

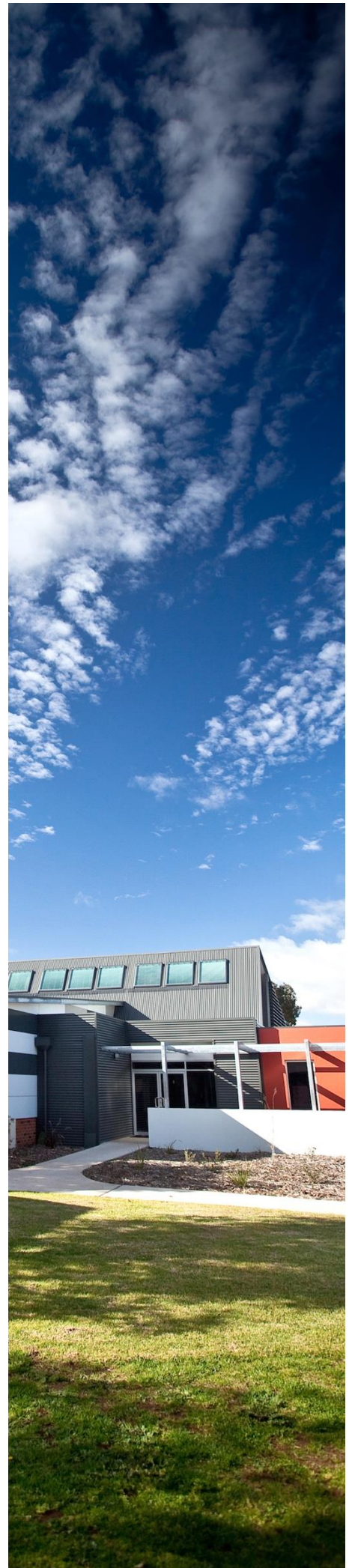


Statement of Environmental Effects

Torrens Title Subdivision
2 Lots into 5 Lots



(Our Reference: 27447-PR03_A)
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Client:	GH Mudgee Pty Limited
Project No.	27447
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1 INTRODUCTION

1.1 Background

Barnson Pty Ltd has been engaged by GH Mudgee Pty Limited to prepare information in support of a Development Application (DA) for a Torrens Title Subdivision – 2 Lots into 5 Lots at 313 Magpie Lane, Galambine.

The subject site fronts Magpie Lane and Guntawang Road and has a combined property area of approximately 74.4 hectares. The site is predominately vacant but does contain one (1) shed and the partial construction of an internal road.

The project will consist of the subdivision of Lot 1 DP 174385 and Lot 1 DP 1003242 into five (5) lots. Three (3) of the lots shall be for residential purposes, one (1) lot shall be used as Primary Production and the residual Lot 1 DP 1003242 shall remain unchanged, with the exception of part of the lot being dedicated as part of the road reserve for Magpie Lane. A Subdivision Sketch Plan has been provided in **Appendix A** of this report.

The site is zoned RU4 Primary Production Small Lots with a Minimum Lot Size of 20 hectares pursuant to the provisions under the *Mid-Western Regional Local Environmental Plan 2012*. The proposed development is defined as a subdivision, which is permissible with consent in the RU4 zone.

This application consists of:

- A completed development application form; and
- One (1) PDF copy of this written statement, including plans and supporting documents.

1.2 Proponent

The proponent for the DA is GH Mudgee Pty Limited.

1.3 Consultant

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██████████
████████████████████
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2 EXISTING ENVIRONMENT

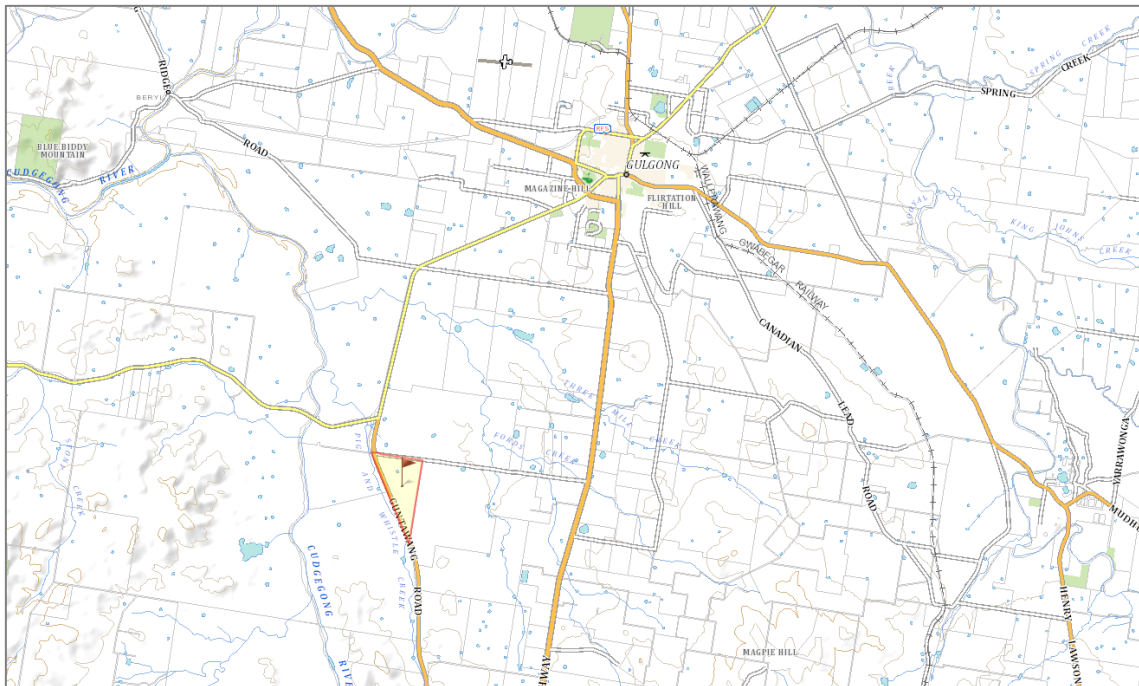
2.1 Location and Title

The subject site of this application is Lot 1 DP 174385 and Lot 1 DP 1003242, known as 313 Magpie Lane, Galambine. Details of the site have been provided in **Table 1** below.

Table 1 – Site Details

Street No.	Lot	Road Frontage	Area	Use of land
313	Lot 1 DP 174385	Magpie Lane & Guntawang Road	72.41ha	Primary production & vacant lands
313	Lot 1 DP 1003242	Magpie Lane & Guntawang Road	2.023ha	Primary production, one (1) storage shed & vacant lands

The site is located in the Galambine area, approximately 10km south west of Gulgong as shown in **Figure 1** below.

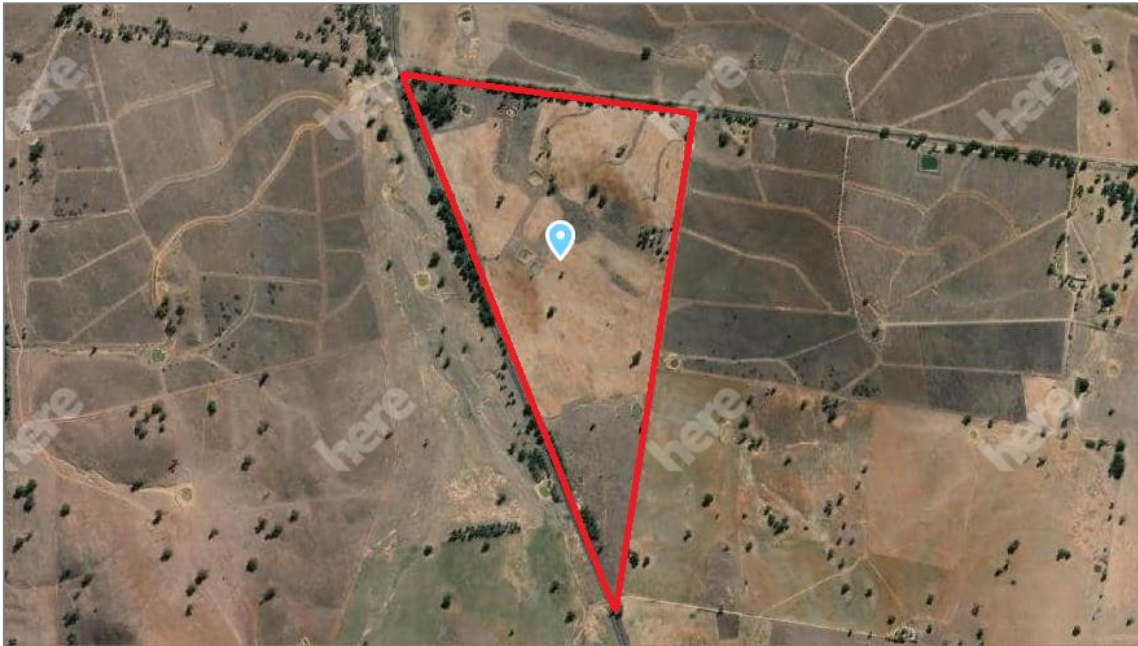


Source: (NSW Government Spatial Services, 2021)

Figure 1 – Site Location

The site has a combined property area of approximately 74.4 hectares. The site contains a rural outbuilding (shed), partially completed internal road and has historically been utilised for agricultural purposes, in particular grazing and cropping.

The Certificate of Title and Deposited Plan for the property is provided in **Appendix B** of this report. Refer to **Figure 2** and **Plates 1-3** for photos of the site and locality.



Source: (NSW Government Spatial Services, 2021)

Figure 2 – Site Aerial



Plate 1 – View of Magpie Line and the existing access point to the site



Plate 2 - View of the subject site



Plate 3 - View of the subject site

2.2 Land Use

The site is located in an area characterised by primary production, scattered rural-residential dwellings and wineries. The site has been used for primary production purposes, predominately grazing and cropping, for an extended period of time.

2.3 Topography and Soils

The site slopes generally from the east to west.

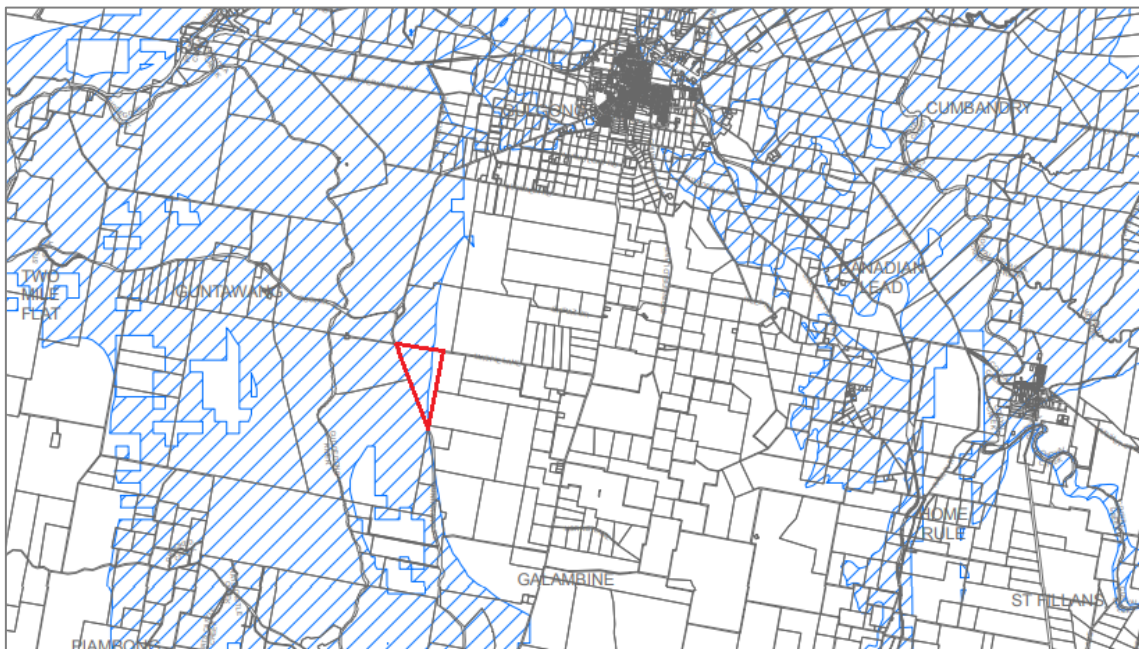
The site is within the Macquarie-Dubbo Soil Landscape as mapped by the *Soil Landscapes of the Dubbo 1:250 000 sheet*, which is found on the alluvial plains and terraces of the Macquarie and Talbragar Rivers. It is characterised by low fertility; seasonal waterlogging; sodic subsoils on lower slopes; high erosion hazard under cultivation; acidic surface soils; and low permeability.

2.4 Flora and Fauna

The site is heavily disturbed as a result of previous activities on the site. It is predominately grassland with scattered trees throughout. The grassland is frequently mown/slashed and well managed. There are no known threatened specified to have been seen or recorded on the site.

2.5 Groundwater

The site is mapped under the *Mid-Western Regional Local Environmental Plan 2012* as being groundwater vulnerable (refer to **Figure 3** below).



Source: (NSW Planning & Environment, 2021)

Figure 3 – Groundwater Vulnerability Map

There are no recorded groundwater bores located on the site or within 500m of the site. An Effluent assessment has been prepared by East West Consulting to determine the current site characteristics and future potential development, refer to **Appendix C** of this report.

2.6 Natural Hazards

The site is not mapped as being bushfire prone or within a Flood Planning Area under the *Mid-Western Regional Local Environmental Plan 2012*, NSW Planning Portal or the RFS' Online Mapping Tool.

2.7 Noise Environment

A noise assessment has not been undertaken as part of this submission. The site is located within an area characterised by primary production and scattered rural residential activities. Noise levels are consistent with these land uses.

2.8 Visual Amenity

The subject site is located in a rural locality with undulating hills and established vegetation. There are scattered residential dwellings and agricultural uses within proximity. The area is very picturesque and supports a variety of small-scale farming and residential activities.

2.9 Services

The site has electricity and telecommunications available within proximity. There is an existing power line that runs through the subject site. There are no other services such as reticulated water, sewer or gas located within the vicinity.

2.10 Access and Traffic

The site has frontage to Guntawang Road and Magpie Lane, which are both bitumen sealed roads. Vehicular access is gained off both road networks via rural gates/access crossings. There are internal roads/driveways established associated with the use of the site.

2.11 Heritage

A search of the State Heritage Inventory, *Mid-Western Regional Local Environmental Plan 2012* and Aboriginal Heritage Information Management System (AHIMS) was undertaken for the site and immediate surrounds. There are no known items or places of European or Aboriginal cultural heritage significance that have been identified as being recorded on or within the vicinity of the site. Refer to AHIMS Search provided in **Appendix D** and Aboriginal Cultural Heritage Report in **Appendix E** of this report.

3 PROPOSED DEVELOPMENT

3.1 Development Details

The proposed development involves the subdivision of Lot 1 DP 174385 and Lot 1 DP 1003242 into five (5) Lots (Torrens title subdivision). A Subdivision Sketch Plan has been provided in **Appendix A** of this report.

The intent of the subdivision is to provide rural residential Lots on the site for future development. In addition, a smaller Lot shall be created for primary production purposes only and part of Lot 1 DP 1003242 shall be dedicated as a road reserve for Magpie Lane.

The following Table outlines the proposed new Lot arrangement.

