuracy of this broad-scale vegetation formation and class mapping was reviewed following the field work. This comprised bottom-up determination of vegetation class and formation based on PCT diagnostic information inputted into the VIS Plant Community Types Identification Tool. Inputted information included (at least) the three dominant species in each of the upper, mid and ground strata, community height and cover classes.

Aerial imagery and field data were used to refine the vegetation mapping. This included delineating vegetation into floristic formations using foliage cover, consistent with Walker and Hopkins (1990) and CSIRO (2009). Field-collected data was analysed using the VIS Classification (OEH 2012) and vegetation of the study site consequently mapped into the most appropriate PCT (Figure 5). A mapping scale of approximately 1:10,000 was adopted to capture PCTs of 0.1ha or above, aligning with the minimum patch size for Commonwealth listed TECs known from the search area.

Stratification and survey effort

The study site was stratified into ESUs following the Native Vegetation Interim Type Standard (Sivertsen 2009). ESUs were aligned with mapped BVTs (Figure 4) to avoid the need to undertake full coverage surveys in locations that are not comprised of remnant vegetation. Survey sites were assessed using either a rapid assessment or comprehensive plot assessment technique following Sivertsen 2009. Eleven survey sites were identified from six ESUs (Figure 4).

Rapid assessment

Rapid assessment flora survey was undertaken at sites 1, 2b, 2c, 2d, 2e, 4b and 6 (Figure 4). For each of these sites, the random meander technique was used to target threatened flora species. Threatened species were also targeted whilst traversing the study site.

Rapid assessment surveys were undertaken during the random meander of the site, with the cover and abundance of the three most dominant species in each stratum (top, mid and under-storey levels) recorded.

Comprehensive plot assessment

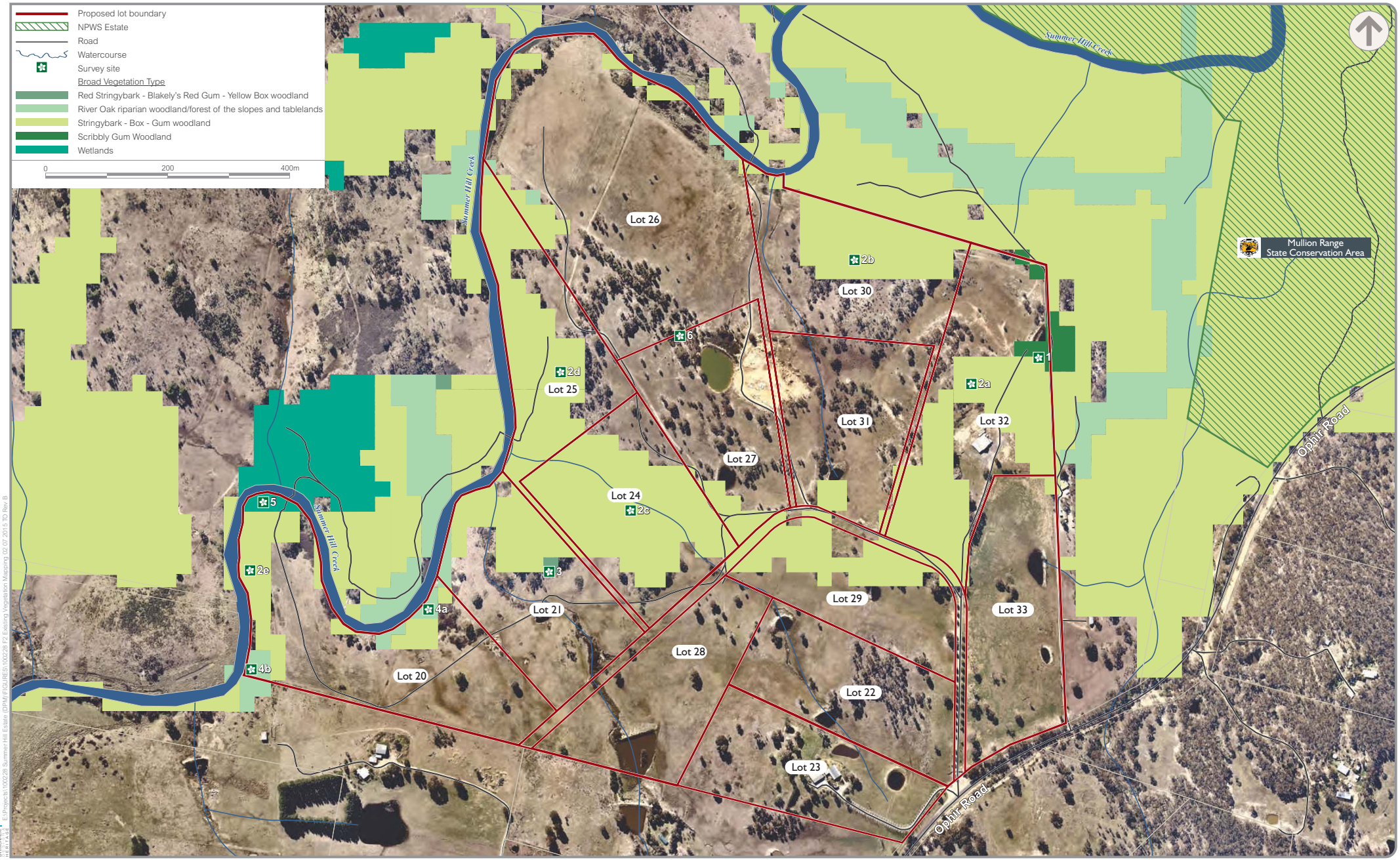
A standard plot size of 0.04 ha (20 m x 20 m) was adopted for floristics following Sivertsen (2009). Comprehensive plot assessment was undertaken at sites 2a, 3, 4a and 5 (Figure 4). These assessments included an inventory of all flora species encountered within the plot at the time of survey. For each species, the percentage cover was estimated and an abundance score allocated.

Table 1 provides a summary of the location and survey methods for each ESU in the study site.

Table 1 Location and survey method for each ESU in the study site

Site	ESU	Flora survey type		Fauna habitat assessment
		Rapid assessment	Comprehensive plot assessment	
Lot 32	1	✓		✓
Lot 32	2a		✓	✓
Lot 30	2b	✓		✓
Lot 26	6	✓		✓
Lot 24	2c		✓	✓
Lot 25	2d	✓		✓
Lot 21	3		✓	✓
Lot 20	4a		✓	✓
Lot 20	5		✓	✓
Lot 20	2e	✓		✓
Lot 20	4b	✓		✓

Where species could not be identified in the field, samples were collected and pressed for subsequent identification under stereomicroscope using taxonomic keys. Confirmed species are presented in Appendix A.



DPM ENVIROSCIENCES

Data Source:
Office of Environment and Heritage (OEH)

EXISTING VEGETATION MAPPING

Summer Hill Estate
Summer Hill Creek, New South Wales

FIGURE 4

4.5.3 Fauna

Fauna habitat assessment was undertaken at each flora survey site (Table 1) to assess the potential for threatened fauna species. At each site an approximate 1 ha search area was assessed for a range of features including:

- overall condition (pristine, very good, good, average, poor, degraded, or completely degraded)
- level of erosion (absent, scattered, frequent)
- presence and type of disturbance (grazing etc.)
- abundance (absent, scattered, common, abundant) of:
    - large hollows (>20 cm)
    - small hollows (<20cm)
    - large logs (>50 cm diameter)
    - small logs (<50cm diameter)
    - cliffs and rocky outcrops
    - large rocks (>30 cm)
    - small rocks (<30 cm)
    - leaf litter
    - dense grass/shrub shelter
    - arboreal and terrestrial termite mounds
    - seeding grass cover
    - fruiting plants
    - nectar and pollen producing plants
    - koala food trees.

Other important habitat features, such as creek banks, connectivity etc., were also noted where detected.

Fauna was opportunistically surveyed across the study site (Appendix B). This included morning bird chorus surveys, diurnal reptile searches, and searches for mammal tracks, scats and other traces.

Photos were obtained and site profiles were compiled for each site (Appendix C).

4.5.4 Bushfire risk assessment

Reference was made to the bushfire prone land map for the Cabonne Council LGA (2014) to establish the mapped vegetation categories for the study site. Potential building envelopes were selected for the purposes of the bushfire risk assessment, based on:

- proximity to access roads (ideally within 200 m)
- elevated position
- relative privacy
- minimal requirement for vegetation clearing
- minimal requirement for earthworks (cut/fill)
- 50 x 40 m building envelope.

The proximity of potential building envelopes to vegetation (bushfire hazard) in this report is based on the ground-truthed vegetation (Figure 5) and measurements obtained in the field.

Minimum asset protection zones (APZs) were identified for each potential building envelope in accordance with NSW RFS (2012). This included:

- determining the vegetation types surrounding potential building envelopes using field assessed vegetation (Section 5.1) and the vegetation chart in Appendix 1 of NSW RFS (2012)
- determining the distance between vegetation formations and the edge of the building envelope
- determining the effective slope (measured using a Nikon Forestry Pro range finder) relative to the hazard
- determining the relevant Fire Danger Index (FDI)
- matching the relevant FDI, vegetation type, distance and effective slope to determine the appropriate APZ.

Australian Standard AS3959-2009 classifies different bushfire intensity levels that a home may experience during a bushfire. These are referred to as Bushfire Attack Levels (BALs), and include:

- **BAL FZ** (Flame Zone) – Where significant radiant heat and a significantly high likelihood of flame contact from a fire front can threaten building integrity and result in significant risk to residents.
- **BAL 40** – Where radiant heat flux ≤ 40 kW/m^2 and potential flame contact could threaten building integrity.
- **BAL 29** – Where attack by burning debris is significant and radiant heat flux ≤ 29 kW/m^2 threatens building integrity. In this case specific construction requirements for ember and higher radiant heat are warranted. Some flame contact is possible.
- **BAL 19** – Where attack by burning debris is significant with radiant heat flux ≤ 19 kW/m^2 threatening some building elements (screened glass). Specific construction requirements for embers and radiant heat are warranted.
- **BAL 12.5** – Where attack by burning debris is significant with radiant heat ≤ 12.5 kW/m^2. Radiant heat is unlikely to threaten building elements (unscreened glass). Specific construction requirements for ember protection and accumulation of debris are warranted.
- **BAL Low** – Where minimal attack from radiant heath and flames is expected due to the distance of the site from vegetation, although some attack by burning debris is possible. There is sufficient threat to warrant specific construction requirements.

The category of bushfire risk (ie BAL) was calculated for each potential building envelope to inform the BAL Risk Assessment Certificate process for potential buildings within the proposed estate. Minimum APZs were applied to the calculation of BAL. This conservative approach assumes that a high level of building protection will be adopted by proponents in place of excessive vegetation clearing.

4.6 Assumptions and Limitations

The information presented in this report is subject to the following assumptions and limitations:

- This report includes a desktop assessment of readily available information which relies upon the accuracy of external data sources referenced in this document.
- Field survey locations are subject to standard handheld GPS device inaccuracies (approximately 10 m).
- This report excludes an assessment of aquatic ecological values of the study site.

- Some of the databases used to obtain information for this report have caveats regarding the completeness of data they contain. For example, the Atlas of NSW Wildlife database is based only on recorded sightings of species, and therefore the absence of a species record in a search area does not necessarily imply that the species does not occur.
- Data from the DotE Protected Matters Search are based on actual records, primarily from State Government databases, combined with modelled distributions of species according to their ecological characteristics. Species identified by this search may occur in the study site, but require further investigation to confirm their presence.
- As the presence or otherwise of a particular fauna species within the site can only be confirmed by detailed targeted field surveys, the precautionary principle has been adopted throughout this assessment. A species is considered likely to occur in the study site if it was recorded in database searches for the region and vegetation mapping and / or field surveys indicated that potential habitat for the species is present, based on existing knowledge of the species' ecological requirements.
- This survey was only conducted in one season and may have missed some species inhabiting the area which were not active (fauna) or detectable (flora) in winter.

5 EXISTING ENVIRONMENT

5.1 Vegetation communities

The study site is characterised by a mosaic of cleared agricultural pasturelands, forest and woodland remnants, as well as woodland / forest regrowth. Past clearing, livestock grazing, earthworks (for dams), exotic plantings, and weed infestation along Summer Hill Creek has impacted and influenced the vegetation across much of the study site. This has removed the native composition and floristic structure of the landscape to varying degrees. However, the upper, mid and lower strata of forest and woodland remnants remain dominated by native species and are generally in very good condition (Appendix C). Grasslands of the study site are also dominated by native species, although native grasses are less prevalent on the banks and floodplain of Summer Hill Creek.

Vegetation communities of the study site include:

- Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest
- regrowth and open woodland remnants derived from Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest
- Yellow Box – Blakely's Red Gum grassy woodland
- native grassland and pastureland
- small patches of short heath / open scrub dominated by sifton bush (*Cassinia arcuata*)
- riparian vegetation dominated by exotic species including Willow (*Salix* spp.) and blackberry (*Rubus anglocandicans*).

5.1.1 Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest

The dominant PCT of the study site is the Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion. This PCT is a mid-high to tall open forest occurring on shallow, yellow to red podzolic clay to loam soils derived from sedimentary, metamorphic and igneous substrates generally between Orange and Yass. The dominant canopy species of this PCT, in general, comprises brittle gum (*Eucalyptus mannifera*), red stringybark (*E. macrorhyncha*), broad-leaved peppermint (*E. dives*), inland scribbly gum (*E. rossii*), bundy (*E. goniocalyx*), argyle apple (*E. cinerea*) and / or red box (*E. polyanthemos* subsp. *polyanthemos*). Floristic surveys undertaken 17-18 June 2015, combined with aerial imagery interpretation, suggests that this PCT occurs within proposed lots 20, 22, 24-27 and 29-32 (Figure 5). Within the study site this PCT is represented by open forest dominated by brittle gum, red stringybark and broad-leaved peppermint, with a sparse mid-storey of silver wattle (*Acacia dealbata*) and sifton bush (*Cassinia arcuata*) and a diverse groundcover dominated by short heath, grasses, rushes and forbs (Plate 1 and Appendix A).

Plate 1 Brittle gum – broad-leaved peppermint – red stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion (Site 2a, Lot 32)

Within the study site this PCT is subject to low-moderate grazing pressure by sheep and cattle, as well as weed ingression – predominantly blackberry (*Rubus anglocandicans*). Mature-aged canopy species are sparse, which may indicate past clearing and subsequent regeneration.

5.1.2 Yellow Box – Blakely's Red Gum grassy woodland

The second-most dominant PCT occurring within the study site is the Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion. This PCT occurs on loamy soils on undulating terrain between 500 and 900 m on the tablelands. The dominant canopy species of this PCT, in general, comprises yellow box (*Eucalyptus melliodora*), apple box (*E. bridgesiana*), Blakely's red gum (*E. blakelyi*), broad-leaved peppermint (*E. dives*), red stringybark (*E. macrorhyncha*), candlebark (*E. rubida* subsp. *rubida*), white sally (*E. pauciflora*), brittle gum (*E. mannifera*) and / or ribbon gum (*E. viminalis*). Floristic surveys undertaken 17-18 June 2015, combined with aerial imagery interpretation, suggests that this PCT occurs within lots 21 and 24 (Figure 5) and is represented by a grassy woodland dominated by yellow box, candlebark, broad-leaved peppermint and apple box, with a sparse shrub layer dominated by sifton bush (*Cassinia arcuata*) and a diverse groundcover dominated by native grasses, short heath, rushes and forbs (Plate 2 and Appendix A).

Plate 2 Yellow Box – Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (Site 2c, Lot 24)

Within the study site this PCT is subject to low-moderate grazing pressure by sheep and cattle, as well as weed ingression – predominantly blackberry (*Rubus anglocandicans*). Remnant mature-aged yellow box are sparse, which may be indicative of past selective clearing and subsequent regeneration.

Parts of this PCT may meet the definition of the following TEC and / or EEC:

- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC (Critically Endangered, EPBC Act)

- White Box Yellow Box Blakely's Red Gum Woodland EEC (Critically Endangered, TSC Act).

This PCT exhibited variation in understorey structure. Some areas had predominantly grassy understorey structure (being potentially the EEC) and other areas had a dominant shrub understorey (not the EEC).

At least 20 native understorey species were detected within this PCT (sites 2c and 3, Appendix A), including 'important species' listed in the policy statement for the TEC (DEH 2006). As such, at least some parts of this PCT are likely to meet the definition of a TEC.

The precautionary principle has been applied in assuming that the entire PCT is both an EEC and TEC. The delineation of this EEC and / or TEC is subject to more detailed assessment once proposed building and clearing footprints are better known. It is noted, however, that Section 5.4 demonstrates that building envelopes could potentially be established on lots 21 and 24 without the need to clear this PCT.

5.1.3 Grassland

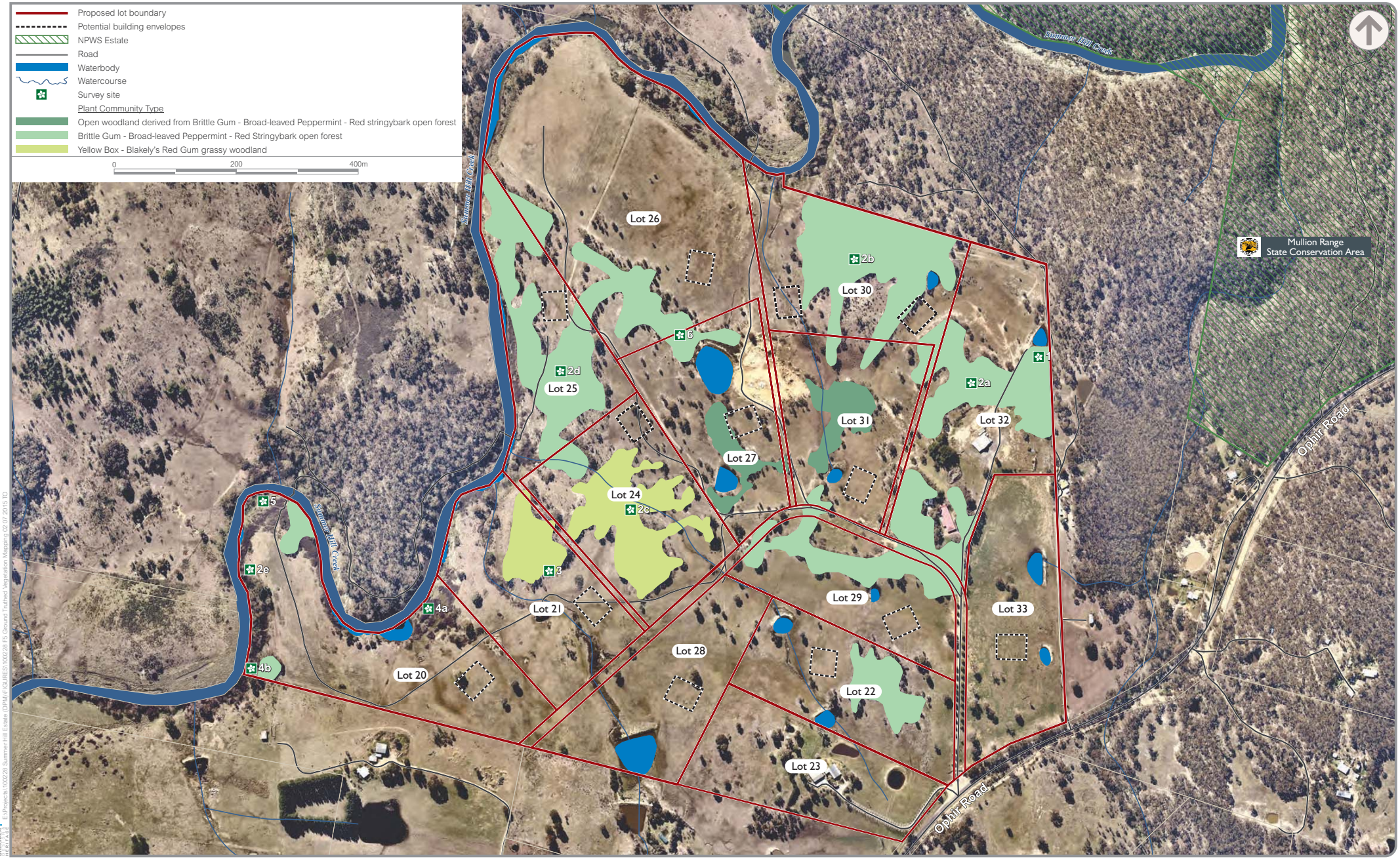
The majority of the study site is comprised of grassland dominated by native species including kangaroo grass (*Themeda triandra*) and wallaby grass (*Rytidosperma spp.*). Other native grasses included three-awn speargrass (*Aristida vagans*), tussock (*Poa labillardierei* var. *labillardierei*), snowgrass (*Poa sieberiana*) and common couch (*Cynodon dactylon*). These grasslands have likely established in response to past land clearing of forest and woodland across the study site to facilitate sheep and cattle grazing. At the time of survey, grasslands of the study site ranged from moderately to heavily-grazed.

Plate 3 Grassland of the study site, dominated by kangaroo grass (*Themeda triandra*) and wallaby grass (*Rytidosperma* spp.) (Lot 26)

5.1.4 Riparian vegetation

Riparian vegetation flanking Summer Hill Creek was dominated by willows (*Salix* spp.) and a dense shrub layer of blackberry (*Rubus anglocandicans*). Native shrubs were scattered throughout the blackberry and included silver wattle (*Acacia dealbata*) and sifton bush (*Cassinia arcuata*). The ground layer comprised a mix of both native and exotic grasses, rushes and forbs (Appendix A). Although the broad vegetation type mapping of the study site suggested that river oak riparian woodland / forest occurred along portions of Summer Hill Creek within the study site (Figure 4), no river oak (*Casuarina cunninghammiana*) was detected.

Plate 4 Riparian vegetation dominated by Willow (*Salix* spp.) and blackberry (*Rubus anglocandicans*) (Lot 20)



DPM ENVIROSCIENCES

SURVEY SITES AND GROUND-TRUTHED VEGETATION MAPPING

Summer Hill Estate
Summer Hill Creek, New South Wales

FIGURE 5

5.2 Flora

Searches of the EPBC Act Protected Matters database, Atlas of NSW Wildlife and the NSW Flora Online Search – ROTAP identified the potential occurrence of four rare or threatened flora species within 10 km of the study site (Table 2). Of these, three are listed under both the EPBC Act and TSC Act. One species is listed under the TSC Act only.

A total of 65 flora species were detected within flora survey plots in the study site during the field survey from 17-18 June 2015. This comprised 46 native species and 19 introduced species (Appendix A). No threatened flora species were detected in the study site during the field survey, despite dedicated searches. However, seasonal conditions were not appropriate for the detection of two of these species: Austral toadflax (*Thesium australe*) and silky swainson-pea (*Swainsona sericea*). As the study site provides potential habitat for these species, the precautionary principle must be applied in assuming their presence until targeted survey can be undertaken in more favourable conditions (ie spring / summer).

Preferred habitat for Robertson's peppermint (*Eucalyptus robertsonii* subsp. *hemisphaerica*) or *Euphrasia arguta* was not detected within the study site. It is unlikely that either of these species would occur within the study site (Table 2).

Table 2 Rare or threatened flora, or their habitat, identified from the search area (within 10 km of the study site)

Scientific name	Common name	Status		Preferred habitat	Likelihood of occurrence within study site	Source		
		EPBC Act[1]	TSC Act[2]			DotE 2015	OEH 2015a	RBGDT 2011
Eucalyptus robertsonii subsp. *hemisphaerica*	Robertson's peppermint	V	V	Closed grassy woodland in locally sheltered sites; on lighter soils, often on granite or quartzite (DotE 2015c). In the Orange district it is limited to a few sheltered sites in gullies and on south-facing slopes in the northern Mullion Range (Bower, Semple and Harcombe 2002).	**Unlikely**. Although known to occur nearby (approximately 5 km north-west of the study site [OEH 2015a]), reconnaissance of the study site 17-18 June 2015 failed to detect this species.	✓	✓	
Euphrasia arguta	-	C E	C E	Eucalypt forest with a mixed grass and shrub understorey within Nundle State Forest. Also in open forest country around Bathurst in sub-humid places, on the grassy country near Bathurst or more generally, in grassy areas near rivers at elevations up to 700 m ASL, within an annual rainfall of 600 mm (DotE 2015d).	**Unlikely**. 'May' occur within the broader search area, but hasn't previously been recorded. The study site is likely too elevated (approximately 800 m ASL) for this species to occur.	✓		
Thesium australe	Austral toadflax	V	V	Shrubland, grassland or woodland, often on damp sites (DotE 2015e); often in association with kangaroo grass (*Themeda triandra*) (OEH 2013a).	**Potential**. 'May' occur within the broader search area, but hasn't previously been recorded. Species not detectable on the Tablelands during winter, so precautionary principle applied.	✓		
Swainsona sericea	silky swainson-pea	-	V	Natural temperate grassland and snow gum woodland on the Monaro plains; box-gum woodland in the Southern Tablelands and South West Slopes (OEH 2013b).	**Potential**. Identifiable in spring in the Central West (OEH 2013b). Species not detectable during winter, so precautionary principle applied.		✓	

Notes: 1. EPBC Act = Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*; 2. TSC Act = NSW *Threatened Species Conservation Act 1995*.

5.3 Fauna

Searches of the EPBC Act Protected Matters database and the Atlas of NSW Wildlife database identified the potential occurrence of 22 threatened fauna species within a search area extending 10 km from the study site (Table 3). Of these species, 11 are listed under both the EPBC Act and TSC Act. The remaining 11 are listed under the TSC Act only. Ten of the fauna species identified from the search are listed as migratory under the EPBC Act.

Of those species identified within the broader search area, 18 threatened fauna species and an additional six migratory species have the potential to occur within the study site (Table 3), based on habitat assessments conducted 17-18 June 2015.

A total of 37 fauna species were detected in the study site during the field survey 17-18 June 2015. This comprised four frog species, five mammal species and 28 bird species (Appendix B). No threatened or migratory fauna species were detected in the study site during this time. However, a number of threatened species may utilise the study site on occasion.

Areas of the study site that provide fauna with opportunities for foraging and nesting are represented by:

- native grassland and pasture
- short heath / open scrub
- Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest
- open woodland remnants and regrowth derived from Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest
- Yellow Box – Blakely's Red Gum grassy woodland
- riparian corridor
- constructed dams.

Table 3 Threatened and migratory fauna species, or their habitat, identified from the search area (within 10 km of the study site)

Scientific name	Common name	Status		Preferred habitat	Likelihood of occurrence in the study site	Source	
		EPBC Act[1]	TSC Act[2]			DotE 2015a	OEH 2015a
Amphibians							
Litoria booroolongensis	Booroolong frog	E	E	On or under boulders and debris in and beside the rocky beds of mountain streams (Cogger 2014).	**Unlikely**. 'May' occur within the broader search area, but hasn't previously been recorded. No mountain streams detected within the study site.	✓	
Birds							
Anthochaera phrygia	Regent honeyeater	E	E	Ironbark forest; also forests and woodlands of box, yellow gum, swamp mahogany and river oak (Morcombe 2003).	**Potential**. 'Likely' to occur within the broader search area, but hasn't previously been recorded. Box woodlands occur within the study site on lots 21 and 24.	✓	
Apus pacificus	Fork-tailed swift	Mi		Low to very high airspace over varied habitat, rainforest to semi-desert, most active just ahead of summer storm fronts (Morcombe 2003).	**Unlikely**. Species or species habitat 'likely' to occur within the broader search area, but hasn't previously been recorded. Unlikely to utilise ground resources of the study site.	✓	
Ardea alba / modesta	Great egret	Mi		Wetlands, flooded pastures, dams, estuarine mudflats, mangroves and reefs (Morcombe 2003). Nests in colonies located in wooded and shrubby swamps including mangrove forests, melaleuca swamps and mixed eucalypt / acacia / lignum swamps (DotE 2015f).	**Potential**. 'Known' to occur within the broader search area.	✓	✓

Scientific name	Common name	Status		Preferred habitat	Likelihood of occurrence in the study site	Source	
		EPBC Act[1]	TSC Act[2]			DotE 2015a	OEH 2015a
Ardea ibis	Cattle egret	Mi		Moist pastures with tall grass; shallow open wetlands and margins, mudflats (Morcombe 2003). Avoids short grass (DotE 2015g).	**Potential**. Farm dams provide potential habitat within the study site.	✓	
Chthonicola sagittata	Speckled warbler		V	Open eucalypt woodlands with rocky gullies, ridges, tussocky grass, sparse shrubbery (Morcombe 2003).	**Potential**. Areas of tussock (*Poa labillardierei* var. *labillardierei*) and sifton bush (*Cassinia arcuata*) provide potential habitat within the study site.		✓
Climacteris picumnus victoriae	Brown treecreeper – eastern subspecies		V	Eucalypt forests and woodlands, scrubs of the drier areas, river-edge trees, timbered paddocks (Morcombe 2003).	**Potential**. Eucalypt forest, woodland, riparian corridor and timbered paddocks occur within the study site.		✓
Daphoenositta chrysoptera	Varied sittella		V	Eucalypt forest and woodland, mallee, farm trees, shelter belts, roadside trees, parks and gardens, with a preference for rough-barked trees.	**Potential**. Eucalypt forest and woodland, timbered paddocks and rough-barked (box and apple) trees occur within the study site.		✓
Gallinago hardwickii	Latham's snipe	Mi		Low vegetation around wetlands in shallows, sedges, reeds, heath, salt marsh, irrigated crops (Morcombe 2003).	**Potential**. Farm dams provide potential habitat within the study site.	✓	
Glossopsitta pusilla	Little lorikeet		V	Forest and woodland, favouring open country – trees along watercourses and paddock trees (Morcombe 2003).	**Potential**. Forest, woodland, open woodland / timbered paddocks and the riparian corridor of Summer Hill Creek provide potential habitat within the study site.		✓

Scientific name	Common name	Status		Preferred habitat	Likelihood of occurrence in the study site	Source	
		EPBC Act[1]	TSC Act[2]			DotE 2015a	OEH 2015a
Haliaeetus leucogaster	White-bellied sea-eagle	Mi		Usually coastal, over islands, reefs, headlands, beaches and bays, estuaries, mangroves, seasonally flooded inland swamps, lagoons and floodplains; often far inland on large pools of major rivers (Morcombe 2003).	**Unlikely**. Species or species habitat 'likely' to occur within the broader search area, but hasn't previously been recorded. Preferred habitat not evident within the study site.	✓	
Hieraaetus morphnoides	Little eagle		V	Hilly country, where it often soars on the updrafts generated by wind deflected up the slopes. Forests, woodlands, open scrublands, tree-lined watercourses of the interior (Morcombe 2003).	**Potential**. Rolling rises (Appendix 3), forest, woodland and the riparian corridor of Summer Hill Creek provide potential habitat within the study site.		✓
Hirundapus caudacutus	White-throated needletail	Mi		High open spaces of sky above almost any habitat, including oceans (Morcombe 2003).	**Unlikely**. Species or species habitat 'likely' to occur within the broader search area, but hasn't previously been recorded. High open spaces are considered to be outside the study site.	✓	
Lathamus discolor	Swift parrot	E	E	Forests and woodlands with flowering trees (Morcombe 2003).	**Potential**. Forest and woodland vegetation occurs within the study site (Figure 5) and represents potential habitat for the swift parrot.	✓	✓
Leipoa ocellata	Malleefowl	V	E	Dry inland scrubs, chiefly mallee country (Cayley 2011).	**Unlikely**. Species or species habitat 'likely' to occur within the broader search area, but hasn't previously been recorded. Preferred habitat not evident within the study site.	✓	

Scientific name	Common name	Status		Preferred habitat	Likelihood of occurrence in the study site	Source	
		EPBC Act[1]	TSC Act[2]			DotE 2015a	OEH 2015a
Merops ornatus	Rainbow bee-eater	Mi		Open country of woodlands, open forest, semi-arid scrub, grasslands, clearings in heavier forests, farmlands (Morcombe 2003).	**Potential**. Open woodland, forest and grasslands of the study site provide potential habitat for the rainbow bee-eater.	✓	
Myiagra cyanoleuca	Satin flycatcher	Mi		Forests and woodlands, mangroves, coastal heath scrubs; in breeding season favours dense, wet gullies of heavy eucalypt forests (Morcombe 2003).	**Potential**. Forest and woodland of the study site provide potential habitat for the satin flycatcher.	✓	
Ninox connivens	Barking owl		V	Open country with stands of trees, tree-lined watercourses and paperbark swamps (Morcombe 2003).	**Potential**. Forest, woodland and adjoining grassland of the study site provides potential hunting habitat for the barking owl; although this species is unlikely to breed within the study site due to lack of large hollows.		✓
Ninox strenu	Powerful owl		V	Eucalypt forest, preferring tall wet forest or ranges where the territories centre on densely vegetated gullies; also in lower or drier forest that holds both prey and large hollows (Morcombe 2003).	**Unlikely**. Although known to occur in the broader search area, preferred habitat is unlikely to occur within the study site and was not encountered during field surveys 17-18 June 2015.		✓
Petroica boodang	Scarlet robin		V	Forest, woodland, suburbs; heavier forest in spring to summer breeding months (Morcombe 2003).	**Potential**. Forest and woodland of the study site provide potential habitat for the scarlet robin.		✓
Petroica phoenicea	Flame robin		V	Rainforest, wet eucalypt forest and woodland; wintering in open woodland and farmland (Morcombe 2003).	**Potential**. Woodland, including open woodland, of the study site provides potential habitat for the flame robin.		✓