Table 2 – Subdivision Details

Proposed Lot	Road Frontage	Area	Use of land
Lot 1	Magpie Lane	10.2ha	Primary Production
Lot 2	Guntawang Road	20.2ha	Rural Residential
Lot 3	Magpie Lane	20.2ha	Rural Residential
Lot 4	Magpie Lane (with Guntawang Road secondary frontage)	21.8ha	Rural Residential
Lot 5	Corner of Magpie Lane & Guntawang Road	1.2ha	Vacant Land

3.2 Infrastructure

Access to the proposed Lots will be from both Guntawang Road and Magpie Lane, as detailed in **Table 2** above. New infrastructure including electricity and telecommunications will be provided for the Lots, along with rural boundary fencing which will delineate the new lot layout.

The proposed lots shall be serviced by onsite rainwater tanks and onsite sewage management systems (OSMS) for future residential development. An Effluent Assessment for the suitability of OSMS systems has been provided in the report in **Appendix C** of this report.

3.3 Groundwater Bores

It is understood that the site is mapped under the LEP as being groundwater vulnerable (refer to **Figure 3** of this report). There are no recorded groundwater bores located on the site or within 500m of the site. Details of four (4) of the closest bores located to the east of the site and two (2) of the closest bores located to the west were obtained and have been provided below.

- GW800644 – Test Bore (intended purpose), work status “filled”, drilled to a final depth of 106.7m. No standing water level was recorded on the GW summary;
- GW800643 – Test Bore (intended purpose), work status “filled”, drilled to a final depth of 121.9m. No standing water level was recorded on the GW summary;
- GW801349 – Irrigation Bore (intended purpose), work status “supply obtained”, drilled to a final depth of 106.7m. Standing water level of 27.2m;
- GW800636 – Domestic Bore (intended purpose), work status “supply obtained”, drilled to a final depth of 93m. No standing water level was recorded on the GW summary. Salinity indicated as “good”;
- GW014906 – Irrigation Bore (intended purpose), work status “abandoned”, drilled to a final depth of 14.3m. No standing water level was recorded on the GW summary; and
- GW028222 – Irrigation Bore (authorised purpose) drilled to a final depth of 106.6m. No standing water level was recorded on the GW summary.

The development has a low potential to adversely affect groundwater and groundwater dependant ecosystems as each bore situated on the proposed lots would be used for irrigation purposes only and in accordance with licencing requirements. The issues of water security and drawdown etc would be addressed as part of water access licencing and associated water supply works approvals specific to each site and the intended use. Accordingly, assessment shall be provided as part of future applications to Council.

3.4 Stormwater Management

The proposed lot sizes are large enough to manage stormwater on each individual site. There are dams located on each proposed lot and all surface water shall be directed into those dams where required. There shall be no stormwater discharge onto adjoining properties.

4 LAND USE ZONING

The subject site is zoned RU4 Primary Production Small Lots pursuant to the provisions under the *Mid-Western Regional Local Environmental Plan 2012* (LEP). The proposed development is for a Torrens title subdivision, which is permissible with consent in the RU4 Primary Production Small Lots zone pursuant to Clause 2.6 of the LEP.

The permissibility of the proposed development is assessed in terms of the heads of consideration in Section 4.15 of the *Environmental Planning & Assessment Act 1979*, which incorporates consideration of the LEP and the objectives and permissible uses outlined in the RU4 zone, as outlined in **Section 5** of this report.

5 PLANNING CONSIDERATIONS

5.1 Biodiversity Conservation Act 2016

5.1.1 Is the development likely to significantly affect threatened species?

Clause 7.2 of the *Biodiversity Conservation Act 2016* (BC Act) identifies the following circumstances where a development is likely to significantly affect threatened species:

- (a) *it is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3, or*
- (b) *the development exceeds the biodiversity offsets scheme threshold if the biodiversity offsets scheme applies to the impacts of the development on biodiversity values, or*
- (c) *it is carried out in a declared area of outstanding biodiversity value.*

Each of these is addressed below.

5.1.1.1 Section 7.3 Test

To determine whether a development is likely to significantly affect threatened species or ecological communities, or their habitats, the following is to be taken into account in accordance with Section 7.3 of the BC Act:

- (a) *in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,*
- (b) *in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:*
 - (i) *is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
 - (ii) *is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,*
- (c) *in relation to the habitat of a threatened species or ecological community:*
 - (i) *the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and*
 - (ii) *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and*
 - (iii) *the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,*
- (d) *whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),*
- (e) *whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.*

Comment: There are no significant physical works required for the proposed subdivision other than the establishment of rural boundary fencing and provision of access crossovers/gateways. Therefore, the proposed development is not likely to significantly affect threatened species or ecological communities, or their habitats.

5.1.1.2 Section 7.4 Test

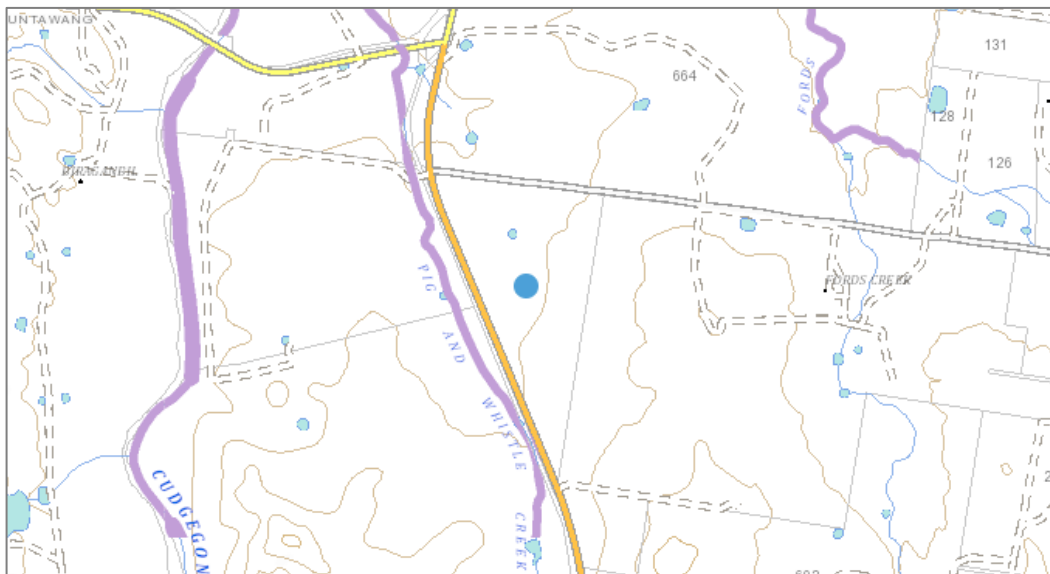
Section 7.4 of the BC Act states:

- (1) *Proposed development exceeds the biodiversity offsets scheme threshold for the purposes of this Part if it is development of an extent or kind that the regulations declare to be development that exceeds the threshold.*
- (2) *In determining whether proposed development exceeds the biodiversity offsets threshold for the purposes of this Part, any part of the proposed development that involves the clearing of native vegetation on category 1-exempt land (within the meaning of Part 5A of the Local Land Services Act 2013) is to be disregarded.*

Comment: The proposed development does not exceed the biodiversity offsets threshold for the purposes of this part.

5.1.1.3 Declared Area of Outstanding Biodiversity Value

The site is not mapped on the Biodiversity Value Map as being land with a high biodiversity value as defined by the BC Act, as shown in **Figure 4** below.



Source: (NSW Government, 2021)

Figure 4 – Biodiversity Value Map

5.1.2 Biodiversity Development Assessment Report

As outlined in **Section 5.1.1**, the proposed development is not likely to significantly affect threatened species as defined by Section 7.2 of the BC Act. Therefore, a Biodiversity Development Assessment Report (BDAR) is not required to accompany the application for development consent.

5.2 Fisheries Management Act 1994

5.2.1 Applicability

The Fisheries Management Act 1994 (FM Act) applies to:

- (a) *in relation to all waters that are within the limits of the State, and*
- (b) *except for purposes relating to a fishery, or a part of a fishery, that is to be managed in accordance with the law of the Commonwealth pursuant to an arrangement under Division 3 of Part 5 and except for purposes prescribed by paragraph (d)—in relation to any waters of the sea not within the limits of the State that are on the landward side of waters adjacent to the State that are within the Australian fishing zone, and*
- (c) *for purposes relating to a fishery, or a part of a fishery, that is managed in accordance with the law of the State pursuant to an arrangement under Division 3 of Part 5—in relation to any waters to which the legislative powers of the State extend with respect to that fishery, whether pursuant to section 5 of the Coastal Waters (State Powers) Act 1980 of the Commonwealth or otherwise, and*
- (d) *for purposes relating to recreational fishing activities engaged in otherwise than by use of a foreign boat (other than recreational activities prohibited or regulated under a plan of management determined under section 17 of the Commonwealth Act)—in relation to any waters to which the legislative powers of the State extend with respect to such activities.*

Comment: The FM Act does not apply to the proposed subdivision.

5.2.2 Is the development likely to significantly affect threatened species, population or ecological community?

Section 221ZV of the FM Act requires the following matters to be taken into consideration to determine whether a proposed development or activity is likely to significantly affect threatened species, populations or ecological communities (unless it is carried out in critical habitat):

- (a) *in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,*
- (b) *in the case of an endangered population, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species that constitutes the*

endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

- (c) *in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

 - (i) *is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
 - (ii) *is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**
- (d) *in relation to the habitat of a threatened species, population or ecological community:

 - (i) *the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and*
 - (ii) *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and*
 - (iii) *the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the threatened species, population or ecological community in the locality,**
- (e) *whether the proposed development or activity is likely to have an adverse effect on any critical habitat (either directly or indirectly),*
- (f) *whether the proposed development or activity is consistent with a Priorities Action Statement,*
- (g) *whether the proposed development constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The assessment guidelines under section 220ZZA apply to the determination of whether any such proposed development or activity is likely to significantly affect threatened species.

Comment: The FM Act does not apply to the proposed subdivision.

5.3 Environmental Planning & Assessment Act 1979

5.3.1 Application of Biodiversity Conservation Act 2016 & Fisheries Management Act 1994

Section 1.7 of the *Environmental Planning & Assessment Act 1979* (EP&A Act) identifies that Part 7 of the BC Act and Part 7A of the FM Act relate to the operation of the EP&A Act in relation to the terrestrial and aquatic environment. These Acts are addressed in **Sections 5.1** and **5.2** of this report respectively.

5.3.2 Evaluation

Section 4.15 of the EP&A Act (as amended) requires the Council to consider various matters in regard to the determination of the Development Application.

In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application:

- (a) *The provisions of:*
 - (i) *any environmental planning instrument, and*
 - (ii) *any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and*
 - (iii) *any development control plan, and*
 - (iiia) *any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and*
 - (v) *the regulations (to the extent that they prescribe matters for the purposes of this paragraph), and*
 - (v) *any coastal zone management plan (within the meaning of the Coastal Protection Act 1979), that apply to the land to which the development application relates,*
- (b) *The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality;*
- (c) *The suitability of the site for the development,*
- (d) *Any submissions made in accordance with this act or the regulations,*
- (e) *The public interest.*

The proposed development has been designed with consideration to the following matters, as outlined below.

5.4 Environmental Planning Instruments

5.4.1 State Environmental Planning Policy (Koala Habitat Protection) 2020

Clause 8 of *State Environmental Planning Policy (Koala Habitat) 2020* requires Council to consider the following before granting consent to the DA.

- (1) *Before a council may grant consent to a development application for consent to carry out development on land to which this Part applies, the council must be satisfied as to whether or not the land is a potential koala habitat.*
- (2) *The council may be satisfied as to whether or not land is a potential koala habitat only on information obtained by it, or by the applicant, from a person who is qualified and experienced in tree identification.*
- (3) *If the council is satisfied—*
 - (a) *that the land is not a potential koala habitat, it is not prevented, because of this Policy, from granting consent to the development application, or*
 - (b) *that the land is a potential koala habitat, it must comply with clause 9.*

Comment: The subject site has been used for agricultural purposes for an extended period of time and does not appear to contain any potential koala habitat vegetation. As the subject site is heavily disturbed and devoid of any significant tracts of vegetation, no further assessment of this SEPP is required in this instance.

5.4.2 SEPP No.55 - Remediation of Land

Clause 7 of *State Environmental Planning Policy No.55 – Remediation of Land* (SEPP 55) requires Council to consider the following before granting consent to a DA:

- (a) *it has considered whether the land is contaminated, and*
- (b) *if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and*
- (c) *if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.*

Comment: The site does not appear to have been impacted by any of the activities/materials listed in Appendix A of the *Managing Land Contamination: Planning Guidelines SEPP 5 – Remediation of Land* (NSW Department of Urban Affairs and Planning & Environment Protection Authority, 1998). The site has historically been utilised for primary production, predominately cropping and grazing. It appears that there have not been any contaminating uses carried out on the site and it is considered that a preliminary site investigation is not required in this instance.

5.4.3 State Environmental Planning Policy (Primary Production and Rural Development) 2019

Schedule 4 of *State Environmental Planning Policy (Primary Production and Rural Development) 2019* states that Council must take into account matters relating to the erection of a dwelling in certain rural zones.

- (5) *The following matters are to be taken into account—*
 - (a) *the existing uses and approved uses of land in the vicinity of the development,*
 - (b) *whether or not the development is likely to have a significant impact on land uses that, in the opinion of the consent authority, are likely to be preferred and the predominant land uses in the vicinity of the development,*
 - (c) *whether or not the development is likely to be incompatible with a use referred to in paragraph (a) or (b),*
 - (d) *any measures proposed by the applicant to avoid or minimise any incompatibility referred to in paragraph (c).*

Comment: Future dwellings should not impact on any existing or approved uses on the site or in the vicinity.

The locality is predominately used for small scale residential/rural activities, and future dwellings would be compatible with development trends in the area. Therefore, this SEPP does not require any further consideration.

5.4.4 Mid-Western Regional Local Environmental Plan 2012

5.4.4.1 Subdivision

Clause 2.6 of the *Mid-Western Regional Local Environmental Plan 2012* (LEP) enables subdivision to be carried out with development consent. The proposed development constitutes a five (5) lot subdivision.

5.4.4.2 Land Use Table

The subject site is zoned RU4 Primary Production Small Lots pursuant to the provisions under the *Mid-Western Regional Local Environmental Plan 2012* (LEP). The objectives of the RU4 zone are:

- *To enable sustainable primary industry and other compatible land uses.*
- *To encourage and promote diversity and employment opportunities in relation to primary industry enterprises, particularly those that require smaller lots or that are more intensive in nature.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To ensure that land is available for intensive plant agriculture.*
- *To encourage diversity and promote employment opportunities related to primary industry enterprises, particularly those that require smaller holdings or are more intensive in nature.*

Comment: The proposed subdivision would be consistent with the zone objectives as it would facilitate future residential and primary production small lots development in accordance with the permissible uses and zone objectives, as listed above.

5.4.4.3 Clause 4.1 Minimum Subdivision Lot Size

The minimum lot size (MLS) applicable to the subject site is 20 hectares pursuant to Clause 4.1 and associated mapping under the LEP. As specified in **Table 2** of this report, Lots 2, 3 and 4 meet the specified minimum lot size of 20 hectares. Proposed Lot 5 shall remain unchanged in terms of size, with the exception of the road reserve dedication, and Lot 1 shall be created in accordance with Clause 4.2 of the LEP (i.e. to be used for primary production purposes).

5.4.4.4 Clause 4.2 - Rural Subdivision

The objectives of this Clause is to provide flexibility in the application of standards for the subdivision of rural zoned land to allow owners a greater change to achieve the relevant zone objectives. Consent is sought for a partial rural subdivision, being for proposed lot 1 as shown on the plans in **Appendix A** of this report. This allotment is under the specified minimum lot size and shall be created in accordance with Clause 4.2 of the LEP. In accordance with this Clause, there would be no existing dwellings situated on this lot and a dwelling entitlement would not exist on the lot once subdivided. The lot would purely be used for small lot primary production purposes in accordance with the zone objectives and permissible uses. It is recommended Council place a condition on the consent and future 88B instrument, clearly specifying that a dwelling entitlement does not exist on this lot. Refer also to the Intensive Agriculture Report provided in **Appendix F** of this report.