Scientific name	Common name	Status		Preferred habitat	Likelihood of occurrence in the study site	Source	
		EPBC Act[1]	TSC Act[2]			DotE 2015a	OEH 2015a
Polytelis swainsonii	Superb parrot	V	V	River red gum, box and similar forests, river-edge forest, nearby mallee, native cypress, farmlands (Morcombe 2003).	**Potential**. Forest, woodland, open scrub and grasslands of the study site provide potential foraging habitat for the superb parrot.	✓	✓
Rhipidura rufifrons	Rufous fantail	Mi		Wet sclerophyll forests, often in gullies with dense shrubby understorey, including ferns. Also in drier sclerophyll forests and woodlands with a shrubby or heath understorey (DotE 2015h).	**Potential**. Forest and woodland remnants of the study site provide potential habitat for the rufous fantail.	✓	
Rostratula australis	Australian painted snipe	E, Mi	E	Shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans (DotE 2015i).	**Potential**. Farm dams of the study site provide potential transient habitat for the Australian painted snipe.	✓	
Stagonopleura guttata	Diamond firetail		V	Grassy groundcover underneath open forest, woodland, mallee, acacia shrub and timber belts along watercourses and roadsides (Morcombe 2003).	**Potential**. Grassy groundcover of forest and woodland in areas adjoining Summer Hill Creek provide potential habitat for the diamond firetail within the study site.		✓
Mammals							
Dasyurus maculatus	Spotted-tailed quoll	E	V	Rainforest, open forest, woodland, coastal heathland and inland riparian forest; den sites have been recorded in caves, rock crevices and hollow logs (Strahan 1995).	**Potential**. Recorded approximately 2 km east of the study site in 1989, and from approximately 3 km north of the study site in 2006 (OEH 2015a).	✓	✓
Chalinolobus dwyeri	Large-eared pied bat	V	V	Dry sclerophyll forests and woodlands; also sub-alpine woodland, the edge of rainforest, wet sclerophyll forest, *Callitris*-	**Potential**. May utilise the study site for foraging, although unlikely to roost within the study site.	✓	✓

Scientific name	Common name	Status		Preferred habitat	Likelihood of occurrence in the study site	Source	
		EPBC Act[1]	TSC Act[2]			DotE 2015a	OEH 2015a
				dominated forest and sandstone outcrop country; roosting in caves, crevices in cliffs and mines (Churchill 2008).			
Miniopterus schreibersii oceanensis	Eastern bentwing-bat		V	Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, melaleuca forests and open grassland; roosting in caves but also man-made constructions such as abandoned mines and road culverts (Churchill 2008).	**Potential**. May utilise the study site for foraging, although unlikely to roost within the study site.		✓
Phascolarctos cinereus	Koala	V	V	West of the Great Dividing Range the koala follows river red gum (*Eucalyptus camaldulensis*) forests that skirt the mosaic of rivers and watercourses (Strahan 1995). Also melaleuca, casuarina and eucalyptus woodland.	**Unlikely**. Although recorded approximately 5 km north of the study site in 2012 (OEH 2015a), SEPP 44 preferred koala feed tree species (Section 3.3) were not detected during the site visit 17-18 June 2015, nor was any sign of koala detected.	✓	✓
Pteropus poliocephalus	Grey-headed flying-fox	V	V	Usually roost near water in stands of native vegetation such as mangrove, rainforest, melaleuca or casuarina (Churchill 2008). Usually commutes within 15 km to feed on various flowering and fruiting plants, feeding extensively on the blossoms of eucalypts, angophoras, tea-trees and banksias (Strahan 1995).	**Potential**. Although unlikely to roost within the study site, the species may forage within the study site on occasion.	✓	

Scientific name	Common name	Status		Preferred habitat	Likelihood of occurrence in the study site	Source	
		EPBC Act[1]	TSC Act[2]			DotE 2015a	OEH 2015a
Reptiles							
Aprasia parapulchella	Pink-tailed worm-lizard	V	V	Found under weathered granite rocks and logs in (mostly) native grasslands (Cogger 2014).	**Potential**. 'May' occur within the broader search area, but not previously recorded.	✓	

Notes:

1. EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*; 2. TSC Act = *Threatened Species Conservation Act 1995.*

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5.4 Biodiversity

The Terrestrial Biodiversity Map (Figure 6) of the Cabonne LEP identifies areas of the LGA important for maintaining biodiversity by:

- protecting native fauna and flora
- protecting the ecological processes necessary for their continued existence, and
- encouraging the conservation and recovery of native fauna and flora and their habitats.

Land identified as "Biodiversity" on the Terrestrial Biodiversity Map includes woodland and forest occurring on proposed lots 20, 21, 24-27 and 29-33 (Figure 6).

In accordance with Clause 6.3 (3) of the Cabonne LEP, any proposed development on land mapped as "biodiversity" needs to consider:

- whether the development is likely to have:
    - any adverse impact on the condition, ecological value and significance of the fauna and flora on the land
    - any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna
    - any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and
    - any adverse impact on the habitat elements providing connectivity on the land, and
- any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

The potential impacts to biodiversity and the measures to manage these impacts are addressed in Section 6 and Section 7, respectively.

E:\Projects\100228 Summer Hill Estate (DPM)\FIGURES\100228 R0 Existing Biodiversity Mapping 02.07.2016 TO Rev A

DPM ENVIROSCIENCES

EXISTING BIODIVERSITY MAPPING

Summer Hill Estate
Summer Hill Creek, New South Wales

FIGURE 6

Data Source:
Cabonne Local Environmental Plan (2012)

5.5 Bushfire assessment

The study site comprises mapped bushfire prone land (Figure 7) containing:

- Vegetation Category 1 – in this case forest and woodland
- Vegetation Category 2 – in this case short heath (open scrub) and grassland.

A bushfire hazard exists in all directions from the potential building envelopes on each proposed lot. APZs would be required in all directions, ranging from 10 m to 20 m (Table 4).

Building envelopes on Lots 20, 21, 22, 26, 28, 29, 31 and 33, following application of the minimum APZs, were determined to be low risk bushfire prone land (BAL-12.5, BAL-19 or BAL-29) (Table 4). For these lots, a BAL Risk Assessment Certificate could be sought from a suitably qualified consultant or Council for endorsement as complying development under the Codes SEPP (Section 3.3.2).

Building envelopes on Lots 24, 25, 27 and 30, following application of the minimum APZs, were determined to be high risk bushfire prone land (BAL-40) (Table 4). Development on these lots would not be endorsed as complying development under the Codes SEPP (Section 3.3.2), but would instead require the lodgement of a Development Application with Council.

Vegetation clearing on lot 24 may be constrained by sensitive vegetation (a potential TEC and EEC), however an acceptable APZ and BAL-40 rating can be achieved without the need to clear vegetation beyond the building envelope (Table 4).

In general, a deemed-to-satisfy outcome could be achieved for lots 24, 25, 27 and 30 by applying the 'Performance Requirements' of the BCA and the 'Specific Objectives' of Planning for Bushfire Protection (NSW RFS 2006) for the type of building being constructed. Minor vegetation clearing on lots 27 and 30 could be undertaken to reduce the calculated BAL and allow more flexibility in using a broader range of building materials.

Bushfire risk can be adequately managed at each potential building envelope by establishing/maintaining the minimum APZ and constructing buildings in accordance with the BCA for the relevant BAL.

E:\Projects\100228 Summer Hill Estate (DPM)\FIGURES\100228 F7 Bushfire Prone Land 02 07 2015 TO Rev B

DPM ENVIROSCIENCES

Data Source:
Cabonne Council (2014)

BUSHFIRE PRONE LAND

Summer Hill Estate
Summer Hill Creek, New South Wales

FIGURE 7

Table 4 Asset protection zones (APZs) and bushfire attack level (BAL) for potential building envelopes within the study site

Proposed lot number	Compass direction	Vegetation type*	Existing separation distance (m)	Effective slope relative to hazard^	Fire Danger Index	Minimum APZ required (m)#	Vegetation clearing required for APZ	BAL (following establishment of APZ)
20	N	Short heath / open scrub	27	2° downslope	80	10	Within building envelope	BAL-19
	E	Short heath / open scrub	150	4° upslope		10	No	BAL-12.5
	S	Woodland	43	2° upslope		10	No	BAL-12.5
	W	Short heath / open scrub	85	7° downslope		10	No	BAL-12.5
21	N	Forest	60	1° upslope	80	20	No	BAL-12.5
	E	Forest	43	3° upslope		20	No	BAL-12.5
	S	Short heath / open scrub	22	1° downslope		10	No	BAL-19
	W	Woodland	65	4° downslope		15	No	BAL-12.5
22	N	Woodland	115	1° downslope	80	15	No	BAL-12.5
	E	Woodland	20	8° upslope		10	No	BAL-19
	S	Woodland	27	1° downslope		15	No	BAL-19
	W	Woodland	70	5° downslope		15	No	BAL-12.5
24	N	Woodland	25	0°	80	10	Within building envelope	BAL-19
	E	Woodland	18	2° downslope		15	No	BAL-29
	S	Woodland	11	0°		10	No	BAL-40
	W	Woodland	30	1° downslope		15	No	BAL-19
25	N	Woodland	45	2° upslope	80	10	No	BAL-12.5
	E	Woodland	10	7° upslope		10	Yes	BAL-40
	S	Forest	27	2° downslope		20	No	BAL-29
	W	Forest	3	9° downslope		20	Yes	BAL-40
26	N	Woodland	140	1° downslope	80	15	No	BAL-12.5

Proposed lot number	Compass direction	Vegetation type*	Existing separation distance (m)	Effective slope relative to hazard^	Fire Danger Index	Minimum APZ required (m)#	Vegetation clearing required for APZ	BAL (following establishment of APZ)
	E	Forest	130	3° downslope		20	No	BAL-12.5
	S	Woodland	47	2° upslope		10	No	BAL-12.5
	W	Woodland	34	5° upslope		10	No	BAL-19
27	N	Woodland	2	5° downslope	80	15	Yes	BAL-40
	E	Woodland	2	6° upslope		10	Yes	BAL-40
	S	Woodland	24	5° upslope		10	No	BAL-19
	W	Woodland	0	2° upslope		10	Yes	BAL-40
28	N	Woodland	140	1° downslope	80	15	No	BAL-12.5
	E	Woodland	65	6° upslope		10	No	BAL-12.5
	S	Short heath / scrub	49	1° downslope		10	No	BAL-12.5
	W	Short heath / scrub	105	5° downslope		10	No	BAL-12.5
29	N	Woodland	28	1° downslope	80	15	No	BAL-19
	E	Woodland	39	4° upslope		10	No	BAL-12.5
	S	Woodland	25	3° upslope		10	No	BAL-19
	W	Woodland	32	1° upslope		10	No	BAL-12.5
30 – Option 1 (lower lying option)	N	Woodland	25	1° downslope	80	15	No	BAL-19
	E	Forest	5	7° upslope		20	Yes (APZ of 21-<31m enables BAL-29; APZ of 31-<42m enables BAL-19).	BAL-40
	S	Woodland	30	2° upslope		10	No	BAL-12.5
	W	Woodland	75	0°		10	No	BAL-12.5
30 – Option 2	N	Woodland	20	0°	80	10	No	BAL-19

Proposed lot number	Compass direction	Vegetation type*	Existing separation distance (m)	Effective slope relative to hazard^	Fire Danger Index	Minimum APZ required (m)#	Vegetation clearing required for APZ	BAL (following establishment of APZ)
(Elevated option)	E	Forest	11	7° upslope		20	Yes	BAL-40
	S	Woodland	25	1° upslope		10	No	BAL-19
	W	Forest	0	2° Downslope		20	Yes	BAL-40
31	N	Woodland	37	2° upslope	80	10	No	BAL-12.5
	E	Forest	38	9° upslope		20	No	BAL-19
	S	Woodland	92	2° upslope		10	No	BAL-12.5
	W	Woodland	32	5° downslope		15	No	BAL-19
33	N	Woodland	48	3° downslope	80	15	No	BAL-12.5
	E	Woodland	85	4° downslope		15	No	BAL-12.5
	S	Woodland	120	2° downslope		15	No	BAL-12.5
	W	Woodland	56	4° upslope		10	No	BAL-12.5

Notes:

* Vegetation type as per Keith (2004). Where a mix of vegetation types occur within 140 m, the vegetation type providing the greater bushfire hazard was used as per NSW RFS (2012).

^ The slope is determined relative to the location of the hazard. For the purposes of this assessment upslope vegetation incurs 0° (flat) rating as per NSW RFS (2012).

In accordance with NSW RFS (2006), the indicated APZs are based upon the need to conform to Level 3 construction (AS 3959 – 1999) for a building of Class 1 or 2 under the Building Code of Australia (2010). If it is intended to construct to a lower bushfire protection standard (e.g. Level 1 or 2) or to no specific bushfire protection standards, Appendix 3 of NSW RFS (2006) should be consulted for the appropriate setbacks for individual circumstances. Grasslands of 100 m from any boundary or buildings do not require construction requirements in conformity with AS 3959 – 2009 or NSW RFS (2006), but require an APZ of 10 m for slopes <18°.

6 POTENTIAL IMPACTS

6.1 Flora

6.1.1 Vegetation removal

Development of the proposed Summer Hill Estate would involve vegetation clearing, earthworks, additional fencing, construction of buildings and access roads. The approximate extent of areas impacted include:

- 0.61 ha of the PCT identified as 'Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion', representing approximately 3.6% of this PCT in the study site (16.71 ha total)
- 0.02 ha of the PCT identified as 'Yellow Box – Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion', representing approximately 0.6% of this PCT in the study site (3.44 ha total)
- 2.55 ha of grassland dominated by native species including kangaroo grass (*Themeda triandra*) and wallaby grass (*Rytidosperma sp.*)
- 30 planted conifers along the existing property access way.

The expected clearing of native vegetation is considered minor in terms of vegetation loss, considering the extent of vegetation remaining within the study site.

6.1.2 Threatened species

No threatened flora species (listed under either the EPBC Act or TSC Act) were detected within the study site. However, seasonal conditions were not appropriate for the detection of two of these species: Austral toadflax (*Thesium australe*) and silky swainson-pea (*Swainsona sericea*). As the study site provides potential habitat for these species, the precautionary principle must be applied in assuming their presence until targeted survey can be undertaken in more favourable conditions (ie spring / summer).

6.1.3 Threatened ecological communities

The study site contains approximately 3.44 ha of 'Yellow Box – Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion'. Parts of this PCT may include the Critically Endangered TEC (EPBC Act) identified as the 'White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland' or the Critically Endangered EEC (TSC Act) identified as the 'White Box Yellow Box Blakely's Red Gum Woodland' (Section 5.1.2).

The precautionary principle has been applied in assuming that the entire PCT is both an EEC and a TEC. The refinement of this PCT and delineation of any EEC and / or TEC is subject to more detailed assessment, which would be undertaken if the final building envelopes, APZs, fences or property access tracks intersect the PCT (Figure 5). It is noted, however, that Section 5.4 demonstrates that building envelopes could be established on lots 21 and 24 without the need to clear this PCT. Furthermore, potential realignment of the access road into Lot 25 from the southern to the northern side of Lot 24 could eliminate the need to clear this PCT between lots 21 and 24.

Where the clearing of the PCT mapped as Yellow Box – Blakely's Red Gum grassy woodland cannot be avoided, additional survey / vegetation mapping should be undertaken to refine the PCT mapping and delineate any EEC or TEC (Section 5.1.2) within this area. The development (e.g. access road) should be designed to avoid any EEC or TEC. Where an EEC or TEC cannot be avoided, an Assessment of Significance should be undertaken in accordance with section 5A

the EP&A Act and / or the EPBC Act to determine whether it is appropriate for the clearing to proceed.

6.2 Fauna

6.2.1 Habitat loss

Vegetation removal is discussed in Section 6.1.1. A small number of trees bearing small hollows were recorded within the study site. No large hollows (>20 cm) were detected. Considering the limited removal of woodland and forest required, and the extent of similar vegetation in the study site and surrounds, impacts are considered to be minor.

The removal of grassland dominated by native species would reduce foraging opportunities for fauna including macropods and seed-eating birds. However, considering the extent of similar vegetation in the study site and broader region, impacts are considered to be minor.

6.2.2 Connectivity and habitat fragmentation

The study site is unlikely to provide an essential role in connecting habits to sustain biodiversity in the broader region. A similar mosaic of forest, woodland, open scrub and cleared grassland vegetation occurs to the north, south and west of the study site. More intact forested areas occur on adjoining land to the east and beyond to the Mullion Range State Conservation Area (Figure 6). Notwithstanding, a number of fauna species are likely to reside within or transit the study site on occasion.

Vegetation clearing associated with the establishment of access roads, building pads, APZs and boundary fences is expected to be minimal (less than 5% of each vegetation community within the study site – Section 6.1.1) and is unlikely to substantially fragment fauna habitat either within the study site or the broader region.

The proposed subdivision of the study site would require additional fencing to identify property boundaries, restrict vehicle access and to keep livestock / pets contained. This has the potential to impede movement of ground-dwelling fauna between camps / nests / dens, watering points and foraging / hunting areas. Where practicable, the use of fauna-friendly inclusion fencing (ie that which allows native animals to pass through) may alleviate such impacts. This could include using plain wire on the top string of stock fences and avoiding the use of mesh wire or electric fencing (on at least the lower section) where practicable.