5.4.4.5 Clause 6.4 - Groundwater vulnerability

Clause 6.4 'Groundwater Vulnerability' applies to the subject application as the land is mapped as vulnerable in the LEP mapping. The proposed development will not affect the function of any groundwater dependent ecosystems, nor would it create any depletion or contamination of vulnerable groundwater resources. Future dwellings shall be connected to suitable on-site effluent systems, as recommended in the Effluent Assessment provided in **Appendix C** of this report. Furthermore, there will be no extraction of vulnerable groundwater to service the proposed development.

5.4.4.6 Clause 6.9 - Essential services

Clause 6.9 of the LEP states:

Development consent must not be granted to development unless the consent authority is satisfied that any of the following services that are essential for the proposed development are available or that adequate arrangements have been made to make them available when required—

- (a) the supply of water,*
- (b) the supply of electricity,*
- (c) the disposal and management of sewage,*
- (d) stormwater drainage or on-site conservation,*
- (e) suitable road access.*

Comment: Future residential dwellings shall be serviced with the following:

- Water supplied via onsite rainwater tanks. All roof water shall be directed into the tanks with overflow to be managed on each allotment;
- Overhead electricity lines;
- Onsite effluent systems; and

- Access crossover/driveway for each allotment.


The subdivision sketch in **Appendix A** shows some service locations, however it is determined that the required essential services for each future dwelling shall be addressed as part of future applications. A Preliminary Effluent Assessment has been provided in **Appendix C** of this report.

5.5 Draft Environmental Planning Instruments

No draft Environmental Planning Instruments are applicable to the subject site or development.

5.6 Development Control Plans

The *Mid-Western Development Control Plan 2013* (DCP) applies to the subject application. An assessment of the relevant provisions of the DCP has been provided in **Table 3** below.

Table 3 – DCP Requirements	
<i>Section 5.3 Stormwater Management</i>	
Section 5.3 of the DCP outlines the requirements for stormwater management. Given the large size of the proposed lots, all stormwater can be appropriately managed on each lot. Surface water shall be directed into existing dams and roof water for future dwellings shall be directed into storage tanks and in accordance with BASIX requirements. Any future development on the Lots would be required to comply with the requirements of the DCP for construction and operation.	
<i>Section 5.4 Environmental Controls</i>	
Protection of Aboriginal Archaeology Items	An AHIMS search has been undertaken for the site and its immediate surrounds (refer to Appendix D of this report). There are no items of Aboriginal Heritage located on the site or within proximity.
Bushfire Management	The site is not mapped as prone to bushfire hazards.
Riparian and Drainage Line Environments	<p>There are two (2) natural watercourses traversing through the site, as shown in the image below.</p>  <p>These identified watercourses are natural flows during flood and large rain events and are not considered running streams. Therefore riparian vegetation is minimal, generally consisting of grassland vegetation. Nevertheless, future dwellings shall not be sited within 40m of these</p>

	watercourses and erosion and sediment control measures would be implemented as part of future applications for residential occupation.
Pollution and Waste Management	<p>The proposed development would not result in pollution of the environment.</p> <p>The residential Lots would be established with suitable onsite effluent systems and all stormwater shall be appropriately managed on each site.</p>
Threatened Species and Vegetation Management	The site has been heavily disturbed as a result of previous agricultural activities on the site. There would be no trees removed as part of the proposed development.
Building in Saline Environments	The site is not known to be saline, nor would there be any impacts on potential saline environments within proximity.
<i>Section 7.2 Rural Subdivision</i>	
Site Plan	<p>The submitted plans in Appendix A of this report show the following:</p> <ul style="list-style-type: none"> • Existing vegetation and improvements; • Proposed access locations; • Proposed easements and land to be dedicated; • Existing infrastructure on the site; and • Designated watercourses and dams. <p>The supplied plans show the relevant detail required by this part of the DCP.</p>
Lot Size	<p>Each proposed residential allotment has sufficient area to enable the construction of a dwelling house, outbuildings, services, parking, access, private open space and the like.</p> <p>Each lot is sufficient size to carry out small scale primary production uses, in line with the zone objectives.</p>
Primary Production Small Lots	<p>This section states that subdivision applications in the RU4 zone for the purpose of agriculture and a dwelling will need to provide details in terms of the future use of the allotments. The following shall constitute as an assessment of the site, its current conditions, and suitability for intensive primary production and residential accommodation. The development is also supported by the Intensive Agriculture Report provided in Appendix F of this report.</p> <p><u>Introduction</u></p> <p>The land, being a total of approximately 74.4 hectares has been historically grazed and cropped due to previous uses. The soil is highly productive and suited for cropping, irrigation and growing feed for stock. The soil is well drained and is suited for a range of crop production in line with permissible uses in the RU4 land use table.</p>

Each Lot shall be used for agricultural activities, such as growing of lucerne/hay and other crops or running stock. These proposed activities shall meet the financial requirements of intensive agriculture in relation to income generation requirements and sustainability of a business.

Dominant Activities

A range of crops are capable of growing on the subject site. The following activities would need to be employed to sustain eventual cropping; sowing, irrigation, weed control, pest control, fertiliser application, mowing, raking, baling, stacking/storage and selling/unloading. Successful production of crop and/or growth of stock would be determined on a 12 month basis.

Budget

To ensure the future uses are productive, a profit and loss analysis would be required and subject to future applications for development on each proposed allotment. A forecast of five (5) years is recommended to ensure the longevity of the intensive agricultural uses.

Market

The Mid-Western Regional LGA is known for the production of crops and animal grazing. The area has many well established lucerne farms, olive farms, vineyards/grape production, along with many animal grazing businesses and horse breeding markets. All these primary production land uses are in strong demand due to the reliable soil production/suitability and source of irrigation in the area.

The subject site is well suited for any of the abovementioned intensive agriculture uses, especially given the presence of vineyards/grape production businesses surrounding the development site. Each proposed lot with its land area proposed, has suitable land to cater for future intensive agriculture land uses, in line with the demand for products throughout NSW and Australia. This means that any new enterprise entering the market would have immediate clearance of total production for the immediate foreseeable future. Mudgee’s unique situation, being within proximity to the Sydney Market, whilst having a strong local market, adds security for the longevity of agricultural business in the area.

Water Requirements

Although not proposed as part of this application, it would be recommended that future uses on each site would be established with their own water source (i.e. groundwater bore). Water is critical for the success and sustainability of these proposed activities. These bores shall be established in accordance with relevant NSW requirements/licencing processes to ensure water security is provided for each new lot.

Suitability of the Land

	<p>Each proposed new lot will be afforded with suitable land area on prime agricultural land with soil that is highly suitable for the production of crops or animal grazing. The soil is within a suitable range for crop production, which is confirmed by the surrounding land uses and there are no salt or salinity issues known to be present.</p> <p>It would be recommended that to ensure the soils productive state, a regular application (approximately 1-2 per year) of Phosphorus and Potassium fertilisers shall ensure the soils nutrient levels are good and in balance for future production. However, the application of these substances shall be subject to future application for residential dwellings/intensive agriculture.</p> <p><u>Conclusion</u></p> <p>It is therefore concluded that the site is located within a suitable location for future agricultural land uses/residential accommodation. Water availability would not be an issue and the land is currently zoned for intensive agriculture purposes. The future uses would be in line with the historical use of the site and adjoining properties.</p>
Services	Not applicable. The subject site is not located within 500m of an R1 General Residential or R2 Low Density Residential zone.
Roads	There are no new roads proposed as part of this subdivision application. The proposed access crossovers to each proposed lot shall be constructed in accordance with Council's Engineering Standards.
Lot Design	The subject site is predominately vacant land with low vegetation and is relatively flat throughout. The boundary layouts have been chosen to reduce environmental impacts and to ensure there are adequate sites for the construction of future dwelling houses.
Bushfire Prone Areas	The subject site is not mapped as a Bushfire Prone Area under RFS mapping. However, the site generally consists of managed grasslands with scattered trees and shrubs. There are no densely vegetated areas on the site, and future dwellings are capable of being sited in areas where vegetation is minimal and Asset Protection Zones are easily achievable.
Heritage	The subject site is relatively flat throughout and there a limited overland drainage lines. There are no known items of Aboriginal Heritage Significance, as confirmed in the Aboriginal Heritage Information Management System search in Appendix D and Aboriginal Cultural Assessment Report provided in Appendix E of this report.
Vegetation/flora	Refer to Sections 5.1 of this report which address's the requirements under the <i>Biodiversity Conservation Act 2019</i> . As stated in this Section, the proposed development is not likely to significantly affect threatened species as defined by Section 7.2 of the BC Act. Therefore, a Biodiversity

	Development Assessment Report (BDAR) is not required to accompany the application for development consent.
Fauna	<p>The subject site has been extensively cleared due to previous agricultural uses. There are some tracts of remnant trees and grassland vegetation.</p> <p>However, considering the site is predominately sparsely vegetated, it is considered that there is minimal fauna present on the site. As such, the proposed subdivision would not impact on any flora or potential fauna located on the site. If any threatened species are sighted or found during the subdivision works, the relevant authorities shall be advised.</p>
Crown Roads	Not applicable – The proposed development does not intend to open or use a Crown Road. However, part of Lot 1 DP 1003242 shall be dedicated as part of the road reserve for Magpie Lane, as shown on the Subdivision Sketch Plans in Appendix A of this report. This road reserve dedication shall be completed in consultation with Council or as required by the development consent once approved.
Watercourses	<p>The only subdivision works proposed as part of this application over watercourses on the site is the establishment of rural fencing. Schedule 4(23) 'Exemptions' of the <i>Water Management (General) Regulation 2018</i> states the following for Controlled Activities Exemptions (refer also to Clause 42 of the Regulation):</p> <p style="padding-left: 40px;">23 <i>Activities connected with construction of fencing, crossings or tracks</i></p> <p style="padding-left: 40px;"><i>Any activity carried out in connection with the construction or use of fencing, or of a vehicular crossing or an access track, that does not impound water, being an activity carried out in, on or under waterfront land—</i></p> <p style="padding-left: 80px;"><i>(a) relating to a minor stream, and</i></p> <p style="padding-left: 80px;"><i>(b) within a rural zone (other than a rural village) under an environmental planning instrument.</i></p> <p>The watercourses are defined as 'Minor Streams'. Therefore, the proposed rural fencing works are exempt from requiring a Controlled Activity Approval or referral from the Natural Resource Access Regulator (NRAR).</p>
Right of Carriageway	Nil proposed.
Battle Axe Handle Access	Nil proposed.
Water Cycle Management Report	An Effluent assessment has been prepared by Eastwest Consulting to determine the current site characteristics and future potential development, refer to Appendix C of this report. The report provides a plan (Figure 2) that shows unsuitable areas for effluent disposal and buffer distances to waterways.

Telecommunications Infrastructure Advice	Each residential allotment shall be connected to telecommunication infrastructure as part of the subdivision works. Consultation with Telstra Corporation, including the preparation of design plans, shall be undertaken prior to the issue of a Subdivision Certificate or as required by Council.
Electricity	There is an overhead electricity line traversing through the subject site. It is proposed to connect each residential allotment to this overhead infrastructure, in accordance with Essential Energy requirements. Consultation with Essential Energy, along with the provision of design documentation, shall be undertaken post DA approval and a Notice of Arrangement (NOA) shall be provided to Council prior to the issue of a subdivision certificate.
Land Use History	The subject site has historically been used for primary production purposes, in particular grazing and cropping. It appears that there have not been any contaminating uses carried out on the site and it is considered that a preliminary site investigation is not required in this instance.
Community Title Subdivision	Not applicable.

5.7 Any Planning Agreement entered into

No Planning Agreements entered into are known to exist in relation to the development or site.

5.8 Any Matters Prescribed by the Regulations

For the purposes of Section 4.15(1)(a)(iv) of the EP&A Act, Clause 92 of the *Environmental Planning and Assessment Regulations 2000* (EP&A Regulations) specifies the additional matters a consent authority must take into consideration when determining a DA. There are no provisions relevant to the proposed development.

5.9 Any Likely Impacts of the Development

5.9.1 Context & Setting

The subject site is located in a rural area comprising of scattered residential developments, small scale farming and winery operations. The area is dominated by animal grazing, crop production and wineries, with many small Lot primary production land uses. The proposed development would be consistent with the existing context and setting as it will reflect the RU4 land use zoning of the site. Furthermore, the intent of the subdivision is to create three residential allotments that can support small scale farming, which diversifies the local housing and property market. The proposed subdivision is therefore consistent with the zoning of the site and context of the locality.

5.9.2 Access, Transport & Traffic

It is not expected that the proposed subdivision would have an adverse impact in terms of traffic generation. The proposed lots shall provide future residential and primary production lots for the locality. Traffic generation of the future development of the lots would be considered as part of any DA for built form. Generally though, the existing traffic networks are considered to be suitable to support the subdivision as would have been anticipated as part of the zoning of the land. There would be minimal additional throughput as part of the subdivision of the land, and therefore no changes to traffic generation would be experienced. Sufficient Safe Intersection Sight Distance (SISD) is provided for each proposed lot in order to facilitate future driveways.

Given the above, the proposed subdivision and subsequent future development of the lots is therefore not expected to adversely impact on the capacity, functioning or safety of the local network or associated intersections.

5.9.3 Utilities

Electricity and telecommunication infrastructure shall be provided to each residential Lot as part of the proposed subdivision. Consultation with each service provider shall be undertaken and Notice of Arrangements (NOAs) shall be provided to Council prior to the issue of a subdivision certificate.

Onsite effluent systems shall be installed as part of future applications for residential development. For sites that may be subject to groundwater vulnerability, alternative systems such as Aerated Wastewater Treatment Systems (AWTS) shall be considered. The Effluent Assessment in **Appendix C** shows that each Lot is provided with sufficient area for onsite sewage management without impacting the natural environmental and nearby development or primary production usages.

Onsite rainwater collection tanks will be established as part of the residential development on each proposed lot. The rainwater harvesting requirements for each household would be dependent on occupancy capacity. Sufficient rainwater would also need to be provided for landscaping and general maintenance. In addition to tanks, each proposed Lot would be established with their own groundwater bore to support the primary production use of each Lot. Groundwater in this area is plentiful, and the required approvals/licenses shall be obtaining as part of future applications.

Therefore, each proposed lot will be connected to utility services, as required.

5.9.4 Heritage

No items of heritage significance have been identified on the site. Therefore, the proposed subdivision is not expected to have any adverse impacts on any items of heritage significance.

5.9.5 Other Land Resources

The subject site is zoned for primary production purposes. Each lot is of sufficient size and orientation to allow for primary production and allied agricultural uses in line with the zone objectives and permissible uses, as well as residential accommodation on the three lots that will be provided with dwelling entitlements.

5.9.6 Flora & Fauna

The site is extensively cleared and predominately contains managed grassland vegetation due to previous agricultural uses carried out on the site. There are ample options for the siting of buildings, without any disturbance to existing flora and fauna, thereby maintaining the ecological integrity of the site and locality.

5.9.7 Social & Economic Impacts in the Locality

The proposed subdivision is not expected to have any adverse social or economic impacts in the locality. The construction works for the subdivision (i.e. rural fencing, extension of powerlines etc) would provide for some minor positive economic impacts through employment and would facilitate future residential/primary production uses.

5.9.8 Construction

During construction there are likely to be minor and temporary impacts in terms of construction traffic, noise and dust. These would be mitigated through working during daytime hours, ceasing work during windy conditions, and by the use of a water spray where required. The installation of infrastructure shall be completed in accordance with the relevant providers requirements. If managed correctly, the construction works should not adversely impact the locality.

5.10 Suitability of the Site for the Proposed Development

The suitability of the site for the proposed development has been addressed in the above sections of this report. There are no prohibitive constraints posed by adjacent developments. There does not appear to be any zoning, planning or environmental matters that should hinder the proposed development of the site. In this regard, it can be concluded that the proposal fits into the locality and the site attributes are conducive for the development.

5.11 The Public Interest

The proposed development is considered to be in the public interest as it provides for a small-scale subdivision. As outlined throughout this report the development is consistent with the zone objectives under the LEP and is not expected to have any adverse off-site impacts.

6 CONCLUSION

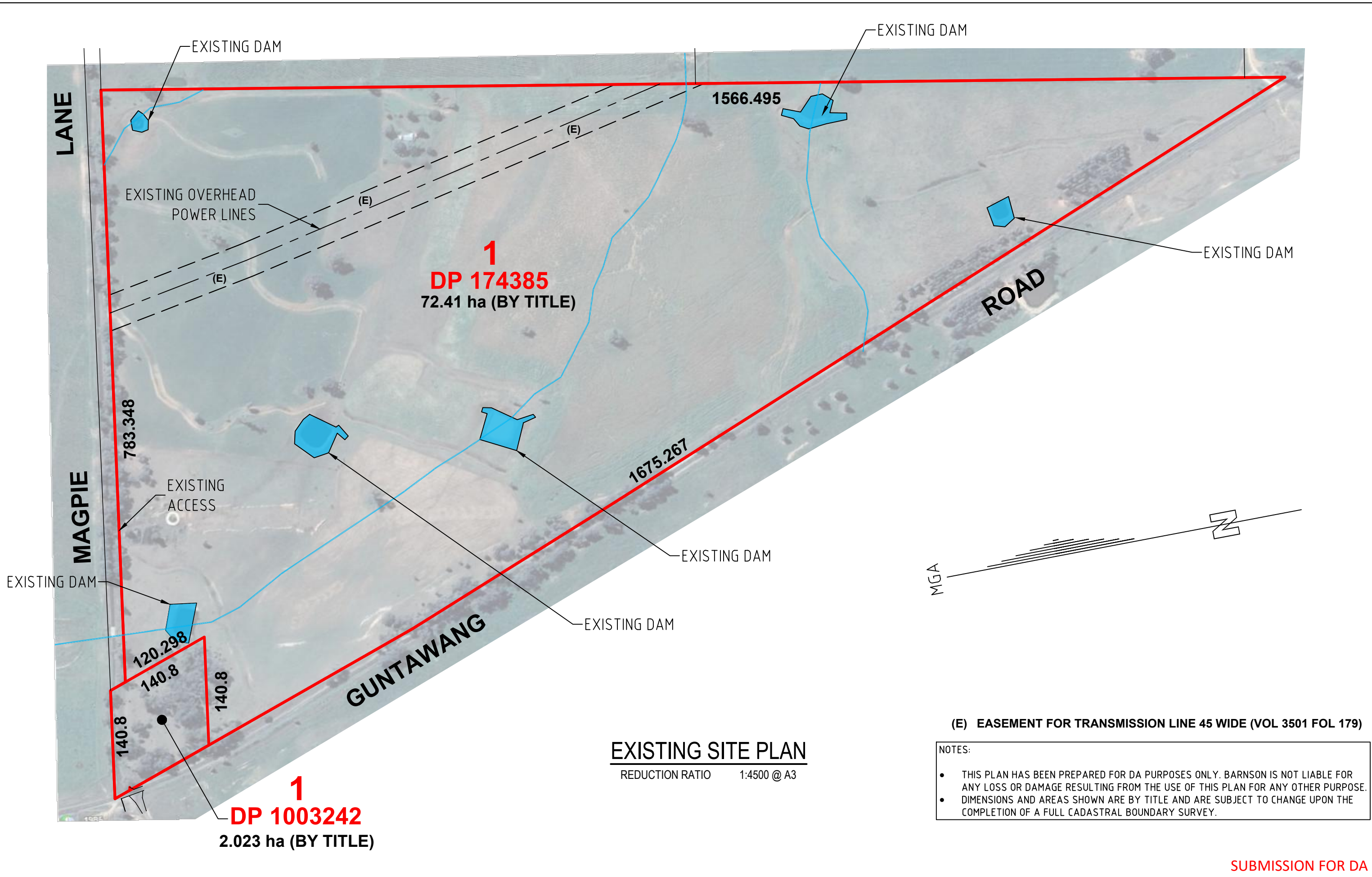
It is recommended that the proposed subdivision of 313 Magpie Lane, Galambine be supported on the following grounds:

- The proposal is considered acceptable in terms of the provisions of Section 4.15 of the *Environmental Planning and Assessment Act 1979*;
- The proposal is permissible with consent and consistent with the relevant development standards and provisions of the *Mid-Western Regional Local Environmental Plan 2012*;
- The proposal complies with the relevant provisions of the *Mid-Western Regional Development Control Plan 2013*;
- The proposed development is not anticipated to generate any adverse impacts in the locality; and
- The proposed development is considered suitable for the site and its surrounds.

7 REFERENCES

- NSW Government. (2021, August 9). *Biodiversity Value Map*. Retrieved from <https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap>
- NSW Government Spatial Services. (2021, August 5). *Six Maps*. Retrieved from <http://maps.six.nsw.gov.au/>
- NSW Planning & Environment. (2021).
- NSW Rural Fire Service. (2019). *Planning for Bush Fire Protection: A Guide for Council's, Planners, Fire Authorities and Developers*. Sydney: NSW RFS.

Appendix A - Subdivision Sketch Plan



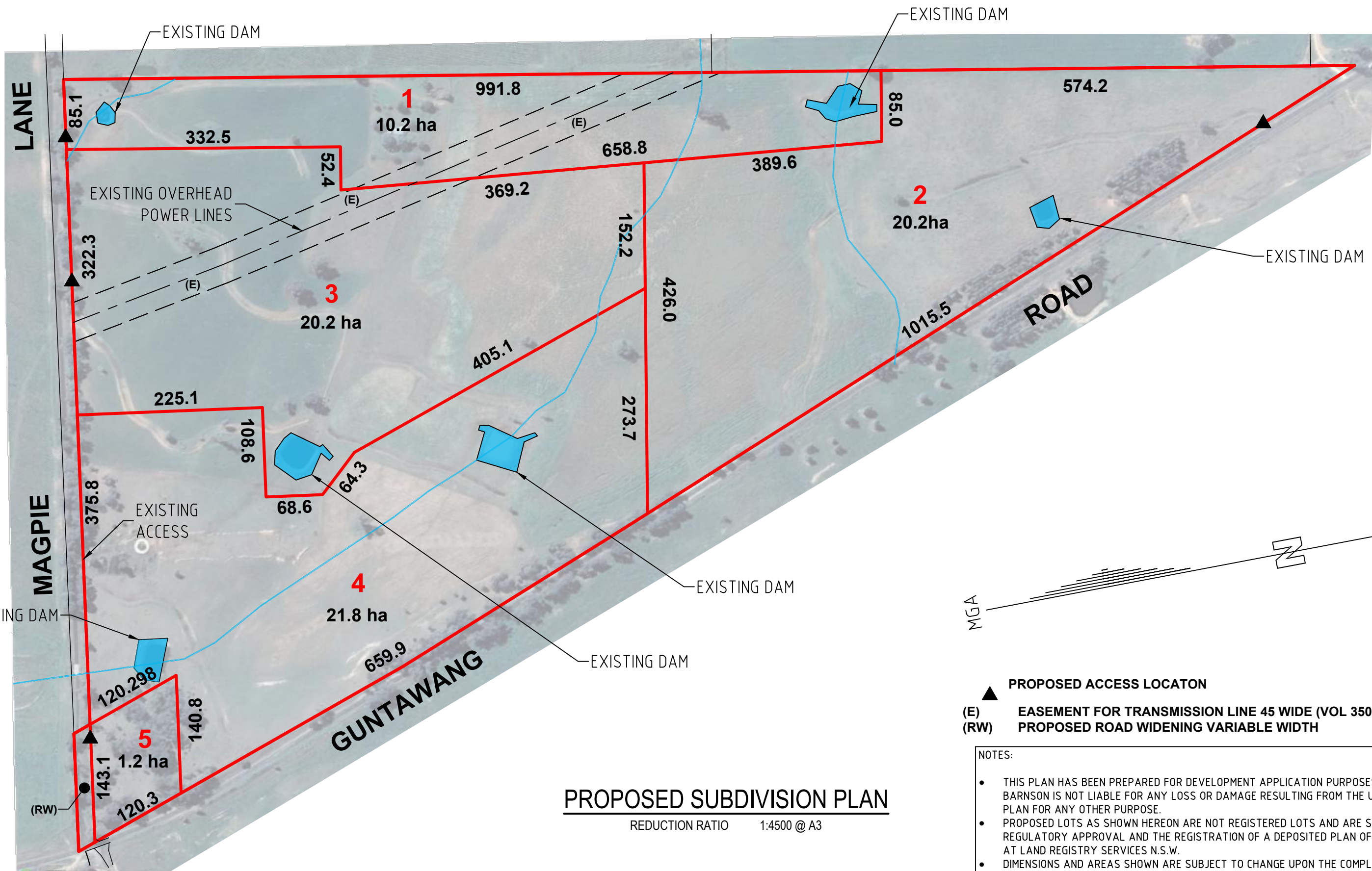
EXISTING SITE PLAN
REDUCTION RATIO 1:4500 @ A3

(E) EASEMENT FOR TRANSMISSION LINE 45 WIDE (VOL 3501 FOL 179)

NOTES:

- THIS PLAN HAS BEEN PREPARED FOR DA PURPOSES ONLY. BARNSON IS NOT LIABLE FOR ANY LOSS OR DAMAGE RESULTING FROM THE USE OF THIS PLAN FOR ANY OTHER PURPOSE.
- DIMENSIONS AND AREAS SHOWN ARE BY TITLE AND ARE SUBJECT TO CHANGE UPON THE COMPLETION OF A FULL CADASTRAL BOUNDARY SURVEY.

SUBMISSION FOR DA



PROPOSED SUBDIVISION PLAN

REDUCTION RATIO 1:4500 @ A3

- ▲ PROPOSED ACCESS LOCATON
- (E) EASEMENT FOR TRANSMISSION LINE 45 WIDE (VOL 3501 FOL 179)
- (RW) PROPOSED ROAD WIDENING VARIABLE WIDTH

NOTES:

- THIS PLAN HAS BEEN PREPARED FOR DEVELOPMENT APPLICATION PURPOSES ONLY. BARNSON IS NOT LIABLE FOR ANY LOSS OR DAMAGE RESULTING FROM THE USE OF THIS PLAN FOR ANY OTHER PURPOSE.
- PROPOSED LOTS AS SHOWN HEREON ARE NOT REGISTERED LOTS AND ARE SUBJECT TO REGULATORY APPROVAL AND THE REGISTRATION OF A DEPOSITED PLAN OF SUBDIVISION AT LAND REGISTRY SERVICES N.S.W.
- DIMENSIONS AND AREAS SHOWN ARE SUBJECT TO CHANGE UPON THE COMPLETION OF A FULL CADASTRAL BOUNDARY SURVEY.

SUBMISSION FOR DA



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Client: GH MUDGEY PTY LTD
 Project: PLANNING PROPOSAL
 LOT 1 IN DP 174385 & LOT 1 IN DP 1003242
 313 MAGPIE LANE GALAMBINE 2850
 Drawing Title: PROPOSED SUBDIVISION PLAN

Rev	Date	Amendment
A	12-08-2021	SUBMISSION FOR DA

Design	EG	Certification	
Drawn	MK		
Check	JM	Drawing Number	Revision
Original Sheet Size = A3		27447 - P11	A

Appendix B - Title & Deposited Plan



NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 1/174385

SEARCH DATE	TIME	EDITION NO	DATE
30/1/2020	2:48 PM	9	9/3/2015

LAND

LOT 1 IN DEPOSITED PLAN 174385
LOCAL GOVERNMENT AREA MID-WESTERN REGIONAL
PARISH OF GALAMBINE COUNTY OF PHILLIP
TITLE DIAGRAM DP174385

FIRST SCHEDULE

G H MUDGEY PTY LIMITED (T AJ300064)

SECOND SCHEDULE (2 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 R341868 EASEMENT FOR TRANSMISSION LINE AFFECTING THE PART
OF THE LAND ABOVE DESCRIBED SHOWN SO BURDENED IN VOL
3501 FOL 179
2412164 EASEMENT VESTED IN THE NEW SOUTH WALES
ELECTRICITY TRANSMISSION AUTHORITY

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

Barnson Pty Ltd (Mudgee)

PRINTED ON 30/1/2020

* Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title.
Warning: the information appearing under notations has not been formally recorded in the Register.

GLOBALX TERRAIN PTY LTD - hereby certifies that the information contained in this document has been provided electronically by the Registrar General in accordance with section 96B(2) of the Real Property Act 1900.

Note: Information contained in this document is provided by GLOBALX TERRAIN PTY LTD (ABN 35 164 894 517),
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A982913

Plan Form No. 6 (for transfers, leases, etc).

Municipality of Shire of Wyaldra.

M.A.M.

A982913

PLAN

F.P.174385

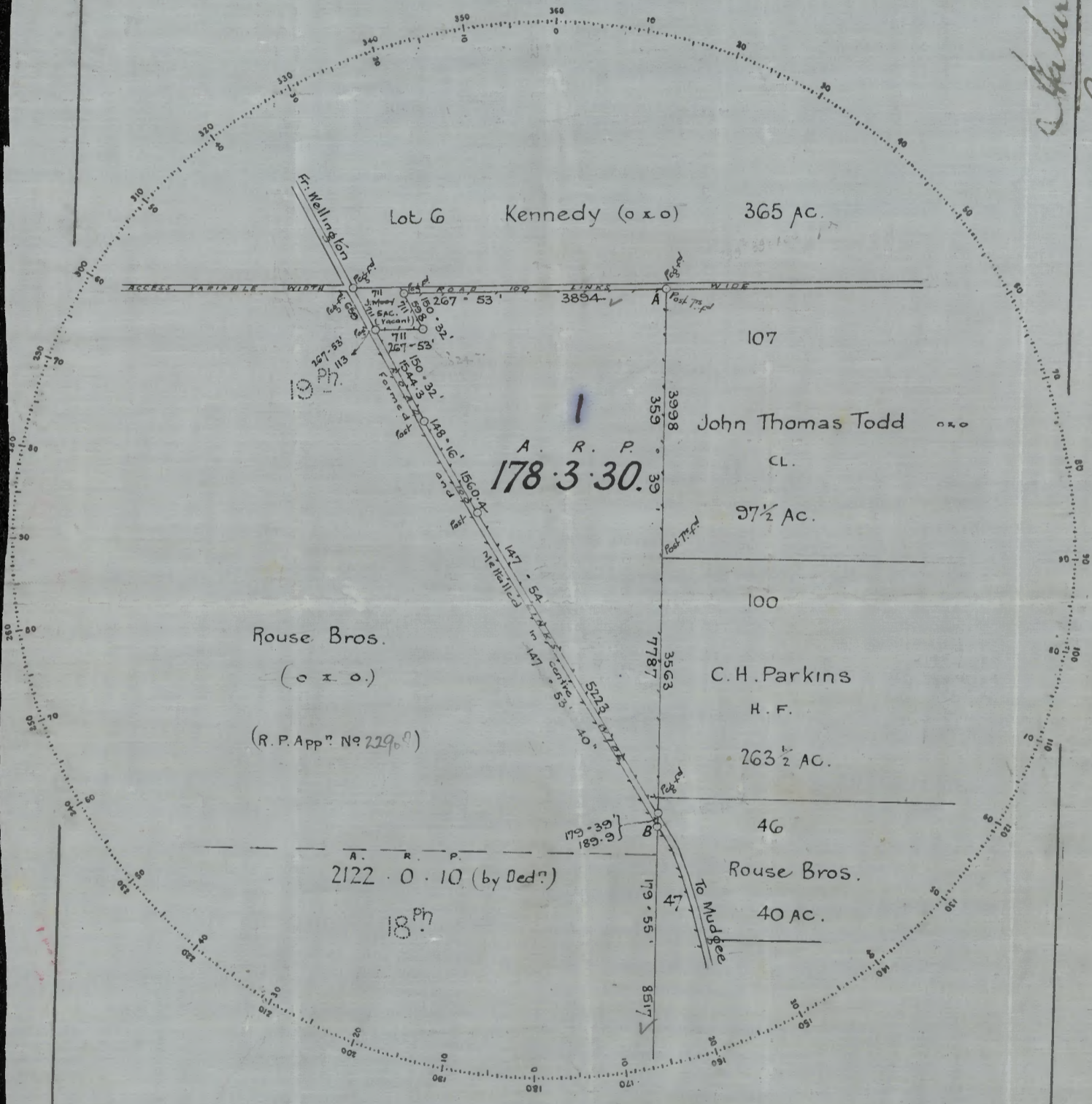
of part of original Portion 19, of 784 Acres.
Parish of Galambine. County of Phillip.