The riparian corridor of Summer Hill Creek on the western boundary of the study site provides moderate habitat for a diversity of fauna, particularly waterfowl, woodland birds and macropds. The proposed development is unlikely to fragment habitat available for wildlife along the banks of Summer Hill Creek. Conversely, changed land management practices, such as destocking and increased ownership of land, has the potential to improve vegetative structure and connectivity. For example, during the site visit 17-18 June 2015, swamp wallabies (*Wallabia bicolor*) were observed fumbling their way through dense infestations of blackberry (*Rubus anglocandicans*) along Summer Hill Creek. The removal of blackberry infestations, combined with assisted regeneration, has the potential to improve opportunities for fauna movement along Summer Hill Creek.

6.2.3 Threatened and migratory species

There is potential for impacts to the following threatened fauna species to occur as a result of the proposal (Table 3):

- Regent honeyeater (*Anthochaera phrygia*) – E, EPBC Act and TSC Act
- Speckled warbler *Chthonicola sagittata*) – V, TSC Act
- Brown treecreeper – eastern subspecies (*Climacteris picumnus victoriae*) – V, TSC Act

- Varied sittella (*Daphoenositta chrysoptera*) – V, TSC Act
- Little lorikeet (*Glossopsitta pusilla*) – V, TSC Act
- Little eagle (*Hieraaetus morphnoides*) – V, TSC Act
- Swift parrot (*Lathamus discolour*) – E, EPBC Act and TSC Act
- Barking owl (*Ninox connivens*) – V, TSC Act
- Scarlet robin (*Petroica boodang*) – V, TSC Act
- Flame robin (*Petroica phoenicea*) – V, TSC Act
- Superb parrot (*Polytelis swainsonii*) – V, EPBC Act and TSC Act
- Australian painted snipe (*Rostratula australis*) – E, EPBC Act and TSC Act
- Diamond firetail (*Stagonopleura guttata*) – V, TSC Act
- Spotted-tailed quoll (*Dasyurus maculatus*) – E, EPBC Act and V, TSC Act
- Large-eared pied bat (*Dasyurus maculatus*) – V, EPBC Act and TSC Act
- Eastern bentwing-bat (*Miniopterus schreibersii oceanensis*) – V, TSC Act
- Grey-headed flying-fox (*Pteropus poliocephalus*) – V, EPBC Act and TSC Act
- Pink-tailed worm-lizard (*Aprasia parapulchella*) – V, EPBC Act and TSC Act.

There is potential for the following migratory (EPBC Act) bird species to utilise the study site on occasion:

- Great egret (*Ardea alba / modesta*)
- Cattle egret (*Ardea ibis*)
- Latham's snipe (*Gallinago hardwickii*)
- Rainbow bee-eater (*Merops ornatus*)
- Satin flycatcher (*Myiagra cyanoleuca*)
- Rufous fantail (*Rhipidura rufifrons*).

Targeted searches for these threatened and migratory fauna species, including their breeding places, should be undertaken prior to site establishment and in conjunction with the targeted flora surveys (Section 6.1.2). Surveys should focus on areas subject to direct impacts by the proposed development (i.e. final building envelopes, APZs, fence lines and access roads). An Assessment of Significance can then be undertaken in accordance with section 5A of the EP&A Act and / or the EPBC Act to determine whether it is appropriate for the works to proceed.

7 MITIGATION MEASURES

In accordance with Clause 6.3 (4) of the Cabonne LEP, any new development must be designed, sited and managed to avoid significant adverse environmental impacts. If the impact cannot be reasonably avoided by adopting feasible alternatives, the development must be designed, sited and managed to minimise that impact. If the impact cannot be minimised, the development must be managed to mitigate that impact.

The following measures would assist in minimising biodiversity impacts as well as bushfire risk to potential dwellings in the study site.

7.1 Flora, fauna and biodiversity

- Targeted searches for threatened flora species, including austral toadflax (*Thesium australe*) and silky swainson-pea (*Swainsona sericea*) should be undertaken in spring / summer to maximise detection of threatened flora species with the potential to occur in the study site. Surveys should at least focus on areas subject to direct impacts by the proposed development (i.e. final building envelopes, APZs, proposed fence lines and access roads).
- Targeted searches for threatened and migratory fauna species and their breeding places, including the 18 threatened fauna species and additional six migratory species identified in Table 3, should be undertaken in conjunction with the targeted flora surveys. Surveys should focus on areas subject to direct impacts by the proposed development (i.e. final building envelopes, APZs, proposed fence lines and access roads).
- Where any clearing of the PCT mapped as Yellow Box – Blakely's Red Gum grassy woodland is proposed to be undertaken, additional survey / vegetation mapping should be undertaken to refine the PCT mapping and delineate any EEC or TEC (Section 5.1.2) occurring within this area. Where an EEC or TEC cannot be avoided, an Assessment of Significance should be undertaken in accordance with the EP&A Act and / or EPBC Act to determine whether it is appropriate for the clearing to proceed.
- Final building envelopes, APZs and access roads should be constructed to minimise the clearing of forest and woodland PCTs identified in Figure 5. The PCT mapping conducted for this scope (Figure 5) is more refined than the broad-scale Terrestrial Biodiversity Mapping for the broader Cabonne LGA (Figure 6) and should be referenced for this purpose.
- Where practicable, infrastructure should be located away from the riparian zone of Summer Hill Creek. Specifically, infrastructure should be positioned at least 40 m beyond the top of the bank.
- The proponent should consider realigning the Lot 25 access road to the northern side of Lot 24. This would avoid the need to construct an access road near the bank of Summer Hill Creek, is expected to facilitate all-weather access to Lot 25, and could eliminate the need to clear potential EEC and TEC vegetation between lots 21 and 24.

7.2 Bushfire considerations

The entire study site is considered to be bushfire prone (Section 4.5.4). Development of potential building envelopes on lots 24, 25, 27 and 30 would require lodgement of a Development Application with Council for detailed consideration of bushfire risk and mitigation measures. In general, a deemed-to-satisfy outcome could be achieved for these lots by applying the 'Performance Requirements' of the BCA and the 'Specific Objectives' of Planning for Bushfire Protection (NSW RFS 2006) for the type of building being constructed. Minor

vegetation clearing on lots 27 and 30 could be undertaken to reduce the calculated BAL and allow more flexibility in using a broader range of building materials.

Development of potential building envelopes on lots 20, 21, 22, 26, 28, 29, 31 and 33 can be undertaken in the proposed R5 (large lot residential) zone provided that the development standards in the Rural Housing Code (a component of the Codes SEPP) can be met. These development standards are:

1. the development conforms to the specifications and requirements of the following that are relevant to the development:
    i. Planning for Bush Fire Protection (NSW RFS 2006)
    ii. Addendum: Appendix 3 (NSW RFS 2010) to Planning for Bush Fire Protection
    iii. if another document is prescribed by the regulations for the purposes of section 79BA of the EP&A Act, that document
2. the part of the lot on which the development is to be carried out and any associated access ways is not BAL-40 or the flame zone (BAL-FZ)
3. the lot has direct access to a public road or a road vested in or maintained by the council
4. the development is located within 200 m of that road
5. there is sufficient access designed in accordance with the acceptable solutions identified in clause 4.1.3 (2) of Planning for Bush Fire Protection (NSW RFS 2006), including:
    i. at least one alternative property access road is provided for individual dwellings (or groups of dwellings) that are located more than 200 m from a public through road
    ii. roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood)
    iii. a minimum carriageway width of 4 m to enable safe access for vehicles
    iv. where property access roads pass through forest or woodland (Figure 5), a trafficable width of 6 m (and 20 m long) is provided every 200 m to facilitate vehicle passing
    v. a minimum vertical clearance of 4 m to any overhanging obstructions, including tree branches
    vi. internal roads to dwellings provide a loop around the dwelling or incorporate a turning circle with a minimum 12 m outer radius
    vii. curves have a minimum inner radius of 6 m and are minimal in number to allow for rapid access and egress
    viii. the minimum distance between inner and outer curves is 6 m
    ix. the crossfall is not more than 10°
    x. maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads
    xi. access to a development comprising more than three dwellings have formalised access by dedication of a road and not by right of way
6. a 20,000 L water supply with 65 mm metal Storz outlet with a gate or ball valve is provided for firefighting purposes on the lot (the gate or ball valve, pipes and tank penetrations are to be designed to allow for a full 50 mm inner diameter water flow through the Storz fitting and must be of metal construction)
7. bottled (or reticulated) gas on the lot is installed and maintained in accordance with AS/NZS 1596:2008: The storage and handling of LPG and the requirements of relevant authorities (metal piping must be used)

8. all fixed gas cylinders on the lot are located at least 10 m from flammable materials and are enclosed on the hazard side of the installation
9. any gas cylinders on the lot that are within 10 m of a dwelling:
    i. have the release valves directed away from the dwelling
    ii. have metal connections to and from the cylinders
10. there are no polymer sheathed flexible gas supply lines to gas meters adjacent to the dwelling.

The requirements of AS 3959–2009: Construction of buildings in bushfire-prone areas set out in the BCA also apply.

8 CONCLUSION AND RECOMMENDATIONS

Development of the proposed Summer Hill Estate would involve vegetation clearing, earthworks, construction of buildings, access roads and additional fencing. This would result in the loss of varying vegetation types including forest, woodland, open scrub and grassland. However, both the natural and rural values are key features of the study site that will be retained and promoted as part of any future development. As such, the development would aim to minimise disturbance to both the natural and rural amenity of the study site.

The approximate extent of vegetation to be removed includes 0.61 ha of both mature and regrowth forest, 0.02 ha of woodland, 2.55 ha of grassland and approximately 30 planted conifers. This clearing is minor in terms of overall vegetation loss, considering the extent of vegetation remaining within the study site and broader locale, including the nearby Mullion State Conservation Area. The study site does however contain woodland remnants of the Yellow Box – Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion PCT. Parts of this PCT may include the Critically Endangered TEC (EPBC Act) identified as the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland or the Critically Endangered EEC (TSC Act) identified as the White Box Yellow Box Blakely's Red Gum Woodland. The precautionary principle has been applied in assuming that this PCT is both an EEC and a TEC. The refinement of this PCT and delineation of any EEC and / or TEC is subject to more detailed assessment, which should be undertaken if any proposed clearing (such as for final building envelopes, APZs, property access tracks or fences) intersects this PCT. It is noted, however, that building envelopes could be established on each lot without the need to clear this PCT. Potential realignment of the access road into Lot 25 from the southern to the northern side of Lot 24 would eliminate the need to clear this PCT between lots 21 and 24. Furthermore, access tracks to individual building envelopes could avoid this PCT. Where an EEC or TEC cannot be avoided, an Assessment of Significance should be undertaken in accordance with section 5A the EP&A Act and / or the EPBC Act to determine whether it is appropriate for the clearing to proceed.

Considering the limited removal of woodland and forest required, and the extent of similar vegetation in the study site and surrounds, impacts to resident and transient fauna of the study site are likely to be minor. The removal of grassland dominated by native species would reduce foraging opportunities for fauna including macropods and seed-eating birds. However, considering the extent of similar vegetation in the study site and broader region, impacts are considered to be minor.

Vegetation clearing associated with the establishment of access roads, building pads, APZs and boundary fences is expected to be minimal (less than 5% of each vegetation community within the study site) and is unlikely to substantially fragment fauna habitat either within the study site or the broader region.

The proposed subdivision of the study site would require additional fencing to identify property boundaries, restrict vehicle access and to keep animals contained. This has the potential to impact fauna movement across the study site. Where practicable, the use of fauna-friendly fencing may alleviate impacts on fauna movement. This could include using plain wire on at least the top wire and avoiding the use of mesh wire or electric fencing on the lower section.

No threatened flora species (listed under either the EPBC Act or TSC Act) were detected within the study site. However, seasonal conditions were not appropriate for the detection of two of these species: Austral toadflax (*Thesium australe*) and silky swainson-pea (*Swainsona sericea*). As the study site provides potential habitat for these species, the precautionary principle must be applied in assuming their presence until targeted survey can be undertaken in more favourable conditions (ie spring / summer).

The study site provides potential habitat for 18 threatened fauna species and an additional six migratory species. Potential impacts on these fauna species are largely associated with habitat reduction, as well as direct impacts to breeding places or to less mobile species such as the pink-tailed worm lizard (*Aprasia parapulchella*). Although potential impacts are unlikely to be significant, due process needs to be followed to obtain sufficient survey data to inform an Assessment of Significance under section 5A of the EP&A Act and / or the EPBC Act to determine whether it is appropriate for the proposal to proceed. Additional survey effort should be undertaken for these species, including their breeding places, in conjunction with the targeted flora surveys in spring / summer. Surveys should focus on areas subject to direct impacts by the proposed development (i.e. final building envelopes, APZs and access roads).

A bushfire hazard exists in all directions from the potential building envelopes on each proposed lot. Asset protection zones would be required in all directions, ranging from 10 m to 20 m. Building envelopes on Lots 20, 21, 22, 26, 28, 29, 31 and 33, following application of the minimum APZs, were determined to be low risk bushfire prone land (BAL-12.5, BAL-19 or BAL-29) (Table 4). For these lots, a BAL Risk Assessment Certificate could be sought from a suitably qualified consultant or Council for endorsement as complying development under the Codes SEPP (Section 3.3.2).

Building envelopes on Lots 24, 25, 27 and 30, following application of the minimum APZs, were determined to be high risk bushfire prone land (BAL-40). Development on these lots would require lodgement of a Development Application with Council. Vegetation clearing on lot 24 may be constrained by sensitive vegetation (a potential TEC and EEC), however an acceptable APZ and BAL-40 rating can be achieved without the need to clear vegetation beyond the building envelope.

In general, a deemed-to-satisfy outcome could be achieved for lots 24, 25, 27 and 30 by applying the 'Performance Requirements' of the BCA and the 'Specific Objectives' of Planning for Bushfire Protection (NSW RFS 2006) for the type of building being constructed. Minor vegetation clearing on lots 27 and 30 could be undertaken to reduce the calculated BAL and allow more flexibility in using a broader range of building materials.

9 REFERENCES

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Appendix A: Flora species recorded during the field survey

Table 5 Flora species recorded during the field survey

Family Name	Scientific name	Common name	Form	Site and Cover (%)										
				1	2a	2b	2c	2d	2e	3	4a	4b	5	6
Native														
Apiaceae	*Daucus glochidiatus*	Native Carrot	forb								5		3	
	Hydrocotyle algida	Pennywort	forb								2		1	
	Hydrocotyle laxiflora	Stinking Pennywort	forb				10				1			
	Hydrocotyle tripartita	Pennywort	forb								2			
Asteraceae	*Cassinia arcuata*	Sifton Bush	shrub	15	15	45	20	8	20	15				20
	Euchiton spp.	A Cudweed	forb							5	5			
Crassulaceae	*Crassula sieberiana*	Australian Stonecrop	forb							2				
Cyperaceae	*Carex appressa*	Tall Sedge	rush								20		10	
	Cyperus exaltatus	Giant sedge	rush								1		1	
	Cyperus lhotskyanus		rush								3		1	
Dilleniaceae	*Hibbertia obtusifolia*	Hoary Guinea Flower	shrub		2					3				
Droseraceae	*Drosera peltata*	A Sundew	forb							1				
Ericaceae	*Brachyloma daphnoides*	Daphne Heath	shrub				5			3				
	Leucopogon muticus	Blunt Beard-heath	shrub							2				
	Melichrus erubescens	Ruby Urn Heath	shrub		2									
	Melichrus urceolatus	Urn Heath	shrub		2					4				
Fabaceae	*Daviesia leptophylla*		shrub		2									
	Hardenbergia violacea	False Sarsaparilla	vine		7	5								
	Hovea heterophylla		shrub		2									
	Acacia dealbata	Silver Wattle	tree			5	2	4	5	10				
Fumariaceae	*Fumaria sp.*	Fumitory	forb								2		2	
Geraniaceae	*Geranium solanderi*	Native Geranium	forb			2				5				
Haloragaceae	*Gonocarpus spp.*	Raspwort	forb		1	5								
Juncaceae	*Juncus australis*	Rush	rush								30		2	
	Juncus usitatus		rush				2							
Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush	rush		2		15	7						

Family Name	Scientific name	Common name	Form	Site and Cover (%)										
				1	2a	2b	2c	2d	2e	3	4a	4b	5	6
	Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush	rush	5	2	5	5	3		3		2		
Myrtaceae	*Calytrix tetragona*	Common Fringe-myrtle	shrub		4									
	Eucalyptus bridgesiana	Apple Box	tree							5				
	Eucalyptus dives	Broad-leaved Peppermint	tree			30	5	30		5				
	Eucalyptus goniocalyx	Bundy	tree	10										
	Eucalyptus macrorhyncha	Red Stringybark	tree	5	10	10		5		20				5
	Eucalyptus mannifera subsp. mannifera	Brittle Gum	tree	60	45			30						30
	Eucalyptus melliodora	Yellow Box	tree				20							
	Eucalyptus rubida subsp. rubida	Candlebark	tree		5	15	5			25				5
Phormiaceae	*Dianella longifolia*	Blueberry Lily	rush	5	2		3							
Phyllanthaceae	*Phyllanthus hirtellus*	Thyme Spurge	shrub		3					2				
Poaceae	*Aristida vagans*	Threeawn Speargrass	grass							5				
	Cynodon dactylon	Common Couch	grass								5		7	
	Poa labillardierei var. labillardierei	Tussock	grass					5			10	10	15	
	Poa sieberiana	Snowgrass	grass			15	5	5		5	4	7	2	5
	Rytidosperma spp.	Wallaby Grass	grass	60	30	25	5	25		20	10	2		20
	Themeda triandra	Kangaroo Grass	grass					5		30	40	2		5
Polygonaceae	*Rumex brownii*	Swamp Dock	forb								2		1	
Pteridaceae	*Cheilanthes sieberi*	Rock Fern	fern					1		5	1			
Rutaceae	*Pomoideae sp.*	Pome tree	tree						2					
Exotic														
Asteraceae	*Gamochaeta spp.*		forb								5	5	5	
Asteraceae	*Hypochaeris radicata*	Catsear	forb								3	2	2	

Family Name	Scientific name	Common name	Form	Site and Cover (%)										
				1	2a	2b	2c	2d	2e	3	4a	4b	5	6
Asteraceae	*Onopordum acanthium subsp. acanthium*	Scotch Thistle	forb								3		1	
Asteraceae	*Soliva stolonifera*	Jo-jo	forb								2			
Asteraceae	*Taraxacum officinale*	Dandelion	forb				2				4	2	3	
Boraginaceae	*Echium plantagineum*	Patterson's Curse	forb								5		4	
Brassicaceae	*Capsella bursa-pastoris*	Shepherd's Purse	forb								2			
Fabaceae (Faboideae)	*Medicago arabica*	Spotted Burr Medic	forb								5		2	
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	forb								10		5	
Geraniaceae	*Geranium molle subsp. molle*	Cranesbill Geranium	forb								2		1	
Malvaceae	*Malva sp.*	Mallow	forb								2	2	3	
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	forb								5		3	
Poaceae	*Briza maxima*	Quaking Grass	grass			1								
Poaceae	*Festuca elatior*	Tall Fescue	grass								5		1	
Poaceae	*Phalaris aquatica*	Phalaris	grass								4			
Rosaceae	*Aphanes arvensis*	Parsley-piert	forb								3			
Rosaceae	*Rubus anglocandicans*	Blackberry	shrub				2		50	40	60	60	60	5
Salicaceae	*Salix fragilis var. fragilis*	Crack Willow	tree						30		8	20	5	
Scrophulariaceae	*Verbascum virgatum*	Twiggy Mullein	forb										4	

Appendix B: Fauna species recorded during the field survey

Table 6 Fauna species opportunistically recorded during the field survey

Scientific name	Common name	Native (N) / Introduced (I)
Amphibians		
Crinia signifera	Common Eastern Froglet	N
Limnodynastes tasmaniensis	Spotted Marsh Frog	N
Litoria peronii	Peron's Tree Frog	N
Litoria verreauxii	Verreaux's Frog	N
Mammals		
Lepus capensis	Brown Hare	I
Macropus giganteus	Eastern Grey Kangaroo	N
Oryctolagus cuniculus	Rabbit	I
Vulpes vulpes	Fox	I
Wallabia bicolor	Swamp Wallaby	N
Birds		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	N
Anas superciliosa	Pacific Black Duck	N
Calyptorhynchus funereus	Yellow-tailed Black-Cockatoo	N
Chenonetta jubata	Australian Wood Duck	N
Corvus coronoides	Australian Raven	N
Cracticus nigrogularis	Pied Butcherbird	N
Cracticus tibicen	Australian Magpie	N
Dacelo novaeguineae	Laughing Kookaburra	N
Eolophus roseicapillus	Galah	N
Fulica atra	Eurasian Coot	N
Gallinula tenebrosa	Dusky Moorhen	N
Grallina cyanoleuca	Magpie-lark	N
Haliastur sphenurus	Whistling Kite	N
Hirundo neoxena	Welcome Swallow	N
Lichenostomus penicillatus	White-plumed Honeyeater	N
Malurus cyaneus	Superb Fairy-wren	N
Manorina melanocephala	Noisy Miner	N
Melanodryas cucullata	Hooded Robin	N
Microeca fascinans	Jacky Winter	N
Neochmia temporalis	Red-browed Finch	N
Platycercus elegans	Crimson Rosella	N
Platycercus eximius	Eastern Rosella	N
Rhipidura leucophrys	Willie Wagtail	N
Smicrornis brevirostris	Weebill	N
Strepera graculina	Pied Currawong	N
Sturnus vulgaris	Common Starling	I
Tachybaptus novaehollandiae	Australasian Grebe	N
Turdus merula	Common Blackbird	I

Appendix C: Site Summaries – Flora and Fauna Habitat

Survey Code 1	
Location Lot 32, Proposed Summer Hill Estate	
Date 18/06/2015	
Latitude -33.191453	
Longitude 149.154160	
Photo direction East	
Assessed By DM	

General Site Description	
Landform	Rolling rises.
Soil	Light brown sandy loam.
Mapped Vegetation (BVT)	Scribbly Gum Woodland (OEH 2008).
Observed Vegetation (PCT)	Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion.
General Site Observations	Dominated by brittle gum (*Eucalyptus mannifera* subsp. *mannifera*), with frequent bundy (*E. goniocalyx*) and red stringybark (*E. macrorhyncha*). Trees form dominant stratum (about 70% cover); connectivity not isolated, semi-irregular patch; minor disturbance associated with grazing, stock watering dam and property access track. Mid stratum dominated by sifton bush (*Cassinia arcuata*) (about 15% cover). Ground layer dominated by Wallaby grass (*Rytidosperma* spp.), with occasional blueberry lily (*Dianella longifolia*), may-flowered mat-rush (*Lomandra multiflora* subsp. *multiflora*) and other natives.
Fauna Habitat Observations	
Shelter / Cover	Leaf/bark litter common, scattered grass/shrub shelter; no hollows detected; no logs detected; no rocks detected.
Food Potential Over Entire Year	Seeding grass cover common; nectar/pollen producing plants common, including eucalypts.
Signs	No koala, glider or possum scratches or scats detected; frogs calling, including common froglet (*Crinia signifera*). Common woodland birds consistent with those recorded across the broader site (Appendix B).
SEPP 44 Koala Feed Tree Species	None detected.
Health / Condition	Very good.
Notes	No erosion detected. Fire scars absent.

Survey Code 2a	
Location Lot 32, Proposed Summer Hill Estate	
Date 18/06/2015	
Latitude -33.191834	
Longitude 149.152989	
Photo direction East	
Assessed By DM	

General Site Description	
Landform	Rolling rises.
Soil	Light brown sandy loam.
Mapped Vegetation (BVT)	Stringybark – Box – Gum Woodland (OEH 2008).
Observed Vegetation (PCT)	Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion.
General Site Observations	Dominated by brittle gum (*Eucalyptus mannifera* subsp. *mannifera*), with frequent red stringybark (*E. macrorhyncha*) and candlebark (*E. rubida* subsp. *rubida*). Trees form dominant stratum (about 70% cover); connectivity not isolated, semi-irregular patch; minor disturbance associated with grazing. Diverse understorey dominated by open heath including ruby urn heath (*Melichrus erubescens*), urn heath (*M. urceolatus*), *Daviesia leptophylla*, false sarsaparilla (*Hardenbergia violacea*) and *Hovea heterophylla*. Ground layer dominated by Wallaby grass (*Rytidosperma* spp.), with occasional blueberry lily (*Dianella longifolia*), many-flowered mat-rush (*Lomandra multiflora* subsp. *multiflora*) and native forbs.
Fauna Habitat Observations	
Shelter / Cover	Leaf/bark litter common, grass/shrub shelter common; scattered small logs (10-50 cm); scattered small rocks (10-30 cm); no hollows detected.
Food Potential Over Entire Year	Seeding grass cover common; nectar/pollen producing plants common.
Signs	No koala, glider or possum scratches or scats detected. Common woodland birds consistent with those recorded across the broader site (Appendix B).
SEPP 44 Koala Feed Tree Species	None detected.
Health / Condition	Very good.
Notes	No erosion detected. Fire scars absent.

Survey Code 2b	
Location Lot 30, Proposed Summer Hill Estate	
Date 18/06/2015	
Latitude -33.190058	
Longitude 149.150897	
Photo direction West	
Assessed By DM	

General Site Description	
Landform	Rolling rises.
Soil	Brown sandy loam.
Mapped Vegetation (BVT)	Stringybark – Box – Gum Woodland (OEH 2008).
Observed Vegetation (PCT)	Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion.
General Site Observations	Dominated by broad-leaved peppermint (*Eucalyptus dives*), with frequent candlebark (*E. rubida* subsp. *rubida*) and red stringybark (*E. macrorhyncha*). Trees form dominant stratum (about 55% cover); connectivity not isolated, semi-irregular patch; minor disturbance associated with grazing. Sparse midstorey comprised of silver wattle (*Acacia dealbata*). Dense low-midstorey / understorey dominated by sifton bush (*Cassinia arcuata*). Ground layer dominated by Wallaby grass (*Rytidosperma* spp.), frequent snowgrass (*Poa sieberiana*) and occasional raspwort (*Gonocarpus* spp.), native geranium (*Geranium solanderi*), many-flowered mat-rush (*Lomandra multiflora* subsp. *multiflora*) and false sarsaparilla (Hardenbergia violacea).
Fauna Habitat Observations	
Shelter / Cover	Scattered large logs (>50 cm); small logs (10-50 cm) common; scattered rock outcrop; scattered small (10-30 cm) and large (>30 cm) rocks; scattered leaf litter, dense grass / shrub shelter common; no hollows detected.
Food Potential Over Entire Year	Seeding grass cover scattered; nectar / pollen producing plants common, including eucalypts.
Signs	No koala, glider or possum scratches or scats detected. Common woodland birds consistent with those recorded across the broader site (Appendix B).
SEPP 44 Koala Feed Tree Species	None detected.
Health / Condition	Very good.
Notes	Past timber cutting / pushing evident. No erosion detected. Fire scars absent.

Survey Code 2c	
Location Lot 24, Proposed Summer Hill Estate	
Date 18/06/2015	
Latitude -33.193785	
Longitude 149.147063	
Photo direction South	
Assessed By DM	

General Site Description	
Landform	Gently undulating rises.
Soil	Brown sandy loam.
Mapped Vegetation (BVT)	Stringybark – Box – Gum Woodland (OEH 2008).
Observed Vegetation (PCT)	Yellow Box – Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion.
General Site Observations	Dominated by yellow-box (*Eucalyptus melliodora*), broad-leaved peppermint (*E. dives*) and candlebark (*E. rubida* subsp. *rubida*), with apple box (E. *bridgesiana*) nearby. Trees form dominant stratum (about 50% cover); connectivity not isolated; semi-irregular patch; disturbance associated with grazing and weed ingression, including blackberry (*Rubus anglocandicans*) and dandelion (*Taraxacum officinale*). Scattered midstorey/understory dominated by sifton bush (*Cassinia arcuata*) and silver wattle (Acacia dealbata) saplings. Ground layer dominated by natives including wallaby grass (*Rytidosperma* spp.), snowgrass (*Poa sieberiana*), blueberry lily (*Dianella longifolia*), many-flowered mat-rush (*Lomandra multiflora* subsp. *multiflora*), wattle matt-rush (*L. filiformis*), Daphne heath (*Brachyloma daphnoides*), pennywort (*Hydrocotyle laxiflora*) and common rush (*Juncus usitatus*).
Fauna Habitat Observations	
Shelter / Cover	Scattered small logs (10-50 cm); scattered small rocks (10-30 cm); abundant leaf litter, scattered grass / shrub shelter; no hollows detected.
Food Potential Over Entire Year	Seeding grass cover scattered; nectar / pollen producing plants common, including eucalypts.
Signs	No koala, glider or possum scratches or scats detected. Common woodland birds consistent with those recorded across the broader site (Appendix B).
SEPP 44 Koala Feed Tree Species	None detected.
Health / Condition	Good.
Notes	**Potential TEC and EEC**.

Survey Code 2d	
Location Lot 24, Proposed Summer Hill Estate	
Date 18/06/2015	
Latitude -33.191778	
Longitude 149.145781	
Photo direction South	
Assessed By DM	

General Site Description	
Landform	Rolling rises.
Soil	Brown loam.
Mapped Vegetation (BVT)	Stringybark – Box – Gum Woodland (OEH 2008).
Observed Vegetation (PCT)	Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion.
General Site Observations	Dominated by brittle gum (*Eucalyptus mannifera* subsp. *mannifera*) and broad-leaved peppermint (*E. dives*), with frequent red stringybark (*E. macrorhyncha*) (about 75% cover); connectivity not isolated; semi-irregular patch; minor grazing disturbance. Sparse mid to lower stratum of silver wattle (*Acacia dealbata*) and sifton bush (*Cassinia arcuata*). Ground layer dominated by wallaby grass (*Rytidosperma* spp.) with frequent kangaroo grass (*Themeda triandra*), tussock (*Poa labillardierei* var. *labillardierei*), wattle matt-rush (Lomandra filiformis), many-flowered mat-rush (*L. multiflora* subsp. *multiflora*) and rock fern (*Cheilanthes sieberi*).
Fauna Habitat Observations	
Shelter / Cover	Scattered small hollows (<20 cm), mostly alive; scattered small logs (10-50 cm); granite outcrop common; scattered large rocks (>30 cm); small rocks (10-30 cm) common; leaf litter common; scattered shrub / grass shelter.
Food Potential Over Entire Year	Seeding grass cover scattered; nectar / pollen producing plants common, including eucalypts.
Signs	No koala, glider or possum scratches or scats detected. Common woodland birds consistent with those recorded across the broader site (Appendix B).
SEPP 44 Koala Feed Trees	None detected.
Health / Condition	Very good.
Notes	Grazed by sheep and cattle. No erosion detected. Fire scars absent.

Survey Code	
2h	
Location	
Lot 20, Proposed Summer Hill Estate	
Date	
18/06/2015	
Latitude	
-33.194757	
Longitude	
149.140405	
Photo direction	
West	
Assessed By	
DM	

General Site Description	
Landform	Gently undulating plain.
Soil	Brown sandy loam.
Mapped Vegetation (BVT)	Stringybark – Box – Gum Woodland (OEH 2008).
Observed Vegetation (PCT)	Non-remnant / non-native
General Site Observations	Weed infested riparian corridor amidst cleared grazing land. Dominated by *willow* spp. including crack willow (*Salix fragilis* var. *fragilis*). Dense understorey of blackberry (*Rubus anglocandicans*) with occasional natives including sifton bush (*Cassinia arcuata*) and silver wattle (*Acacia dealbata*).
Fauna Habitat Observations	
Shelter / Cover	Scattered small logs (10-50 cm); scattered small rocks (10-30 cm) common; scattered leaf litter; dense shrub / grass shelter abundant.
Food Potential Over Entire Year	Seeding shrubs scattered; fleshy fruiting plants abundant (in other times of the year), comprised of introduced blackberry and a single pome fruit tree.
Signs	No koala, glider or possum scratches or scats detected. Whistling tree frog (*Litoria verreauxii*) and clicking froglet (*Crinia signifera*) calling. Birds opportunistically observed included superb fairy-wren (*Malurus cyaneus*), willie wagtail (*Rhipidura leucophrys*), Pacific black duck (*Anas superciliosa*), Eurasian coot (*Fulica atra*) and common blackbird (*Turdus merula*).
SEPP 44 Koala Feed Trees	None detected.
Health / Condition	Degraded.
Notes	Grazed by sheep and cattle. No erosion detected. Fire scars absent.

Survey Code 3	
Location Lot 21, Proposed Summer Hill Estate	
Date 18/06/2015	
Latitude -33.194693	
Longitude 149.145670	
Photo direction West	
Assessed By DM	

General Site Description	
Landform	Rolling rises.
Soil	Light brown clay loam.
Mapped Vegetation (BVT)	Red stringybark – Blakely's Red Gum – Yellow Box Woodland (OEH 2008).
Observed Vegetation (PCT)	Yellow Box – Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion.
General Site Observations	Dominated by candlebark (*Eucalyptus rubida* subsp. *rubida*) and red stringybark (*E. macrorhyncha*), with occasional apple box (*E. bridgesiana*) and broad-leaved peppermint (about 50% cover); connectivity not isolated; semi-irregular patch; grazing disturbance; weed ingression (edge effects). Sparse mid to lower stratum of sifton bush (*Cassinia arcuata*), silver wattle (*Acacia dealbata*) and blackberry (*Rubus anglocandicans*). Ground layer dominated by a diversity of natives including wallaby grass (*Rytidosperma* spp.) and kangaroo grass (*Themeda triandra*), snowgrass (*Poa sieberiana*), three-awn speargrass (*Aristida vagans*), thyme spurge (*Phyllanthus hirtellus*), many-flowered mat-rush (*Lomandra multiflora* subsp. *multiflora*), native geranium (*Geranium solanderi*), urn heath (*Melichrus urceolatus*), blunt beard-heath (*Leucopogon muticus*), daphne heath (*Brachyloma daphnoides*), sundew (*Drosera peltata*), Australian stonecrop (*Crassula sieberiana*) and rock fern (*Cheilanthes sieberi*).
Fauna Habitat Observations	
Shelter / Cover	Granite outcrop scattered; scattered small rocks (10-30 cm); scattered small logs (10-50 cm); leaf litter common; dense shrub / grass shelter common; no hollows detected.
Food Potential Over Entire Year	Seeding grass and shrub cover common; fleshy fruiting plants scattered; nectar / pollen producing plants common.
Signs	No koala, glider or possum scratches or scats detected. Common woodland birds recorded across the broader site (Appendix B).
SEPP 44 Koala Feed Trees	None detected.
Health / Condition	Good.
Notes	**Potential TEC and EEC**. Grazed by sheep and cattle.