Scale: 20 Chains to an Inch.

Arthur H. ...

Leslie G. ...

Signatures of parties to be made in this margin.



This is the plan marked "E" referred to in Transfer from H.C. Rouse to L.G. Rouse
Dated 14th August 1923

I, William Abernethy of Mudgee N.S.W. Licensed Surveyor, specially Licensed under the Real Property Act, do hereby solemnly and sincerely declare that the boundaries and measurements shown in this plan are correct for the purposes of the said Act, and that the survey of the land to which the plan relates has been made* by me, and I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the Oaths Act, 1900.

Subscribed and declared before me at Mudgee this 23rd day of June A.D. 1920

William Abernethy
Licensed Surveyor.

Datum line of Azimuth A.B.

Date of Survey 24th June 1920.

* Here add by me or under my immediate supervision as the case may be

*Mk 626 P60
A. 238-23
28-23*



CONVERSION TABLE ADDED IN
DEPARTMENT OF LANDS

DP 174385

LINKS	METRES
100	20.117
113	22.732
189.9	38.202
598	120.298
659	132.570
699	140.616
711	143.030
1544.3	310.664
1560.4	313.903
3563	716.762
3894	783.348
3998	804.270
5223	1050.700
7787	1566.495
8517	1713.348

AC	RD	P	HA
5	-	-	2.023
40	-	-	16.19
97	2	-	39.46
178	3	30	72.41
263	2	-	106.6
365	-	-	147.7
2122	-	10	858.8

Appendix C - Effluent Assessment

On-site effluent management study
313 Magpie Lane, Galambine NSW 2850

Envirowest Consulting Pty Ltd ABN 18 103 955 246

- 9 Cameron Place, PO Box 8158, Orange NSW 2800 • Tel (02) 6361 4954 •
- 6/72 Corporation Avenue, Bathurst NSW • Tel (02) 6334 3312 •
- Email admin@envirowest.net.au • Web www.envirowest.net.au •

*Environmental
Geotechnical
Asbestos
Services*



Document control					
Client ██████████ ██████████ ██████████					
Rev	Report number	Date	Prepared by	Checked by	Revision details/status
0	R11872e	17/04/2020	Ashleigh Adams BSc Environmental Scientist	Andrew Ruming BSc Senior Environmental Scientist	
1	R11872e1	10/08/2021	Tiffany Skinner BNatRes (Hons) Environmental Scientist	Leah Desborough BNatRes (Hons) Senior Environmental Scientist	Revised for lot layout

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Summary

Proposed development and situation

A rural residential development consisting of five lots is proposed for Lot 1 DP174385 and Lot 1 DP1003242, 313 Magpie Lane, Galambine NSW. An existing dwelling is located on the site and is expected to be serviced by an existing septic tank and absorption trench. The development is unlikely to be connected to municipal sewer. An on-site effluent management system is required for each dwelling on the site.

This report describes the assessment and recommends a suitable effluent treatment and application system on a generic basis.

Objective

Undertake site assessment using the Australian Standard 1547, On-site domestic wastewater management and the Environment and Health Protection Guidelines, On-site sewage management for single households (1998), Department of Urban Affairs and Planning, as guidelines. Site limitations were identified and suitable wastewater application systems and sizing are recommended on a generic basis.

Investigation

A site assessment was undertaken on 1 April 2020. Soil data from boreholes previously undertaken on the site (7 September 2001 and 24 April 2003) were used. A desktop study was conducted using expected wastewater flows and collection of available site information.

Site and soil assessment

The historical land-use of the site is grazing of livestock. The terrain is undulating rolling hills. Drainage lines and dams are located across the site. The surface water from the site discharges into Pig and Whistle Creek and eventually into Cudgegong Creek.

Vegetation on the site consists of pasture species and broadleaved weeds.

The previous soil investigations identified topsoil consisting of clay loams to sandy loams to a depth between 150 and 300mm. Subsoils consisted of clay loams, light clays and medium clays to the drilling depth of 1100mm. Grey mottles were identified in the soil profile from a depth of 420mm and indicate moderate drainage. The soil samples collected were moderately to highly dispersive.

Limitations to the application of effluent were identified and include topography, rock outcrops, soil type, soil dispersiveness and landscape features.

System recommendation

Based on the site and soil limitations, practicality and cost considerations the following recommendations are made for the treatment and application of effluent for each lot.

The recommended effluent system for each lot based on available information and assumptions is expected to be:

- **Surface irrigation area of 488m²** with a secondary treatment system accredited by NSW Health

The recommendations are made using the available data and should be considered as being generalised for the site as a whole. Assumptions have been made in the soil description and a specific site and soil assessment is required to make recommendations of locations and suitable systems for individual lots.

All lots are expected to have sufficient areas for application systems after allowance for buffer distances to boundaries, buildings, drainage lines and bores.

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Appendix 3b. Estimation area requirement from organic matter and nutrient balances	
Appendix 4. Checklist for effective management of wastewater systems	

1. Introduction

A rural residential development consisting of five lots is proposed for Lot 1 DP174385 and Lot 1 DP1003242, 313 Magpie Lane, Galambine NSW. An existing dwelling is located on the site and is expected to be serviced by an existing septic tank and absorption trench. The development is unlikely to be connected to municipal sewer. An on-site effluent management system is required for each dwelling on the site.

The site has a total area of approximately 75 hectares. The proposed lot sizes range from 0.7 to 18.5 hectares and currently consist primarily of pasture crops. The historical land-use for the property is pasture for livestock grazing.

2. Scope of work

A site assessment and soil assessment was undertaken using the Australian Standard 1547, On-site domestic wastewater management, Sydney Catchment Authority guidelines, Designing and Installing On-site Wastewater Systems (2012) and the Environment and Health Protection Guidelines, On-site sewage management for single households (1998), Department of Urban Affairs and Planning, as guidelines. Site limitations were identified and suitable wastewater application systems and sizing are recommended on a generic basis.

3. Site identification

3.1 Location

The site is bordered by Guntawang Road and Magpie Lane (Figure 1). The site is described as Lot 1 DP DP174385 and Lot 1 DP1003242, 313 Magpie Lane, Galambine NSW.

3.2 Council area

Mid-Western Regional Council

3.3 Owner/Developer

Barnson
6/11 White Street
Tamworth NSW 2340

3.4 Development

The proposed subdivision will create 5 lots, Lots 1 to 5. Lots range in size from 0.7ha to 18.5ha (Figure 2). The development will involve the construction of access driveways.

3.5 Area and lot sizes

The total area of the site is 75 hectares from which five lots are proposed. Individual sizes are presented in Figure 2. Building envelopes have not been identified for each lot. The whole site was assessed for on-site effluent suitability. Photographs of the site are presented in Figure 3.

3.6 Current land use

The current land-use is crop and grazing of stock.

3.7 Local experience of on-site management systems

Effluent systems work satisfactorily in locality when they have been adequately designed

4. Site condition and surrounding environment

An assessment of the site was made from a desktop study and field visit. Information for the desktop study was obtained from topographic maps, aerial photographs and database searches.

A site inspection was undertaken on 1 April 2020. The site was described and soil sample collected for laboratory analysis. Previous boreholes undertaken on the site were obtained for information on the soil profile.

At the time of the investigation surrounding land-use consisted of stock grazing.

4.1 Topography

The topography of the site is undulating rolling hills with slopes ranging from 1 to 5%. Slopes are gentler in the southern section of the site. The site is located on a lower slope. Elevation ranges from 425 to 445 metres. Aspect varies over the site.

The lots predominately have a high exposure and flood hazard across the site is low. The subsoil has a low to moderate erodibility and erosion hazard. The erosion hazard is reduced by maintenance of adequate vegetation cover.

4.2 Climate

Summers are warm to hot and winters are cold with little or no effective evaporation. The occurrence of rainfall is slightly higher in summer. Average annual rainfall is 647 mm and annual evaporation is 1335mm.

4.3 Hydrogeology

4.3.1 Surface Water

No permanent streams are located on the site. Two drainage lines are located on the site, one traversing from the east to the north west and another from the east to the west. Surface water across the site predominately flows north west and south. Surface water flows along intermittent drainage lines and eventually into Pig and Whistle Creek approximately 100m west and 750m north from the site. Pig and Whistle Creek discharges into the Cudgegong River 1.5km east of the site.

Six dams are located on the site. The dams are expected to be used for stock watering.

The proximity of drainage lines and dams is a limitation to the application of effluent. Application areas need to be a minimum of 40m from drainage lines and dams.

4.3.2 Groundwater

No bores are located on the site or within 500m. The site is located in a groundwater vulnerable area identified on the Mid-Western Council Local Environmental Plan 2012. Local groundwater has very high salinity.

4.4 Vegetation

The site has been predominately cleared of native vegetation and is dominated by pasture species and broadleaved weeds.

No bare areas or areas indicating salinity were identified on the site.

4.5 Soil type and geology

The site is within the Mullion Creek Soil Landscape (Kovac *et al.* 1990).

The soils are derived from Chesleigh Formation, Cookman Formation, Undifferentiated, Cunningham Formation, Dunmoogin Formation, Lana Formation and Guroba Formation. Soils on the site include red podzolic soils on crests and upper slopes and yellow soloths and yellow solodic soils on mid to lower slopes and in drainage lines.

5. Investigation methods

A site inspection was undertaken on 1 April 2020. The site and surface conditions on the site were described.

Boreholes were previously undertaken on the site and the soil profile was described and samples were collected from boreholes at representative depths for the determination of physical and chemical properties. Soil physical and chemical properties measurements undertaken included: dispersion, texture, colour, pH and electrical conductivity (salinity). The tests were conducted by Envirowest Testing Services.

Soil electrical conductivity (EC) results of the 1:5 (soil:water suspension) were converted to saturated extracts (ECe). EC values are converted to ECe by using a multiplier factor (Hazelton and Murphy 1992), which is dependent on the soil texture (Table 1). Saline soils are defined as those with an electrical conductivity (ECe) greater than 4 dS/m (Charman and Murphy 2001). Soil salinity ratings and effects on plant growth are presented in Table 2.

Table 1. ECe texture based conversion factors (Charman and Murphy 2001)

Soil texture	Conversion factor
Loamy sand, clayey sand, sand	23
Sandy loam, fine sandy loam, light sandy clay loam	14
Loam, loam fine sandy, silt loam, sandy clay loam	9.5
Clay loam, silty clay loam, fine sandy clay loam	8.6
Sandy clay, silty clay, light clay	7.5
Light medium clay, medium clay, heavy clay	5.8

Table 2. Soil salinity ratings based on ECe readings

Salinity rating	ECe (dS/m)*	Effects on Plants
Non saline (NS)	0-2	Salinity effects negligible
Slightly saline (SS)	2-4	Very salt sensitive plant growth restricted
Moderately saline (MS)	4-8	Salt sensitive plant growth restricted
Highly saline (HS)	8-16	Only salt tolerant plants unaffected
Extremely saline (ES)	>16	Only extremely tolerant plants unaffected

*ECe - Electrical conductivity of a saturated extract

Soil with ECe below 2 dS/m will have negligible effects on plant growth and soil stability. Soil with ECe of between 2 and 4 dS/m may restrict very salt sensitive plant growth. Soil with ECe between 4 and 8 dS/m will restrict the growth of salt sensitive plants.

Samples collected were analysed for dispersion using the Emerson aggregate test. Table 3 details the Emerson dispersion classes.

Table 3. Emerson dispersion classes

Class	Description
1	Highly dispersive (slakes, complete dispersion)
2	Moderately dispersive, slakes, some dispersion
3	Slightly dispersive, slakes, some dispersion after remoulding
4	Non-dispersive, slakes, carbonate or gypsum present
5	Non-dispersive, slakes, dispersion in shaken suspension
6	Non-dispersive, slakes, flocculates in shaken suspension
7	Non-dispersive, no slaking, swells in water
8	Non-dispersive, no slaking, does not swell in water

6. Results

6.1 Soils

Soil was previously assessed on the site on 7 September 2001 and 24 April 2003 by drilling 7 boreholes to 1.1 metres or drill refusal due to rock.

The soil profile was described and representative sample collected for the determination of physical and chemical properties. Soil physical properties measurements undertaken included: dispersion, texture, colour, pH, and salinity. The laboratory tests for physical properties were undertaken by Envirowest Testing Services and presented with the borelogs in Appendix 1.

6.1.1 Soil profile

The previous soil investigations identified topsoil consisting of clay loams to sandy loams to a depth between 150 and 300mm. Subsoils consisted of clay loams, light clays and medium clays to the drilling depth of 1100mm. Grey mottles were identified in the soil profile from a depth of 420mm and indicate moderate drainage. The soil samples collected were moderately to highly dispersive.

6.1.2 Depth to bedrock

Soil depth was previously identified between 600 to greater than 1100mm. This depth is expected to decrease on the upper slopes of the site. The depth to rock is expected to be a site limitation on these upper slopes to the application of effluent.

6.1.3 Surface rocks, rock outcrops

Rock outcrops were observed on the site. These rock outcrops will be a limitation to the application of effluent in specific areas. Rock outcrops are indicated in Figure 2.

6.1.4 Depth to groundwater

Seasonally elevated groundwater was previously identified between 600 and 1000mm as indicated by the presence of grey mottles and ironstone gravel.

6.1.5 Coarse fragments

Gravel and sand were previously identified in the borehole profiles. The gravel is not a limitation to the application of effluent. Some areas contain cobbles on the surface and in the profile.

6.1.6 Bulk density

Bulk density was estimated to be moderate from field assessment and the land-use history. Bulk density will not limit plant growth.

6.1.7 pH

Soils on the site were previously measured to be neutral. The levels present will significantly affect the growth of most species.

6.1.8 Salinity

No salt tolerant vegetation was observed. The electrical conductivity of all soil samples tested was non-saline. Results were less than 4 mS/cm which is considered the saline threshold. Saline soils are known to occur in the locality.