Survey Code	
4a	
Location	
Lot 20, Proposed Summer Hill Estate	
Date	
18/06/2015	
Latitude	
-33.195289	
Longitude	
149.143550	
Photo direction	
South	
Assessed By	
DM	

General Site Description	
Landform	Gently undulating plain.
Soil	Brown sandy loam.
Mapped Vegetation (BVT)	River Oak Riparian Woodland / Forest of the Slopes and Tablelands (OEH 2008).
Observed Vegetation (PCT)	Non-remnant.
General Site Observations	Weed infested riparian corridor amidst cleared grazing land. Dominated by *willow* spp. including crack willow (*Salix fragilis* var. *fragilis*). Dense monospecific shrub layer of blackberry (*Rubus anglocandicans*). Ground layer contained a mix of native and exotic species. At least 17 exotic species represented (Appendix A). Native species included kangaroo grass (*Themeda triandra*), wallaby grass (Rytidosperma sp.), tussock (*Poa labillardierei* var. *labillardierei*), snowgrass (Poa sieberiana), rush (*Juncus australis*), tall sedge (*Carex appressa*), giant sedge (*Cyperus exaltatus*), *Cyperus lhotskyanus*, native carrot (*Daucus glochidiatus*), pennyworts (*Hydrocotyle* spp.), cudweed (*Euchiton* spp.), fumitory (*Fumaria* sp.) and common couch (*Cynodon dactylon*).
Fauna Habitat Observations	
Shelter / Cover	Dense shrub / grass shelter abundant. Terrestrial habitat lacked fauna habitat features such as hollows, logs, rocks and leaf litter.
Food Potential Over Entire Year	Seeding grasses and rushes common; fleshy fruiting plants abundant (in other times of the year), comprising introduced blackberry.
Signs	No koala, glider or possum scratches or scats detected. Whistling tree frog (*Litoria verreauxii*), clicking froglet (*Crinia signifera*) calling. Birds opportunistically observed included superb fairy-wren (*Malurus cyaneus*), willie wagtail (*Rhipidura leucophrys*), Eurasian coot (*Fulica atra*) and common blackbird (*Turdus merula*). Mammals opportunistically observed included fox (Vulpes vulpes) and rabbit (*Oryctolagus cuniculus*).
SEPP 44 Koala Feed Trees	None detected.
Health / Condition	Degraded.
Notes	Grazed by sheep and cattle. No erosion detected. Fire scars absent.

Survey Code 4b	
Location Lot 20, Proposed Summer Hill Estate	
Date 18/06/2015	
Latitude -33.196207	
Longitude 149.140462	
Photo direction West	
Assessed By DM	

General Site Description	
Landform	Gently undulating plain.
Soil	Brown sandy loam.
Mapped Vegetation (BVT)	River Oak Riparian Woodland / Forest of the Slopes and Tablelands (OEH 2008).
Observed Vegetation (PCT)	Non-remnant.
General Site Observations	Weed infested riparian corridor amidst cleared grazing land. Dominated by *willow* spp. including crack willow (*Salix fragilis* var. *fragilis*). Dense monospecific shrub layer of blackberry (*Rubus anglocandicans*). Ground layer contained a mix of native and exotic species. Native species included tussock (*Poa labillardierei* var. *labillardierei*), snowgrass (*Poa sieberiana*), wallaby grass (*Rytidosperma* sp.) and kangaroo grass (*Themeda triandra*). Exotic ground layer species included *Gamochaeta* spp., catsear (*Hypochaeris radicata*), dandelion (*Taraxacum officinale*), and mallow (*Malva* sp.).
Fauna Habitat Observations	
Shelter / Cover	Dense shrub / grass shelter abundant. Terrestrial habitat lacked fauna habitat features such as hollows, logs, rocks and leaf litter.
Food Potential Over Entire Year	Seeding grasses scattered; fleshy fruiting plants abundant (in other times of the year), comprised of introduced blackberry.
Signs	No koala, glider or possum scratches or scats detected. Whistling tree frog (*Litoria verreauxii*) and clicking froglet (*Crinia signifera*) calling. Birds opportunistically observed included superb fairy-wren (*Malurus cyaneus*), Eurasian coot (*Fulica atra*), Pacific black duck (*Anas superciliosa*) and common blackbird (*Turdus merula*).
SEPP 44 Koala Feed Trees	None detected.
Health / Condition	Degraded.
Notes	Grazed by sheep and cattle. No erosion detected. Fire scars absent.

Survey Code 5	
Location Lot 20, Proposed Summer Hill Estate	
Date 18/06/2015	
Latitude -33.193752	
Longitude 149.140616	
Photo direction South	
Assessed By DM	

General Site Description	
Landform	Gently undulating plain.
Soil	Brown sandy loam.
Mapped Vegetation (BVT)	Wetlands (OEH 2008).
Observed Vegetation (PCT)	Non-remnant.
General Site Observations	Weed infested riparian corridor amidst cleared grazing land. Dominated by *willow* spp. including crack willow (*Salix fragilis* var. *fragilis*). Dense monospecific shrub layer of blackberry (*Rubus anglocandicans*). Ground layer contained a mix of native and exotic species. At least 14 exotic species represented (Appendix A). Native species included tall sedge (*Carex appressa*), tussock (*Poa labillardierei* var. *labillardierei*), snowgrass (Poa sieberiana), giant sedge (*Cyperus exaltatus*), *Cyperus lhotskyanus*, common couch (*Cynodon dactylon*), rush (*Juncus australis*), native carrot (*Daucus glochidiatus*), pennywort (*Hydrocotyle* sp.), fumitory (*Fumaria* sp.) and swamp dock (*Rumex brownii*).
Fauna Habitat Observations	
Shelter / Cover	Dense shrub / grass shelter abundant. Terrestrial habitat lacked fauna habitat features such as hollows, logs, rocks and leaf litter.
Food Potential Over Entire Year	Seeding grasses and rushes common; fleshy fruiting plants abundant (in other times of the year), comprising introduced blackberry.
Signs	No koala, glider or possum scratches or scats detected. Whistling tree frog (*Litoria verreauxii*) and clicking froglet (*Crinia signifera*) calling. Birds opportunistically observed included superb fairy-wren (*Malurus cyaneus*), willie wagtail (*Rhipidura leucophrys*) and common blackbird (*Turdus merula*). Mammals opportunistically observed included swamp wallaby (*Wallabia bicolor*) and rabbit (*Oryctolagus cuniculus*).
SEPP 44 Koala Feed Trees	None detected.
Health / Condition	Degraded.
Notes	Grazed by sheep and cattle. No erosion detected. Fire scars absent.

Survey Code 6	
Location Lot 26, Proposed Summer Hill Estate	
Date 18/06/2015	
Latitude -33.191185	
Longitude 149.147862	
Photo direction North	
Assessed By DM	

General Site Description	
Landform	Rolling rises.
Soil	Brown sandy loam.
Mapped Vegetation (BVT)	Non-remnant (OEH 2008).
Observed Vegetation (PCT)	Regrowth of Brittle Gum – Broad-leaved Peppermint – Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion. Conservatively mapped as such (Figure 5).
General Site Observations	Dominated by brittle gum (*Eucalyptus mannifera* subsp. *mannifera*), with frequent red stringybark (*E. macrorhyncha*) and candlebark (*E. rubida* subsp. *rubida*) (about 50% cover); connectivity not isolated; semi-irregular patch; high grazing disturbance. Sparse mid to lower stratum of sifton bush (*Cassinia arcuata*) and blackberry (*Rubus anglocandicans*). Ground layer dominated by wallaby grass (*Rytidosperma* spp.) with frequent kangaroo grass (*Themeda triandra*) and snow grass (*Poa sieberiana*).
Fauna Habitat Observations	
Shelter / Cover	Scattered shrub / grass shelter. Large rocks (>30 cm) scattered and small rocks (10-30 cm) common; leaf litter scattered; no hollows or logs detected.
Food Potential Over Entire Year	Seeding grasses common; fleshy fruiting plants scattered (in other times of the year), comprised of introduced blackberry; nectar / pollen producing plants common, including eucalypts.
Signs	No koala, glider or possum scratches or scats detected. Common woodland birds consistent with those recorded across the broader site (Appendix B). Australasian grebe (*Tachybaptus novaehollandiae*) pair utilising nearby dam.
SEPP 44 Koala Feed Trees	None detected.
Health / Condition	Average
Notes	Heavily grazed by sheep and moderately by cattle. No erosion detected. Fire scars absent.

Appendix C

ABORIGINAL HERITAGE ASSESSMENT

New South Wales Archaeology Pty Ltd ACN 106044366

Summer Hill Estate, NSW
Brief Summary of Aboriginal Heritage

Date: 28 July 2015
Author: Dr Julie Dibden
Proponent: Geolyse Pty Ltd
Local Government Area: Orange City Council

www.nswarchaeology.com.au

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INTRODUCTION

NSW Archaeology Pty Ltd has been engaged by Geolyse Pty Ltd to conduct an Aboriginal heritage assessment of *Summer Hill Estate*, north of Orange, NSW (the activity area).

This brief report summarises:

- the results of an OEH AHIMS site search,
- the results of a preliminary field assessment;
- discusses these results in relation to the proposed rezoning proposal for a rural subdivision; and
- outlines the further heritage works which would be required prior to subdivision.

As a result of this preliminary assessment, the following conclusions are made:

- There are no known previously recorded Aboriginal objects located in the activity area.
- In accordance with a consideration of the local environment and known Aboriginal land use patterns, it is concluded that Aboriginal occupation in the activity area is likely to have been of low to medium intensity. Accordingly, any material evidence of that occupation is predicted to be of low density except in elevated landforms close to the river where artefact density may be greater.
- Eleven Aboriginal object locales were found across the property area during the preliminary field assessment. These are all low density, highly disturbed stone artefact distributions of generally low archaeological heritage significance.
- While this assessment is of a preliminary nature, it is nevertheless concluded that the Aboriginal heritage values do not pose any constraint in regard to a rezoning and future rural subdivision proposal.
- An Aboriginal Cultural Heritage Assessment Report (ACHAR) and a formal process of Aboriginal Consultation would need to be undertaken prior to the subdivision.
- An Aboriginal Heritage Impact Permit will eventually be required.

Acknowledgments

Archaeological evidence confirms that Aboriginal people have had a long and continuous association with the region for thousands of years. We would in particular like to acknowledge and pay our respects to the traditional owners of the country which is encompassed by the proposal.

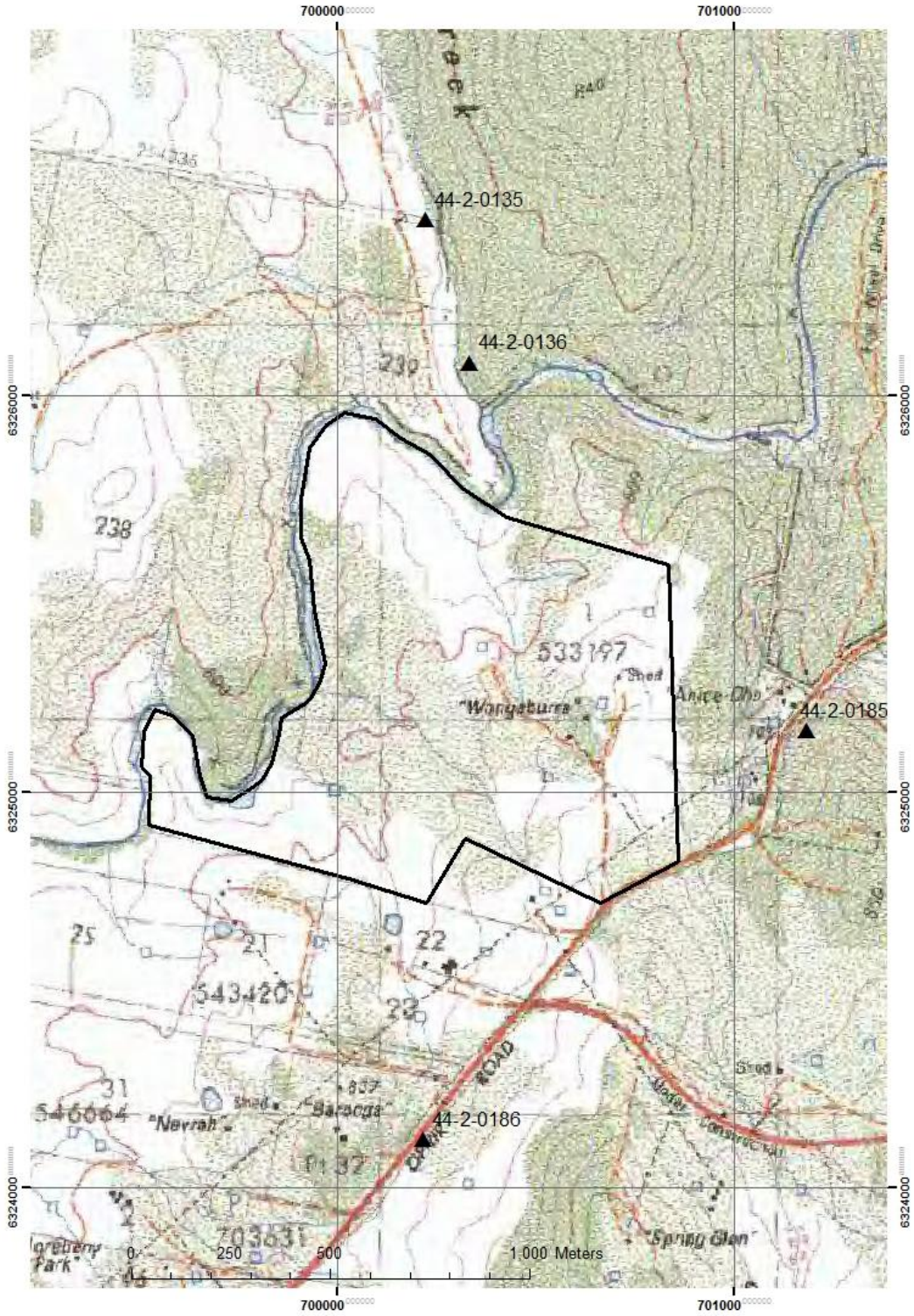

Figure 1 Location of the property with NSW OEH AHIMS sites.

1. INTRODUCTION

The property is 1099 Ophir Road, Summer Hill Creek, Lot 2 DP794456, north of Orange. The site has a frontage to Summer Hill Creek in the west, as well as a number of mapped tributaries draining into Summer Hill Creek (Figure 1).

It is proposed to rezone the land from primary production to rural residential. A concept layout has been prepared showing lot boundaries, a road location and indicative building envelopes.

The site is in the Cabonne Shire Council.

2. AHIMS DATABASE SEARCH

A search of the NSW OEH Aboriginal Heritage Information Management System (AHIMS) has been undertaken (AHIMS Search ID #174422). The search covered an area of 80 square kilometres, encompassed by Eastings: 696000–704000 and Northings: 6320000–6330000, with a buffer of 50 metres.

The previously recorded Aboriginal object sites (N = 13) listed on the AHIMS search are presented in Appendix 1. None of these are located within the proposed activity area (*see* Figure 1).

It is worth noting that the AHIMS register only includes sites which have been reported to the NSW OEH. Generally, sites are only recorded during targeted surveys in either development or research contexts, none of which are known to have taken place previously in the study area. Accordingly, this search cannot be considered to be an actual or exhaustive inventory of Aboriginal objects situated within the local area or indeed within the subject area itself.

It is also important to acknowledge that AHIMS data is often incorrect. Grid references and datums are not always accurate.

3. FIELD INSPECTION

A preliminary field inspection was carried out on the 27th May 2015. The area was divided into eight survey units. Eleven stone artefact locales were recorded in a widespread distribution (Figure 2). All artefact locales were found to be low density, highly disturbed stone artefact distributions of generally low archaeological heritage significance. The site was found to be generally disturbed and many areas were eroded to

bedrock. Hence most sites did not possess the potential to hold archaeological deposit. All sites were assessed to be of low archaeological significance.

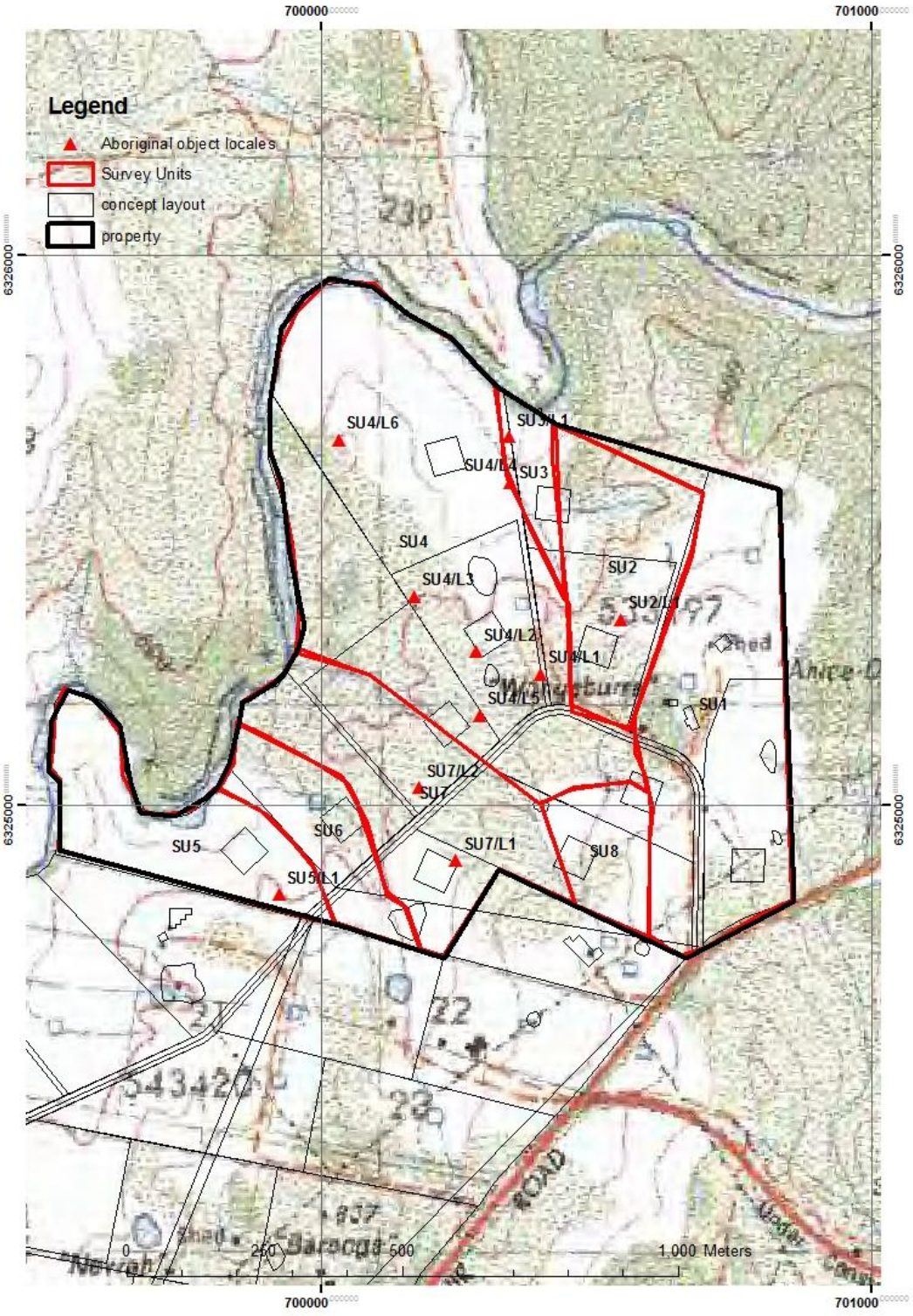

Figure 2 Location of Aboriginal object locales, Survey Units and concept subdivision layout

4. LEGISLATION

The National Parks and Wildlife Act 1974 (NPW Act) is the primary legislation for the protection of some aspects of Aboriginal cultural heritage in NSW. One of the objectives of the NPW Act is:

> *… the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including but not limited to: (i) places, objects and features of significance to Aboriginal people … (s.2A(1)(b))*

Part 6 of the NPW Act is administered by the NSW Office of Environment and Heritage (NSW OEH) and provides specific protection for Aboriginal objects and declared Aboriginal places by establishing offences of harm. Harm is defined to mean destroying, defacing or damaging an Aboriginal object or declared Aboriginal place, or moving an object from the land.

Section 86 of the NPW Act, *Harming or desecrating Aboriginal objects and Aboriginal places,* sets out the penalties for harming an Aboriginal object. For an individual, the penalty for harming an object the person knows is an Aboriginal object, is imprisonment for up to 2 years and a significant fine (>$200,000). The penalties for corporations are considerably higher.

Anyone proposing to carry out an activity that may harm an Aboriginal object or declared Aboriginal place must investigate, assess and report on harm that may be caused by the activity they propose. An Aboriginal Heritage Impact Permit (AHIP) may be required if harm to Aboriginal objects and declared Aboriginal places is proposed. When this is the case, an Aboriginal Cultural Heritage Assessment Report (ACHAR) is required to support the AHIP application. No Aboriginal objects are known to be present in the activity area and site is assessed to be of low archaeological sensitivity. Based on the current assessment it is concluded that an AHIP is not required.

Further archaeological investigations such as test excavations can be undertaken to provide a more informed assessment. Such work can be done within the provisions of the NSW DECCW (2010b) Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (the Code of Practice). Test Excavation undertaken in accordance with the Code of Practice allows harm to Aboriginal objects to occur (during excavation) without the need for an AHIP.

Given the presence of Aboriginal objects in the proposal area, an ACHAR is required to be prepared. Eventually, an AHIP will be required.

5. RECOMMENDATIONS

The recommendations below are made on the basis of:

- A consideration of the relevant legislation (see Section 4, Statutory Information).
- The results of the investigation as documented in this brief report.
- Consideration of the nature of proposed impacts.

The following recommendations are made:

1. There are no known previously recorded Aboriginal objects located in the activity area.
2. In accordance with a consideration of the local environment and known Aboriginal land use patterns, it is concluded that Aboriginal occupation in the activity area is likely to have been sporadic and of low to medium intensity. Accordingly, any material evidence of that occupation is predicted to be of low density except in elevated landforms close to the river where artefact density may be greater.
3. Eleven Aboriginal object locales were found across the property area during the preliminary field assessment. These are all low density, highly disturbed stone artefact distributions of generally low archaeological heritage significance.
4. While this assessment is of a preliminary nature, it is nevertheless concluded that the Aboriginal heritage values do not pose any constraint in regard to a rezoning and future rural subdivision proposal.
5. An Aboriginal Cultural Heritage Assessment Report (ACHAR) and a formal process of Aboriginal Consultation would need to be undertaken in accordance prior to the subdivision.
6. An Aboriginal Heritage Impact Permit will eventually be required.

APPENDIX 1 – AHIMS DATABASE SEARCH

Office of Environment & Heritage

AHIMS Web Services (AWS)

Extensive search - Site list report

Purchase Order/Reference : Summer Hill

Client Service ID : 174422

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
44-2-0132	Western Boundary Firetrail OS1	AGD	55	699780	6328020	Open site	Valid	Artefact : 3		
	Contact	Recorders	Bill Allen					Permits	1624	
44-2-0133	Western Boundary Firetrail OS2	AGD	55	699760	6327790	Open site	Valid	Artefact : 5		
	Contact	Recorders	Bill Allen					Permits	1624	
44-2-0134	Western Boundary Firetrail ST1	AGD	55	699760	6327980	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Bill Allen					Permits		
44-2-0135	Mullion Creek OS1	AGD	55	700110	6326260	Open site	Valid	Artefact : 4		
	Contact	Recorders	Bill Allen					Permits		
44-2-0136	Mullion Creek IF1	AGD	55	700220	6325900	Open site	Valid	Artefact : 1		
	Contact	Recorders	Bill Allen					Permits		
44-2-0187	MPA6	GDA	55	703778	6327215	Open site	Partially Destroyed	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd,Mr.Adrian Cressey,Mr.NICHOLAS HARR					Permits		
44-2-0188	MPA7	GDA	55	703127	6326698	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd,Mr.Adrian Cressey,Mr.NICHOLAS HARR					Permits		
44-2-0189	MPA8	GDA	55	702960	6326458	Open site	Partially Destroyed	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd,Mr.Adrian Cressey,Mr.NICHOLAS HARR					Permits		
44-2-0190	MPA9	GDA	55	702484	6325758	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd,Mr.Adrian Cressey					Permits		
44-2-0202	MPA PASA2	GDA	55	698527	6321317	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd,Mr.Adrian Cressey					Permits		
44-2-0184	MPA2	GDA	55	699066	6322931	Open site	Valid	Artefact : 1		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd,Mr.Adrian Cressey					Permits		
44-2-0185	MPA3	GDA	55	701184	6325155	Open site	Partially Destroyed	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd,Mr.Adrian Cressey,Mr.NICHOLAS HARR					Permits		
44-2-0186	MPA4	GDA	55	700218	6324125	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	Navin Officer Heritage Consultants Pty Ltd,Mr.Adrian Cressey,Mr.NICHOLAS HARR					Permits		

Report generated by AHIMS Web Service on 25/05/2015 for Julie Dibden for the following area at Datum :GDA, Zone : 55, Eastings : 696000 - 704000, Northings : 6320000 - 6330000 with a Buffer of 50 meters. Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 13

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

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Appendix D

EFFLUENT MANAGEMENT REPORT

154 Peisley Street
PO Box 1963
ORANGE NSW 2800

02 6393 5000
02 6393 5050

orange@geolyse.com
geolyse.com

Our Ref: 214394_LET_002A.docx

23 July 2015

Gwenda and Anthony Sandrin
1099 Ophir Road
Orange NSW 2800
By email: gwendasand@hotmail.com

Attention: Gwenda and Anthony Sandrin

EFFLUENT MANAGEMENT REPORT – LOT 2 | DP 794456, 1099 OPHIR ROAD, SUMMER HILL CREEK, NSW

Geolyse has been engaged to prepare a Planning Proposal to facilitate the rezoning of the site at 1099 Ophir Road, Summer Hill Creek NSW, currently zoned RU1 Primary Production (minimum lot size 100 ha) to Residential Large Lot zoning, in accord with a concept plan that accommodates lots sized from 5 to 9 ha (no reticulated services).

This letter has been prepared to support the Planning Proposal and provides a desk top review of site characteristics relating to on-site effluent management systems for domestic effluent and provides specific comment on groundwater vulnerability.

Site Location and Layout

The site is identified as Lot 2 in DP 794456 and is located in Summer Hill Creek, approximately 8.5 km to the north-east of Orange on the western side of Ophir Road (refer to **Figure 1**). The site is currently utilised for rural purposes, with one residence located in the eastern portion of the site.

A proposed subdivision layout is shown on **Figure 2**.

The land is not within the flood planning area of the Cabonne Local Environmental Plan 2012, being located above the 1:100 average recurrence interval plus 0.5 m freeboard.

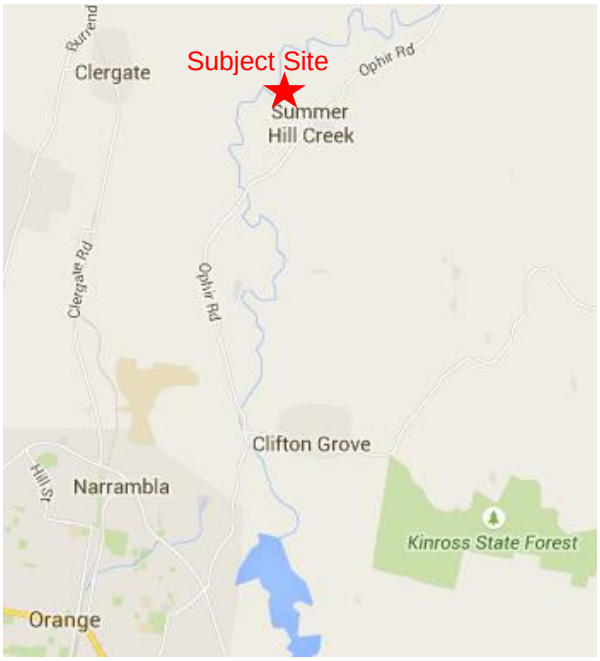

Figure 1: Site Location

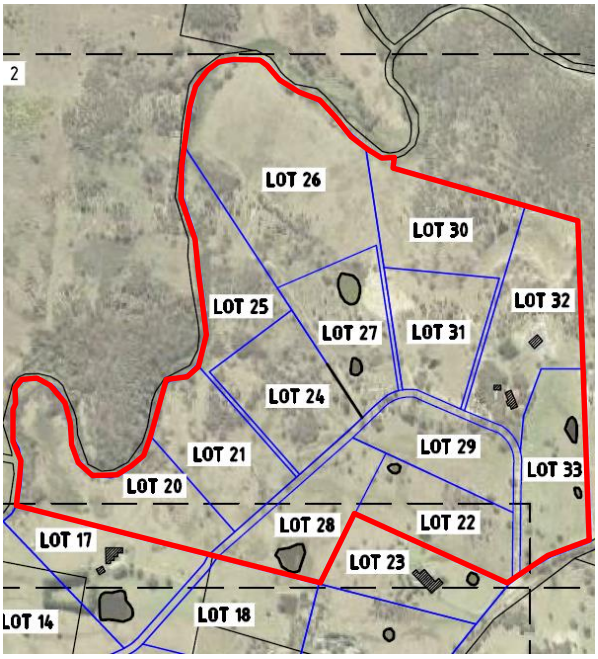

Figure 2: Proposed Site Layout

On-Site Effluent Management – Site Suitability

The suitability of the site for on-site effluent reuse was assessed in accordance with:

- Environment & Health Protection Guidelines for On-site Sewage Management for Single Households (Department of Local Government, 1998); and
- AS/NZS 1547:2012 On-site domestic wastewater management.

Soil Landscapes

Mapped soil landscapes around the site are shown on **Figure 3**. The site lies entirely on the Mookerawa soil landscape as defined in Kovac et al (1990).

The Mookerawa soil landscape consists of rolling low hills to rolling hills with red podzolic soils on crests and upper slopes, and yellow soloths and yellow solodic soils on lower slopes and in drainage depressions. The proposed subdivision is located on the lower slopes of this soil landscape, given the proximity to Summer Hill Creek which borders the site to the west and north-west and generally comprises yellow soloths and yellow solodic soils. These soils types have soil profiles extending greater than 1.5 m to bedrock, with fine dark brown to yellow brown sandy loam topsoils to 0.6 m depth, overlying yellow brown heavy clay subsoil.

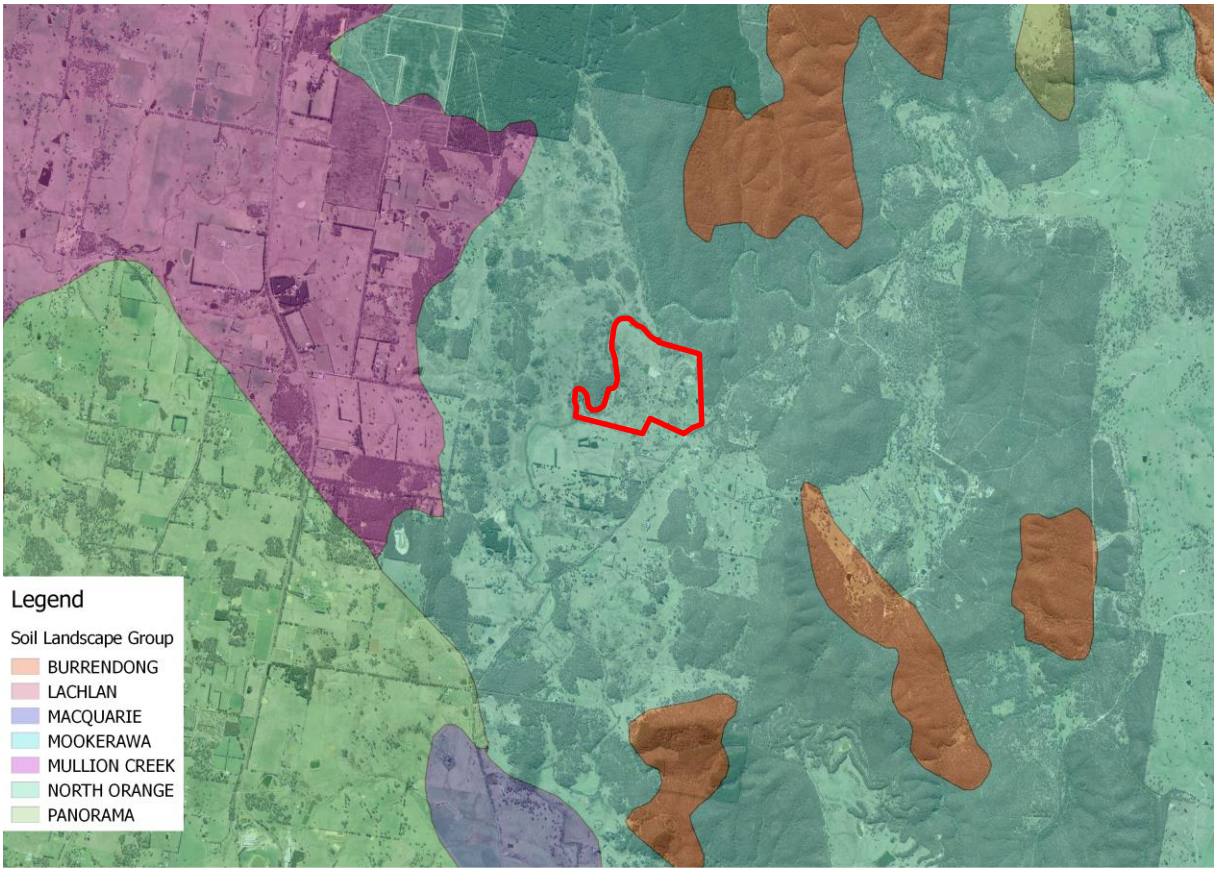

Figure 3: Soil Landscape Groups

The soil category defined in accordance with Table 5.1 of AS1547:2012 for these soil profiles would be:

- Topsoil Category 2
- Subsoils Category 6

Topography and Drainage

Slope across the site grades downward towards Summer Hill Creek which borders the site to the west and north-west, at approximate gradients ranging from 6-8% at the site's north-west to 13-17% at the site's north-east. General slopes across the southern portion of the site approximately range between 6% and 13%.