The site is located in the Dunedoo hydrogeological landscape. The salinity occurrence is localised and salt store high. Strata contains high salt load which is readily mobilised from concentrations in impermeable layers with fractured beds. Groundwater was very high salinity.

6.1.8.1 Indicators of salinity

Bare soil

No bare soils were present on the site at the time of inspection.

Salt crystals

No salt crystals were present on site at the time of inspection. Saline areas are known to occur upslope in the sub-catchment.

Vegetation indicators

No highly salt tolerant plant species are present on site. No patchiness or reduced vigour in any area of the pasture was observed.

Die back

No die back was observed on or surrounding the site.

Effects on buildings

No staining, corrosion or rising damp observed.

6.1.9 Phosphorus sorption

Estimated to be low to moderate for the site (6,500mg/kg).

Phosphorous sorption of the soil is a minor limitation. The effluent system will be designed to contain phosphorus within the application area.

6.1.10 Nutrient balance

Nitrogen will be utilised by plant growth and denitrified or absorbed in the soil. The soil has capacity to support active vegetation which will contain nitrogen in the application area.

6.1.11 Cation exchange capacity (CEC)

The CEC is estimated to be low to moderate from the soil texture. The application of nutrient in the effluent will provide nutrients for plant growth that are naturally deficient in the soil. The soil will provide adequate retention of nutrients for plant growth.

6.1.12 Dispersiveness

Moderately to highly dispersive soils have been previously identified on the site. An adequately designed effluent system with the maintenance of vegetation on the application area and the regular

application of gypsum will prevent any reduction in infiltration or erosion problems associated with the dispersive soils.

6.1.13 Soil structure

The soils were assessed to have a moderate soil structure.

7. On-site effluent management

7.1 Slope

Slope is a limitation to application of wastewater. Steep slopes can cause greater run-off during wet weather. The application of wastewater from absorption trench systems is limited to slopes of 15% or less and for sub-surface irrigation systems of 30% or less. Application area location and system selection prevent slope from limiting the application of effluent on the site. Slopes within the recommended application area are 3% to 5%.

7.2 Buffers and available area

Sufficient buffer distances to drainage lines and dams are available in all lots and this can be additionally confirmed at the time of construction. Recommended buffer distances to streams, bores, dwellings, rock outcrops and boundaries are presented in Appendix 2. Areas of established trees should be protected by exclusion of application areas within the canopy drip zone.

7.2.1 Permanent waters, streams, lakes, rivers.

No streams are located on the site. Pig and Whistle Creek is a permanent stream located within 100m east of the site. Cudgegong River is located approximately 500m east of the site.

7.2.2 Other waters, intermittent waterways

A drainage line is located from the east to the north west of the site and one drainage line is located from the east to the west in the southern section of the site. Six dams are located on the site. The dams are expected to be used for stock watering. A 40m buffer distances is required to the dams and drainage lines.

7.2.3 Domestic groundwater wells

No groundwater bores are located on the site or within 500m. No impact on groundwater is expected from the application of effluent.

7.2.4 Boundary premises

A buffer of 12m from the boundaries in each lot is required.

7.2.5 Available area and reserve area

Typical application areas are 488m² and therefore sufficient area is available in each lot for effluent application.

7.3 Dispersive soil

Moderately to highly dispersive soil has been identified on the site and within the locality. Soil dispersion can result in soil crushing. The maintenance of vegetation on the application area and the regular application of gypsum will prevent any reduction in infiltration or erosion problems associated with the slightly to highly dispersive soils. The periodic application of gypsum is recommended.

7.4 Environmental concerns

The site is not located in a sensitive biodiversity area (Mid-Western Local Environmental Plan 2012).

Native Plants	Nil
High water table	Nil
Community water storage	None nearby
Waterway/wetland	None nearby

7.7 Suitability of application systems

Application system	Treatment system	Site limitations of the application system	Modifications to mitigate constraints	Suitability
Absorption system	Septic tank	Moderately to highly dispersive subsoil Saline soils in locality Rocky outcrops on site	Nil Nil Nil	No
Evapotranspiration absorption system	Septic tank	Moderately to highly dispersive subsoil Saline soils in locality Rocky outcrops on site	Nil Nil Nil	No
Surface irrigation	Secondary	Moderately dispersive topsoils Rocky outcrops on site Saline subsoils	Regular application of gypsum Avoid irrigating in rocky areas Adequate sizing of application area, offset planting of trees, upslope surface diversion drains, detailed assessments to avoid saline surface areas for effluent applications, protect established vegetation	Yes
Sub-surface irrigation	Secondary	Moderately to highly dispersive subsoil Saline soils in locality Rocky outcrops on site	Nil Nil Nil	No

8. Effluent design

8.1 Estimated flows

Typical effluent flow designs allowances in households with standard water fixtures is 120 litres/person/day where the water source is on-site tank supply (AS1547). Assuming the occupancy of the dwelling is 5 people (four bedrooms) the design flow rate for the dwelling is 600 litres/day.

Flows are based on the use of water saving devices such as dual flush toilets (6/3 litre water closets), water reduction cycles on dishwashers, aerator faucets fitted to taps and water reducing shower heads.

8.2 Hydraulic balance calculations and nutrient balance

The interactions between soil, climate, topography and the hydraulic and nutrient loadings were modelled based on the design in DUAP (1998). The model provides estimates consistent with more complex models and meets environmental performance objectives.

The parameters used in the model were as follows:

- effluent flow of 600 litres/day
- estimated absorption rate of expected soils on site for irrigation systems of 3mm/day. Trench systems are not suitable due to moderately to highly dispersive soils and saline soils in the locality.
- estimated phosphorus sorption of 6,500kg/ha for expected soils
- Climate data for Gulgong

The estimated area required is presented in appendix 3.

8.3. System recommendation

Based on the site and soil limitations, practicality and cost considerations the following recommendations are made for the treatment and application of effluent.

The recommended effluent system for each lot based on available information and assumptions is expected to be:

- **Surface irrigation area of 488m²** with a secondary treatment system accredited by NSW Health. Surface irrigation is suitable depending on site limitations.

The recommendations are made using the available data and should be considered as being generalised for the site as a whole. Assumptions have been made in the soil description and more detailed assessment is required to make recommendations of locations and suitable systems for individual lots.

The main limitation is subsurface salinity and management is required to prevent deep recharge and mobilisation or stored salts. The following mitigation measures should enable a sustainable development to be undertaken

- Adequate sizing of application area
- Offset planting of trees
- Upslope surface diversion drains
- Detailed assessments to avoid saline surface areas for effluent applications
- Protect established vegetation
- Dams on site should be filled to prevent recharge

Construction of the treatment and application systems should be according to AS1547.

Surface diversion drains are recommended upslope of the application area and should be maintained.

Gypsum should be applied to the application area during construction and every two years to maintain permeability.

Secondary treatment systems require regular maintenance to ensure effective operation. Maintenance scheduling should be undertaken in accordance with manufacturers and NSW Health guidelines.

The water balance is calculated using full water saving devices, including dual flush toilets (6/3 litre water closets) and aerator faucets fitted to taps, handbasins, showers and a kitchen.

9. System management

Wastewater should be evenly applied over the application area.

The application area should be restricted access to people and stock as recommended in AS1547 and summarised in Appendix 4.

The topsoil on the site is capable of supporting plant growth that will optimise evapotranspiration and wastewater usage. A grass sward should be maintained in the application area. Annual assessment of the vegetation and soil areas should be undertaken and mitigation measure undertaken to maintaining vegetation growth and soil health.

Appendix 4 is a checklist of do's and don'ts to ensure correct operation of the wastewater system. Periodic application of gypsum is recommended.

10. Report limitations and intellectual property

This report has been prepared for the use of the client to achieve the objectives given the clients requirements. The Australian Standard 1547, On-site domestic wastewater management, and the Environment and Health Protection Guidelines, On-site sewage management for single households (1998) Department of Urban Affairs and Planning, have been used as guidelines in this report. Where system limitations or uncertainties are known, they are identified in the report. No liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been predicted using the scope of the investigation and the information obtained. No guarantee can be made that the wastewater system will achieve all performance criteria because of operational factors and the inherent variable and unpredictable nature of the soil. All components of the wastewater system have a limited life.

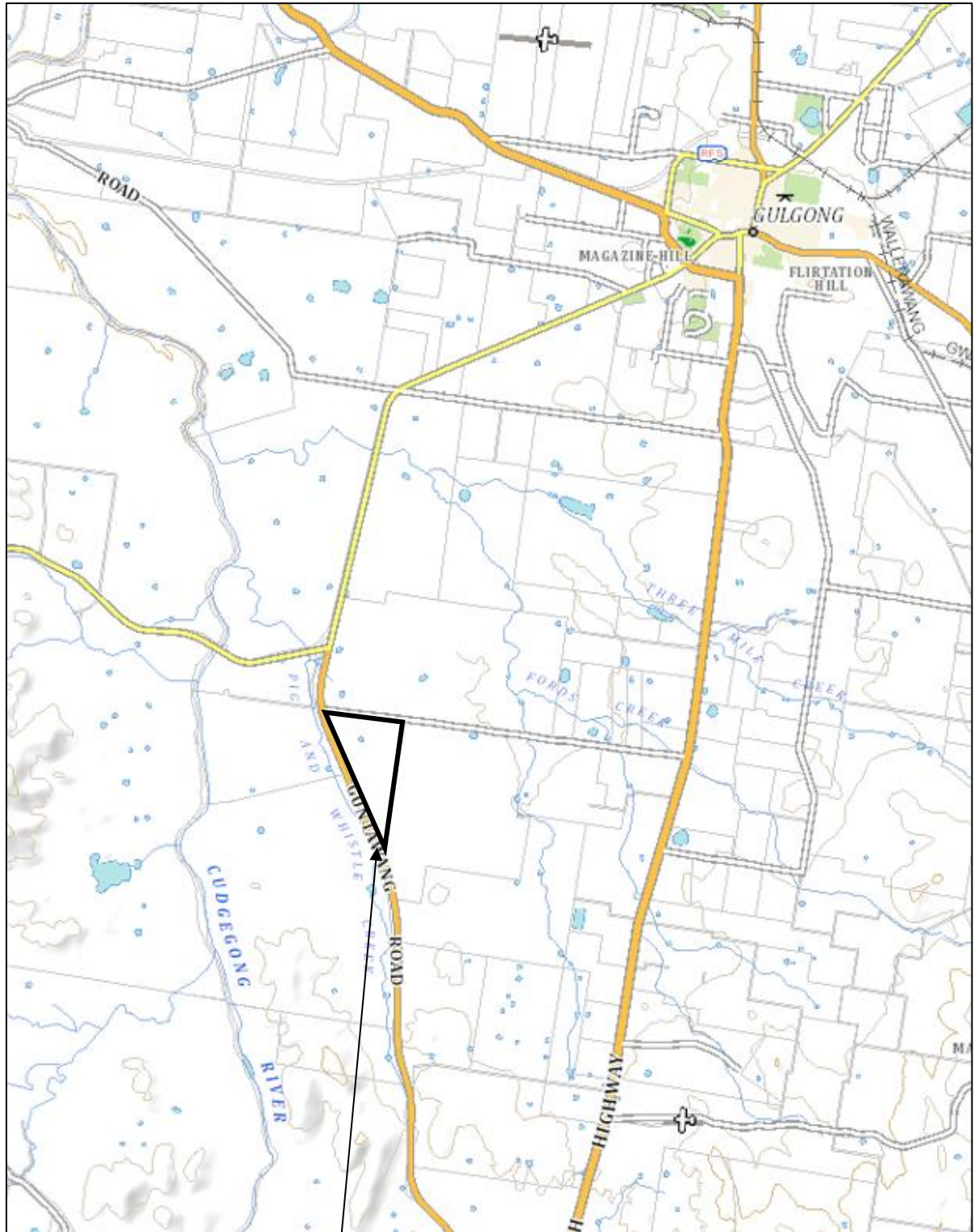
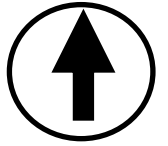
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Figures

Figure 1. Locality map

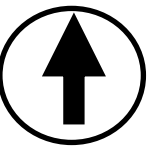
Figure 2. Site plan with recommended buffer distances

Figure 3. Representative photographs of the site taken on 1 April 2020









Investigation area

Figure 1. Locality plan		
313 Magpie Lane, Galambine NSW		
	Envirowest Consulting Pty Ltd	
Job: R11872e1	Drawn by: AA	Date: 7/4/2020



Legend

-  Lot Boundary
-  Dams
-  Drainage lines
-  Unsuitable areas for application area
-  Buffer distance to waterways
-  Rock outcrops/ exclusion areas

Approximate Scale 1: 6,000
0 60 120 240m


Figure 2. Site plan with recommended buffer distances		
313 Magpie Lane, Galambine NSW		
	Envirowest Consulting Pty Ltd	
Job: R11872e1	Drawn by: TS	Date: 10/08/2021

Figure 3. Representative photographs of the site



Looking west across the northern section of the site



Looking south across the northern section of the site



Looking west across the site



Looking south west across the site



Looking north east across the site



Looking west across the site

Appendices

Appendix 1. Bore logs and laboratory results from previous investigations on 7/9/2001 and 24/4/2003

Depth (mm)	Description	Sampled (X)	Texture group	Moisture	Emerson aggregate test*	pH (1:5 water)	ECe dS/m
Test hole 1							
0-150	Dark brown sandy loam	X	SL	M	3	6.5	0.66
150-450	Light brown sandy clay loam	X	SCL	M	1	6.9	0.70
450-7500	Red brown light clay	X	LC	M	2	7.3	0.63
750-760	Red clayey sand		CS	M			
1500	End of hole, refusal on rock						
Test hole 2							
0-380	Dark brown light clay	X	LC	M	1	6.8	0.45
380-700	Yellow brown medium clay	X	MC	M	4	8.2	0.28
700-1000	Dull yellow brown medium clay	X	MC	M	4	8.0	0.49
1000	End of hole, refusal on rock						
Test hole 3							
0-150	Dark brown clay loam	X	CL	M	5	6.7	0.54
150-420	Light brown clay loam	X	CL	M	3	6.7	0.54
420-750	Yellow brown medium clay with grey and red mottles and some medium sized gravel	X	MC	M	2	6.7	0.42
750	End of hole, refusal on rock						
Test hole 4							
0-150	Dark brown clay loam	X	CL	M	5	6.8	0.45
150-300	Brown clay loam		CL	M			
300-900	Red brown light clay with red mottles	X	LC	M	1	7.0	0.63
900-1100	Red brown light clay	X	LC	M	4	8.6	0.36
1100	End of hole						
Test hole 5							
0-150	Brown sandy loam	X	SL	M	3	7.2	0.66
150-320	Light brown sandy loam	X	SL	M	3	7.3	0.66
320-600	Red sandy loam with brown mottles and ironstone	X	SL	M	1	6.9	0.60
600-610	Clayey sand with siltstone		CS	M			
610	End of hole, refusal on rock						
Test hole 6							
0-300	Brown loam with gravel	X	CL	M	2	5.8	0.40
300-600	Brown loamy gravel	X	CL	M	2	6.0	0.60
600-900	Yellow light clay	X	MC	M	3	5.8	1.60
900	End of hole, refusal on rock						
Test hole 7							
0-200	Brown sandy loam	X	SL	M	5	6.4	0.2
200-1000	Yellow brown medium clay	X	MC	M	4	5.5	1.9
1000	End of hole, refusal on rock						

M=Moist, D=Dry

*1= highly dispersive (slakes, complete dispersion), 2= moderately dispersive (slakes, some dispersion), 3= slightly dispersive (slakes, some dispersion after remoulding), 4= non-dispersive (slakes, carbonate or gypsum present), 5= non-dispersive (slakes, dispersion in shaken suspension) 6= non-dispersive (slakes, flocculates in shaken suspension), 7= non-dispersive (no slaking, swells in water), 8= non-dispersive (no slaking, does not swell in water).

Appendix 2. Recommended buffer distances for on-site systems (*On-site Sewage Management for Single Households* (1998) Dept of Urban Affairs and Planning)

Feature	System and buffer distance (m)				
	Surface irrigation	spray	Surface drip	Subsurface irrigation	Absorption systems
Permanent streams	100		100	100	100
Domestic groundwater wells	250		250	250	250
Intermittent streams	40		40	40	40
Property boundaries	6 (upslope) 3 (down slope)		6 (upslope) 3 (down slope)	6 (upslope) 3 (down slope)	12 (upslope) 6 (down slope)
Dwelling/ buildings	15		6 (upslope) 3 (down slope)	6 (upslope) 3 (down slope)	6 (upslope) 3 (down slope)
Swimming pools	6		6 (upslope) 3 (down slope)	6 (upslope) 3 (down slope)	6 (upslope) 3 (down slope)
Paths and walkways	3		-	-	-
Driveways,	6 (upslope) 3 (down slope)		6 (upslope) 3 (down slope)	6 (upslope) 3 (down slope)	6 (upslope) 3 (down slope)

Appendix 3a. Monthly water balance to determine the wastewater application area required

Design wastewater flow	Q	L/day	480	120	L/person/day	4	persons
Design percolation rate	R	mm/wk	21	3	mm/day		
Land area	L	m ²	100				
Effective precipitation	EP		0.9		(10% runoff)		

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	50.7	41.8	47.2	47.2	46.9	54.5	53	55.5	51.6	58.3	50.3	52.6	647
Evaporation	E		mm/month	216	157	137	94	51	41	38	51	81	114	152	203	1335
Crop factor	C		-	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	10.8
Inputs																
Effective Precipitation	EP		mm/month	45.63	37.62	42.48	42.48	42.21	49.05	47.7	49.95	46.44	52.47	45.27	47.34	549
Effluent irrigation	W	QXD/L	mm/month	148.8	134.4	148.8	144.0	148.8	144.0	148.8	148.8	144.0	148.8	144.0	148.8	1752
Inputs		P+W	mm/month	194.4	172.0	191.3	186.5	191.0	193.1	196.5	198.8	190.4	201.3	189.3	196.1	2301
Outputs																
Evapotranspiration	ET	ExC	mm/month	194.4	141.3	123.3	84.6	45.9	36.9	34.2	45.9	72.9	102.6	136.8	182.7	1202
Percolation	B	R/7xD	mm/month	93.0	84.0	93.0	90.0	93.0	90.0	93.0	93.0	90.0	93.0	90.0	93.0	1095
Outputs		ET+B	mm/month	287.4	225.3	216.3	174.6	138.9	126.9	127.2	138.9	162.9	195.6	226.8	275.7	2297
Storage	S	(EP+W)-(ET+B)	mm/month	-93.0	-53.3	-25.0	11.9	52.1	66.2	69.3	59.9	27.5	5.7	-37.5	-79.6	
Cumulative storage	M		mm	0.0	0.0	0.0	11.9	64.0	130.1	199.4	259.3	286.8	292.5	255.0	175.4	
Storage																
	V	largest M	mm	292.5												
		Soil storage	mm	372.0												
		Storage required	mm	-79.5												
		VxL/1000	m ³	-8.0												
Irrigation area			m ²	100												

	water holding capacity	depth (mm)	Totals(mm)
Topsoil	34%	200	68
Subsoil	38%	800	304
			372

Appendix 3b. Estimation area requirement from organic matter and nutrient balances

Estimated effluent flow	(Q)	600	L/day
Soil depth		1	m

Organic matter balance

BOD (C)	20	mg/L
treated wastewater flow rate (Q)	600	L/day
critical loading rate of BOD (Lx)	3000	mg/m ² /day
land area required (A)	4.0	m²

Nitrogen balance

nutrient concentration	37	mg/L
treated wastewater flow rate	600	L/day
critical loading rate of nutrient	50	mg/m ² /day
land area required (A)	444	m²

Determination of nitrogen critical loading rate

Nitrogen load (kg/year)	8.1	kg/year	
Loss 20% denitrification	6.5	kg/year	
Load to soil	146.0	kg/ha/year	assumed irr. area 444 m ²
Vegetation usage	200.0	kg/ha/year	from table
Residual (potential leaching)	-54.0	kg/ha/year	

Typical nitrogen uptake (Myers et al. 1984)

Pastures	300 kg/ha/year	82 mg/m ² /day
Pine	350 kg/ha/year	96 mg/m ² /day
Eucalypts	180 kg/ha/year	49 mg/m ² /day

Phosphorus balance

Phosphorus sorption capacity per metre=	6,500	kg/ha
Phosphorus sorption capacity of profile=	6,500	kg/ha
Soil factor	0.33	

Critical loading= 3 mg/m²/day

P concentration*= 12 mg/L

P adsorbed= phosphorus sorption capacity x soil factor
2145
0.2145 kg/m²

Puptake= critical loading x year
days/year x 50 s
54750
0.0548 kg/m²

Pgenerated= total phosphorus concentration x wastewater
volume in 50 years
131400000

131 kg
Pgenerated / (Padsorbed + Puptake)

Land area required 488.0 m²

Appendix 4. Checklist for effective management of wastewater systems

Domestic wastewater system

DO

Check household products for suitability of use with a septic tank.
Conserve water, prolonged period of high water use can lead to application area failure. For optimum operation, avoid daily and weekly surges in water flows. Spas are not recommended.
Scrape cooking dishes and plates prior to washing to reduce solid load.
Maintain the system with regular servicing as per the manufacturers instructions.

DON'T

Dispose excessive solid material, fats, lint or large water volumes into drains.

Land application area

DO

Construct and maintain diversion drains around the top-side of the application area to divert surface water.
The application area should be a grassed area, which is maintained at 10-30cm height.
The area around the perimeter can be planted with small shrubs to aid transpiration of the wastewater.
Ensure run-off from the roof or driveway are directed away from the application area.
Periodic application of gypsum may be necessary to maintain the absorptive capacity of the soil.

DON'T

Don't erect any structures or paths on the land application area.
Don't graze animals on the land application area.
Don't drive over the land application area.
Don't plant large trees that shade the land application area thereby reducing transpiration of water.
Don't let children or pets play on the land application area.
Don't extract untreated groundwater for potable use.

Appendix D - Aboriginal Heritage Information Management System Search

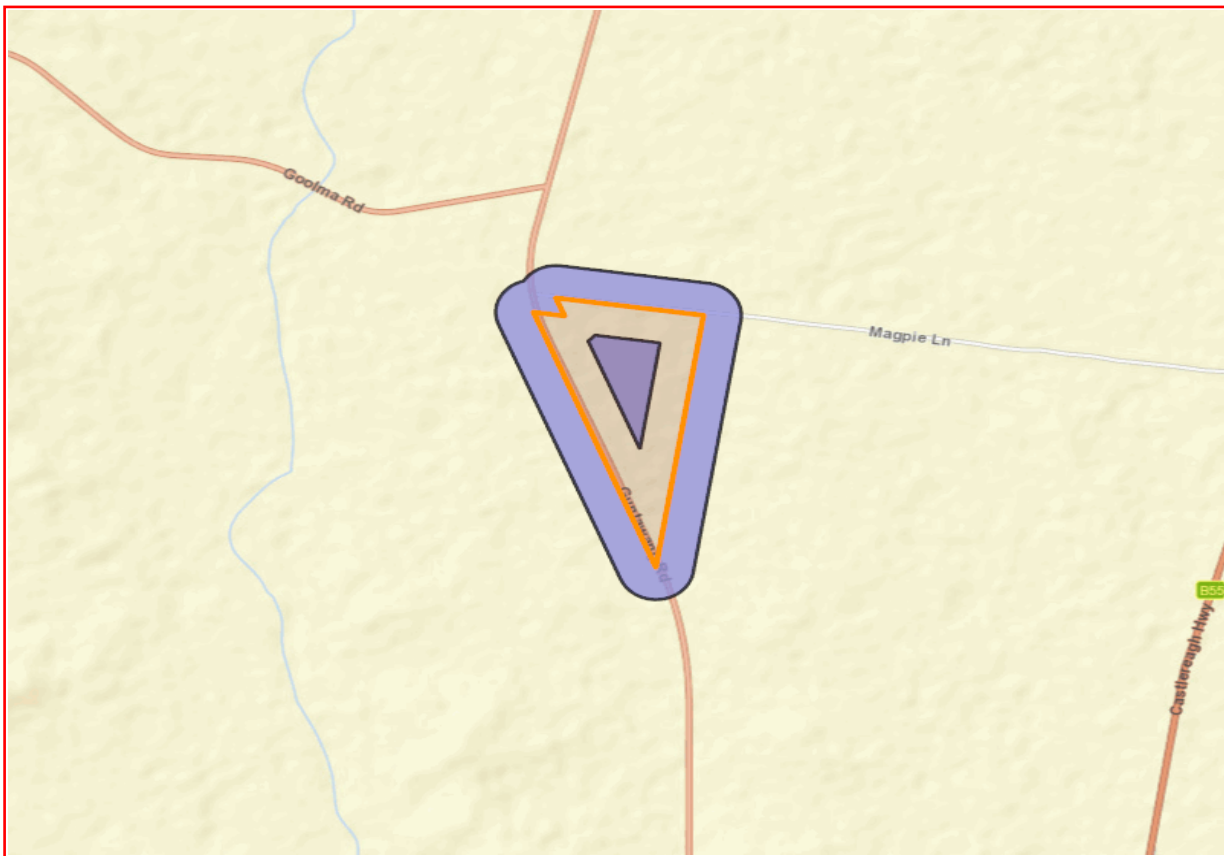
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 1, DP:DP174385, Section : - with a Buffer of 200 meters. [REDACTED]

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



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

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

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

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

Important information about your AHIMS search

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



Appendix E - Aboriginal Cultural Heritage Report

MUDGEE LOCAL ABORIGINAL LAND COUNCIL

**PO BOX 1098
MUDGEE NSW 2850
0263723511 / FAX 0263723522**

**PREPARED
FOR MR LES SMEATON
NSW**

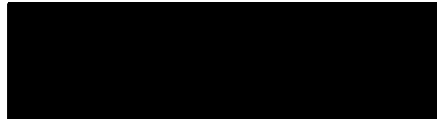


**BY
DAVID MAYNARD**

MUDGEE LOCAL ABORIGINAL LAND COUNCIL

**INFORMATION RELATING TO ABORIGINAL SITES CONTAINED IN THIS REPORT
IS OF A SENSITIVE NATURE AND SHOULD NOT BE MADE PUBLIC WITHOUT
PRIOR PERMISSION BY MUDGEE LOCAL ABORIGINAL LAND COUNCIL**

MUDGEE LOCAL ABORIGINAL LAND COUNCIL



RE/ ABORIGINAL CULTURAL HERITAGE SURVEY FOR PROPOSED WATER PIPE LINE FROM THE WESTERN END OF MAGPIE LANE TO GULGONG WATER SUPPLY

Date 11/10/11

INTRODUCTION

PURPOSE FOR THE INVESTIGATION

This document are the results of an Aboriginal Cultural Heritage assessment of 3.8 klms of the Magpie Lane and 4.5 klms of the Castlereagh Hyw to Gulgong. The purpose for the investigation is to pump water from Gulgong water Supply to a proposed development Motel Complex area on the corner of Magpie Lane and Guntawang road Gulgong. The proposed investigation was to inspect the route for any possible Cultural Heritage material that maybe impacted by the proposed development during the excavation stage during the project.

LOCATION OF DEVELOPMENT

The study area is identified in the western Region of the Great Dividing Range on the western edge of the Sydney Basin. The proposed development is located in the Parish of Guntawang 6 klms south of Gulgong and 25 klms north west of Mudgee. Another report was furnished to the developer dated the 18th of August 2003 for a proposed pipeline to the Cudgegong River but did not eventuate.

QUALIFICATIONS RELEVANT LEGISLATION

Mudgee Local Aboriginal Land Council works in accordance with requirements of the National Parks and Wildlife Service and DECCW Guidelines. All works carried out by Mudgee Local Aboriginal Land Council Representatives meet the requirements both of the National Parks and Wildlife Act and the Department of Environmental and Conservation including other State and Federal Heritage Legislation's. Mudgee Local Aboriginal Land Council as the Local Custodians of the Mudgee area of Wiradjuri country has the predominate aim in the Protection and Management relating to Aboriginal Cultural Heritage, conservation issues and working with relevant agencies. David Maynard is one of the Local Aborigina Heritage Officers for MLALC and has been for an extended period of time and

has been carrying out Cultural Heritage assessments for MLALC in the surrounding district. All relevant reports are taken back to a Meeting of MLALC for their comments and recommendations.

CONSULTATION

David Maynard was notified by Mr H. J. Fiander (Toby) from Toby Fiander and Associates on Friday the 7th of October 2011 to perform a proposed survey the following day. David was unable to accommodate Mr Fiander over the weekend but recommended to meet at MLALC Office on Monday the 10th of October to talk of the proposal before going on site. As a result the assessment was conducted on site the same day. David Maynard and John ////////////// were the Aboriginal reps on site and Toby Fiander and Alex Williams from Toby Fiander & Associates.

DISCRIPTION OF STUDY AREA

The description of the study area is undulating country consisting gentle slopes down to drainage lines along the entire route. Two main creek lines are considered sensitive in terms of open camp sites (1) Fords Creek Magpie Lane and Three Mile Creek on the Castlereagh Hwy. Since European occupation over the study area it is evident such as past clearing, cultivating, planting of extensive vineyards, fencing grazing, dams, roads and tracks. There is advanced salinity and erosion features in some areas in the region.

DISCRIPTION OF IMPACT

Impact to Aboriginal Cultural Heritage sites or objects in the past over the proposed development area would have generally been associated with agricultural activities to a depth of at least 20 to 30 centimeters of top soil disturbance over terrace, crest's, flats, slopes roads and drainage areas. Although most of the proposed development area would had been significantly disturbed by past farming practices. Aboriginal objects that are exposed or under the top soils are still protected under the National Parks Wildlife ACT 1974 and continue to be important to the Mudgee Local Aboriginal Community regardless of the site condition.

The following caution applies. All earth moving contractors and operators and should be instructed in the event of any bone or stone objects or discrete distributions of shell being unearthed during any work activities, work should cease immediately in the effected area Mudgee Local Aboriginal Land Council and officers of DECC must informed of the discovery. Work should not recommence until the materials have been inspected by those officials and permission has been given to proceed. This also applies to any skeletal remains.

METHODOLOGY, PRE FEILDWORK

Local Aboriginal cultural knowledge of the surrounding area regarding site locations are 18 known and recorded sites in the region within a 8 km radius of the assessment area. The nearest being the Pig and Whistle Creek, Fords Creek, and Three Mile Creek, including the Cudgegong River area. Biraganbil area are also regarded as sacred lands where past Aboriginal Massacres occurred in the past.

AIMS OF SURVEY

MLALC Representative was required to :-

- (1) Identify, Evaluate and document any Aboriginal Heritage Sites of Cultural Significance within the study area.
- (2) Record any Sites found during the investigation that is to be recorded onto the NPWS Sites Data Base for future conservation and reference.
- (3) Submit a report outlining the results that may include recommendations for the conservation and management of identified Aboriginal sites or relics that are of Aboriginal Cultural Heritage Concern.