Drainage would generally occurs across the site as sheet flow concentrating into 3 shallow drainage lines which head in a north-westerly direction. As a north-south aligned ridge line is present in the eastern portion of the site, the catchment of these drainage lines is not likely to extend beyond the site's eastern boundary. Some flow from beyond the site's southern boundary is anticipated, however.

Constraints to On-Site Effluent Management

Constraints for on-site effluent disposal based on site features were rated using Table 4 of the *Environment & Health Protection Guidelines* (Department of Local Government, 1998). A summary of this analysis is provided in **Table 1**. Site features are generally rated as minor limitations or can be managed to achieve a minor limitation, with the exception of slope at specified lots.

Table 1 – Desktop Site Assessment

Site Feature	Comment	Rating
Flood potential	• Site is not identified as being affected by 1 in 100 year ARI flooding.	Minor limitation
Exposure	• High sun and wind exposure. • Northerly or north-easterly aspects possible.	Minor limitation
Slope %	Absorption Systems • Lots 21, 22, 24, 25, 26, 28, 29, 33: Slope less than 10% • Lots 20, 27, 30, 31, 32: Slope less than 20%	Minor limitation Moderate limitation
	Surface Irrigation Systems • Lot 24: Slope less than 6% • Lots 20, 21, 22, 25, 26, 27, 28, 29, 33: Slope less than 12% • Lots 30, 31, 32: Slope greater than 12%	Minor limitation Moderate limitation **Major limitation**
Landform	• Convex side slopes and plains – some drainage lines. • Managed through localised siting and controls at reuse areas.	Minor limitation
Run-on and upslope seepage	• Located on terraces of Summer Hill Creek. • Lots 20, 21, 28: Drainage from areas to the south. • Localised earthworks could be used to divert upslope runoff around reuse areas.	Minor limitation
Erosion potential	• No apparent signs of erosion potential. • Mookerawa soil landscape (yellow soloths) – moderate to high topsoil and subsoil erodibility when exposed • Managed by maintaining ground cover in reuse areas.	Minor limitation
Site drainage	• No visible signs of surface dampness. • Adequate site drainage.	Minor limitation
Fill	• No fill on site	Minor limitation
Buffer distance	• Adequate buffer to off-site domestic bores. • Adequate area available to locate reuse areas and required surface water buffer distances at individual lot level.	Minor limitation
Land area	• Minimum land area required for irrigation system is 1400 m^2 (see below) • Minimum land area required for absorption system is 144 m^2 (see below) • Adequate area available on minimum 5 ha lot.	Minor limitation
Rocks and rock outcrops	• Less than 10% of site area containing rocks >200mm diameter	Minor limitation
Geology / Regolith	• No major geological discontinuities. • No highly porous regolith on site.	Minor limitation

On-Site Effluent Management – Preliminary Sizing System

The methods of on-site effluent management at each proposed lot include aerated wastewater treatment systems (AWTS) with irrigation reuse (surface or sub-surface irrigation), and absorption trench or bed

systems. Each system has advantages and disadvantages. Irrigation systems may be preferred due to the low permeability of heavy clay soils, while absorption trenches or beds may be preferred due to the significant sloping landform of some lots, particularly in the site's north-east.

Detailed sizing of the required application area is presented in the following sections. The preliminary system sizing is based on a wastewater flow allowance of 120 L/p/day (Table H1, Appendix H, AS1547:2012) and a 5 person household using a tank supply (i.e. 600 L/day).

Irrigation System

Treated effluent from an AWTS is reused across irrigation areas. From Table 5.2 in AS1547:2012 and based on the subsoil category (heavy clay), a conservative design irrigation rate (DIR) of 2 mm/day (14 mm/week) can be used in the design, coupled with a review of the water balance and nutrient loading calculations. Table M2 in AS1547:2012 suggests a reduction of 20% for sites sloping between 10% and 20%.

Using an adjusted DIR of 11.2 mm/week, and daily effluent generation of 600 L/day, the required irrigation area is 375 m^2.

The following were assumed for inputs and outputs in the water balance equation:

- design precipitation corresponding to the median year (i.e. 50 percentile). Data was obtained from the Bureau of Meteorology station in Clifton Grove (Conroy Place), Site No. 063172;
- evaporation data was obtained for the Bureau of Meteorology station in Orange (Orange Agricultural Institute, Site No. 063254). Monthly evapotranspiration was determined by multiplying evaporation by a monthly crop factor representative of pasture/grass;
- the final treated effluent containing 30 mg/L total nitrogen and 15 mg/L phosphorus;
- rate of downward percolation to the groundwater system was conservatively modelled as 0 mm/week;
- zero runoff; and
- a conservative phosphorus sorption capacity of 100 mg/kg and soil profile depth of 1.5 m.

The nutrient and water balance calculations are included as **Attachment A**.

The preliminary design calculations undertaken for surface irrigation indicate that the nutrient balance is the limiting factor with a minimum irrigation area of 1,135 m^2 required to balance the phosphorous production and usage over 50 years. It is suggested that the nominated irrigation area be increased by approximately 20% in place of providing wet weather storage. Therefore the recommended minimum irrigation area would be 1,362 m^2 (say 1,400 m^2).

The minimum lot size in the proposed subdivision is 5 ha (50,000 m^2). Therefore the preliminary irrigation area is only 3% of the minimum lot size. This indicates there would be adequate room for a suitably sized reuse area and associated buffers. There would also be adequate room for back up irrigation areas in the unlikely event that they are required.

The weekly hydraulic loading across this area, based on 600 L/day, is 3 mm/week, which is less than the DIR determined for the soil type. It is therefore within the capacity of the soil.

As indicated in **Attachment A**, an irrigation area of 1,400 m^2 would be sufficient to achieve a hydraulic balance for each proposed lot, provided effluent storage capacity of 65.6 mm is accounted for. Data from The Australian Soil Resource Information System (ASRIS) on-line database, maintained by CSIRO Land and Water, indicates the available water capacity (AWC), defined as the difference in volumetric water content between the field capacity and the permanent plant wilting point, ranges from 40 mm (topsoil) to 75 mm (subsoil). The total AWC for site soils, 115 mm, is greater than the required storage capacity and is indicative of a low potential for leaching

Trench or Bed Systems

Treated effluent from an AWTS is discharged to evapotranspiration trench or bed areas. From Table L1 in AS1547:2012 and based on the subsoil category (heavy clay), a design loading rate (DLR) of 5 mm/day (35 mm/week) can be used in the design, coupled with a review of the water balance and nutrient loading calculations.

Using a DLR of 35 mm/week, and daily effluent generation of 600 L/day, the required evapotranspiration trench or bed area is 120 m^2. It is suggested that the nominated trench area be increased by approximately 20% in place of providing wet weather storage (i.e. to 144 m^2).

A maximum bed width of 4.0 m would require the total length of the evapotranspiration system to be approximately 36 m per proposed lot. Table L2 in AS1547:2012 indicates the minimum spacing between adjacent sidewalls of 1.0 m. There is no limitation on the number of adjacent evapotranspiration trenches, and a layout of 3 beds of 4.0 m in width and 12 m in length, with interval spacing of 1.0 m has been adopted for simplicity. This layout results in a trench area of 168 m^2.

The following were assumed for inputs and outputs in the water balance equation:

- design precipitation corresponding to the median year (i.e. 50 percentile). Data was obtained from the Bureau of Meteorology station in Clifton Grove (Conroy Place), Site No. 063172;
- evaporation data was obtained for the Bureau of Meteorology station in Orange (Orange Agricultural Institute, Site No. 063254). Monthly evapotranspiration was determined by multiplying evaporation by a monthly crop factor representative of pasture/grass;
- rate of downward percolation to the groundwater system was based on the subsoil DLR of 5 mm/day.

The water balance calculations are included as **Attachment A**.

The minimum lot size in the proposed subdivision is 5 ha (50,000 m^2). Therefore the preliminary evapotranspiration trench area is a small proportion of the minimum lot size. This indicates there would be adequate room for a suitably sized reuse area and associated buffers. There would also be adequate room for back up trench areas in the event that resting of trench systems is required to reduce clogging potential.

The weekly hydraulic loading across this area, based on 600 L/day, is 29 mm/week, which is less than the DLR determined for the soil type, when allowing for an additional 20% wet weather storage capacity, and is considered to be within the capacity of the soil.

As indicated in **Attachment B**, an effective evapotranspiration trench or bed area of 144 m^2 would be sufficient to achieve a hydraulic balance for each proposed lot, provided effluent storage capacity of 71.4 mm is accounted for. Data from the ASRIS on-line database indicates the AWC ranges from 40 mm

(topsoil) to 75 mm (subsoil). The total AWC for site soils, 115 mm, is greater than the required storage capacity and is indicative of a low potential for leaching.

CONCLUSION

Based on the review presented above it is concluded that there are no major constraints that would prevent sustainable on-site effluent management and that the proposed lots would have sufficient area available to install an on-site effluent management system in accordance with the current guidelines and Australian Standard.

The following factors and corresponding design management controls should be considered when consent is sought to install effluent management systems at each individual lot:

- Site Slope – Effluent irrigation systems should only be proposed for areas where the site slope is less than 12% grade. Whilst the average slope at each lot has been considered in this report, the specific slope of the proposed irrigation area should be reflected in any application for development.
- Soil Depth – Whilst soil landscape literature has identified the depth of the soil profile to be greater than 1.5 m, sporadic rock outcrops observed at the site are indicative of shallow soils being present in some areas. Effluent management systems (irrigation, trench or bed) should be located in areas where the depth of the soil profile is sufficient for the selected system.
- Soil Permeability – The heavy clay subsoil encountered at the site and potential low absorption of effluent in trench or bed systems may be a constraining factor. Topsoil overlying trench or bed systems should be sufficient to allow for intensive planting of high evapotranspiration vegetation.

Please contact the author at our Orange office should you have any queries regarding this report.

Yours faithfully
Geolyse Pty Ltd

BRENDAN STUART
Environmental Scientist

No. of Attachments – 2
A: On-Site Sewage Management for Single Households – Irrigation
B: On-Site Sewage Management for Single Households – Evapotranspiration Trench/Bed

References:

AS/NZS 1547:2012 *On-site Domestic Wastewater Management*.
Department of Local Government (1998) *Environment & Health Protection Guidelines – On-site Sewage Management for Single Households*.
Kovac et. al. (1990) *Soil Landscapes of the Bathurst 1:250,000 Sheet (SI55-8)*. Soil Conservation Service of NSW.

ATTACHMENT A: ON-SITE SEWAGE MANAGEMENT FOR SINGLE HOUSEHOLDS - IRRIGATION

Client: Sandrin
Job No.: 214394
Location: Summer Hill Creek
Effluent Treatment: AWTS
Disposal: Surface irrigation
Hydraulic Loading: 600 litres per day

1. NUTRIENT LOADING

Nitrogen		TN concentration in effluent	30	mg/L
		Critical loading rate	27	$mg/m^2/d$
		Irrigation area required	**667**	**m^2**
Phosphorus		TP concentration in effluent	15	mg/L
	Soil uptake:	P sorption	100	mg/kg
		Bulk density	1800	kg/m^3
		P sorption capacity (1 m deep)	1800	kg/ha
		soil depth	1.5	m
		P sorption capacity	2700	kg/ha
			0.27	kg/m^2
	Vegetation:	Vegetation uptake	3	$mg/m^2/d$
		Vegetation uptake over 50 years	54750	mg/m^2
			0.055	kg/m^2
		P generation over 50 years	164	kg
		Irrigation area required	**1135**	**m^2**

Limiting nutrient loading is ***Phosphorus*** which requires a minimum disposal area of **1135 m^2**

2. HYDRAULIC LOADING

2a Nominated Area Method

Design Rainfall 50 % ile

Daily Effluent	Q	600 litres/day
Nominated irrigation area	L	1400 m^2
Design percolation rate	R	0 mm/wk

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D		days	31	28	31	30	31	30	31	31	30	31	30	31	365
Precipitation	P		mm/month	61.4	80.9	73.7	40.4	48.1	77.9	65.8	71.2	58.6	69.6	72.7	89.9	810.0862
Evaporation	E		mm/month	220.1	172.325	148.8	96	62	42	46.5	65.1	96	133.3	165	210.8	1457.925
Crop factor	C		-	0.7	0.7	0.7	0.6	0.5	0.45	0.4	0.45	0.55	0.65	0.7	0.7	-
Inputs																
Precipitation	P	-	mm/month	61.4	80.9	73.7	40.4	48.1	77.9	65.8	71.2	58.6	69.6	72.7	89.9	810.1
Effluent irrigation	W	(QxD)/L	mm/month	13.3	12.1	13.3	12.9	13.3	12.9	13.3	13.3	12.9	13.3	12.9	13.3	156.5
Inputs		P+W	mm/month	74.7	93.0	87.0	53.3	61.4	90.7	79.1	84.5	71.5	82.9	85.5	103.2	966.6
Outputs																
Evapotranspiration	ET	ExC	mm/month	154.1	120.6	104.2	57.6	31.0	18.9	18.6	29.3	52.8	86.6	115.5	147.6	936.8
Percolation	B	(R/7)xD	mm/month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Outputs		ET+B	mm/month	154.1	120.6	104.2	57.6	31.0	18.9	18.6	29.3	52.8	86.6	115.5	147.6	936.8
Storage	S	(P+W) - (ET+B)	mm/month	-79.4	-27.6	-17.2	-4.3	13.3	12.9	13.3	13.3	12.9	-3.8	-30.0	-44.4	-
Cumulative storage	M	-	mm	0.0	0.0	0.0	0.0	13.3	26.1	39.4	52.7	65.6	61.8	31.8	0.0	-

Storage	V	largest M	mm	65.6
		(MxL)/1000	m^3	**91.8**

ATTACHMENT B: ON-SITE SEWAGE MANAGEMENT FOR SINGLE HOUSEHOLDS - EVAPOTRANSPIRATION TRENCH/BED

Client: Sandrin
Job No.: 214394
Location: Summer Hill Creek
Effluent Treatment: AWTS
Disposal: Evapotranspiration Trench
Hydraulic Loading: 600 litres per day

2. HYDRAULIC LOADING

2a Nominated Area Method

Design Rainfall 50 % ile

Daily Effluent	Q	600 litres/day
Nominated irrigation area	L	144 m^2
Design percolation rate	R	35 mm/wk

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D		days	31	28	31	30	31	30	31	31	30	31	30	31	365
Precipitation	P		mm/month	61.4	80.9	73.7	40.4	48.1	77.9	65.8	71.2	58.6	69.6	72.7	89.9	810.0862
Evaporation	E		mm/month	220.1	172.325	148.8	96	62	42	46.5	65.1	96	133.3	165	210.8	1457.925
Crop factor	C		-	0.7	0.7	0.7	0.6	0.5	0.45	0.4	0.45	0.55	0.65	0.7	0.7	-
Inputs																
Precipitation	P	-	mm/month	61.4	80.9	73.7	40.4	48.1	77.9	65.8	71.2	58.6	69.6	72.7	89.9	810.1
Effluent irrigation	W	(QxD)/L	mm/month	129.2	117.7	129.2	125.0	129.2	125.0	129.2	129.2	125.0	129.2	125.0	129.2	1521.9
Inputs		P+W	mm/month	190.6	198.6	202.9	165.4	177.2	202.9	195.0	200.3	183.6	198.8	197.7	219.0	2332.0
Outputs																
Evapotranspiration	ET	ExC	mm/month	154.1	120.6	104.2	57.6	31.0	18.9	18.6	29.3	52.8	86.6	115.5	147.6	936.8
Percolation	B	(R/7)xD	mm/month	155.0	141.3	155.0	150.0	155.0	150.0	155.0	155.0	150.0	155.0	150.0	155.0	1826.3
Outputs		ET+B	mm/month	309.1	261.9	259.2	207.6	186.0	168.9	173.6	184.3	202.8	241.6	265.5	302.6	2763.0
Storage	S	(P+W) - (ET+B)	mm/month	-118.5	-63.3	-56.3	-42.2	-8.8	34.0	21.4	16.0	-19.2	-42.9	-67.8	-83.5	-
Cumulative storage	M	-	mm	0.0	0.0	0.0	0.0	0.0	34.0	55.4	71.4	52.2	9.3	0.0	0.0	-

Storage	V	largest M	mm	71.4
		(MxL)/1000	m^3	**10.3**