SURVEY STRATERGY

The main aim of the assessment was to determine the presents of any Aboriginal Cultural Heritage objects or Places that are of Aboriginal Cultural Significance to the Local Wiradjuri people. As the Magpie Lane had never been surveyed before except for a small section at the Guntawang road end of Magpie Lane where the proposed Resort was to be built on the development area. The Magpie Lane will be inspected along both sides of the road easement due to the lack of full visibility of the ground surface because of the vegetation cover all exposures will be investigated to obtain a representative sample of the study area.

Any sites identified during the investigation will be recorded on to the DECCW Site Register. It is important that these areas be recorded so that protection and management of any Cultural resources identified. This information is to be presented before any development works commence. It will be taken into account during the investigation not only features over the landscape in which sites are most likely to be present but also to include the areas where the presents of artifact materials was less likely. The immediate survey area is regarded as a culturally sensitive region due the surrounding sites identified in the area and at drainage lines such as Fords Creek and Three Mile Creek .

FIELDWORK

The assessment along Magpie lane and section of the Castlereagh Hwy was carried out on Monday the 10.10.11. the day was fine and ideal conditions to identify any objects that may be found during the assessment. Mudgee Local Aboriginal Land Council representatives both assisted in the road easement inspection. Extreme heavy grass cover prevented a complete analysis of the ground surface along the road easement that had very little exposures. The grassed area on both sides of the easement seemed to have been mowed some time previously

SURVEY RESULTS

From the areas surveyed no Cultural objects were identified because of the extensive ground cover except at the eastern end of Magpie Lane approximately 100 mtrs from the Castlereagh Hwy where a large Grindstone was found jammed between two trunks of a White Box Tree on the western side of the Magpie Lane road easement. The site and object was recorded with Site name (Isolated Find Magpie Lane 1) (IF ML1).

As much of the Castlereagh Hwy had been previously surveyed in the past during RTA and Vineyard surveys it was recommended that it was unnecessary to survey the road easement again. MLALC. Dave Maynard advised that the Three Mile Creek region along the Hwy was sensitive and will make recommendations of this area later in this report.

Aboriginal Cultural Values

Murong Gialinga ATSIC supports the concept of Environmental Impact Studies that include Aboriginal and Archaeological concerns required for developments that would have an impact on the environment. Aboriginal Sites are of great Cultural importance to the Wiradjuri people. All sites hold special Significance and are a special link to the past not only in terms Archaeological material evidence but also by a Spiritual connection to the land and its people including its associated environments that was part of every day life and Ceremonial activities

These are some of the important aspects for Mudgee Local Aboriginal Land Council to consider when appraising different types of sites or landscapes whether disturbed or undisturbed including natural bush land environments that have been an intimate bond and spiritual meaning to the Wiradjuri People and has been for thousands of years. As with our history the tablet of the lore was the landscape itself explained through the Dreaming of our identity and complex system of family life and unity with the land and its people. It is vital to Endeavour to preserve the environment where ever possible for future generations to come. Any site identified during any investigation are regarded as

highly important both in Cultural, Spiritual and educational values to Mudgee Local Aboriginal community.

RECOMMENDATIONS

(1)

MLALC recommends that monitoring 100 MTRS upslope on both sides of the Fords Creek area by a MLALC Representative be present during the excavation phase for the proposed pipeline

(2)

MLALC recommends that monitoring 100 mtrs up slope on both sides of the Three Mile Creek area by a MLALC Representative present during the excavation phase of the proposed pipeline

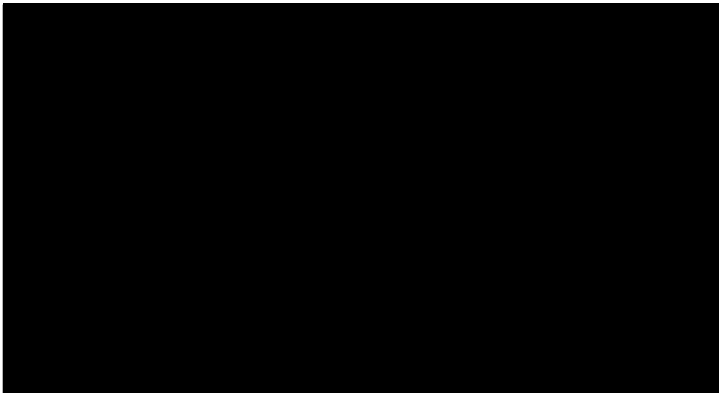
(3)

It is recommended by MLALC that a permit to relocate out of harms way any objects that maybe brought to the surface during the excavation process

(4)

MLALC recommends that a permit be sought to move the grindstone out of harms way to a safer location as the object is only three mtrs from the edge of the road pavement and is subject to be taken.

MLALC would like to thank the developer Mr Les Smeaton and Toby Fiander and Associates for the opportunity to protect Wiradjuri Cultural Heritage in the Mudgee area



SITE DISCRIPTION FORM

Date : 10 /10/2011

Recorded by: D. Maynard MLALC

Site Name: Magpie Lane IF1

Map: HOME RULE 8833-3-S **Scale:** 1:25 000 / **Goolma Scale** 8733-II &III

Grid Reference: GPS. 55 737462 E 646410892 N

Field Code Magpie Lane ML IF1

Land Form:

The landform at the site is undulating. A great number of drainage lines are associated with Magpie Lane flowing from south to north in particular the Fords Creek that crosses Magpie Lane. A drainage line is some 15 mtrs from where the object was identified at this site.

Permanent Water:

The nearest permanent water source is Fords Creek 1.6klms east of the site area. Many of the drainage lines would run and hold water for extended long periods after rain.

Ephemeral Creeks :

As with the landscape such as undulating hilly country many ephemeral creeks are in the area that would only flow during rain periods.

Erosion Features:

Erosion features have impacted along table drains within the confines of the road easement where the possibility of cultural Heritage objects could be in the area.

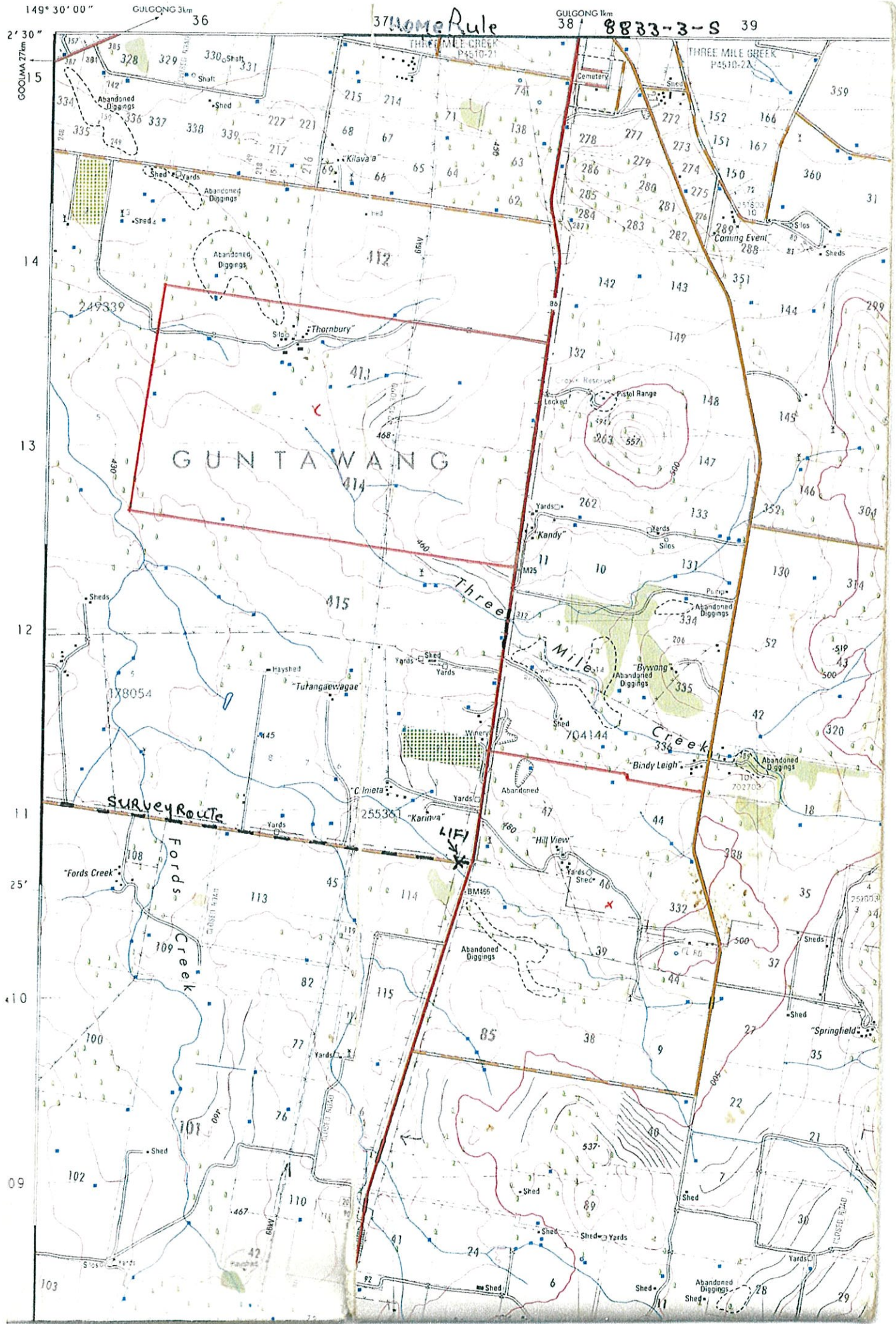
Soil Exposure: Not very much of the survey route had soil exposures due to the resent rains that had caused extensive grass cover approximately 95 %.

Site Description:

Site MLIF1 object was identified between the fork of a white Box tree three near ground level and 3 Mtrs from the edge of the road pavement. There is a high possibility that someone had placed the object between the fork of the tree some time ago maybe before the road bitumen was laid when the road used to be graded. The object is Sandstone material with two groves one on either side. The size of the object is 570mm long x 240mm wide and 75 mm thick. The side with the longest groove is 310 mm x 110 mm wide with a groove depth of 10mm deep. The shortest groove on the opposite side of the stone is 200 mm long x 110 mm wide and 12 mm deep, color is light brown.

Vegetation

Large Yellow Box, White Box, Kurrajong, some introduced species with the main trees being Eucalypt along the entire route.



400/MA 8732-11X11

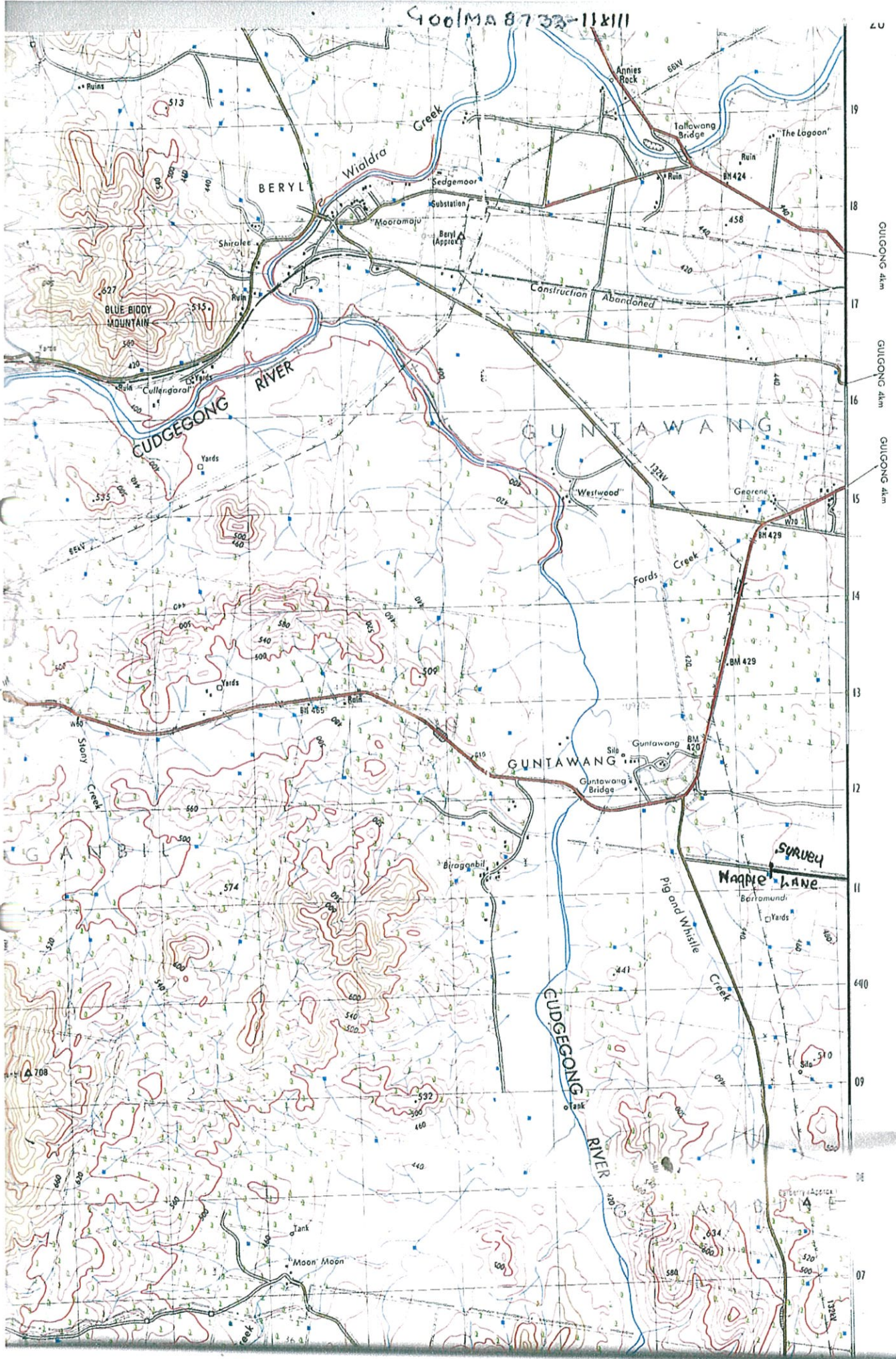




Figure 1. Looking East towards Ford's Creek in the background.



Figure 2. Looking North toward Gulgong at Three Mile Creek.



Figure 3. Looking West at tree where the object was identified.



Figure 4. Looking East at location where object was identified.



Figure 5. Photograph of object identified as a grinding stone, approximately 100 metres from the Castlereagh Highway.



Appendix F - Intensive Agricultural Report

**Proposed
Subdivision
Plan**

Lot 1 in DP 174385 & Lot 1 in DP 1003242



Intensive Agricultural Report

Prepared by: *Stoddart Agriculture*

01/12/2021



Table of Contents:

• Outline of the development	3
• Objectives of the development	3
• Location	4
• Soils	4
• Erosion Hazard	5
• Salinity	5
• Rural Capacity	5
• Current Land Use	6
• Water Resources	6
• Proposed Intensive Agricultural Enterprise	6
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• Marketing	12-16
• Proposed Economic Viability	17-22
• Future Value Adding Opportunities	23-26
• References	27
• Appendix A - Soil test	
• Appendix B - NSW DPI Gross Margin Budget, example.	
• Appendix C - Weekly Times article	

Outline of the Development

This intensive agricultural report has been prepared to accompany an application for the proposed subdivision of Lot 1 in DP 174385 & Lot 1 in DP 1003242313 Magpie Lane, Gallambine. This report aims to:

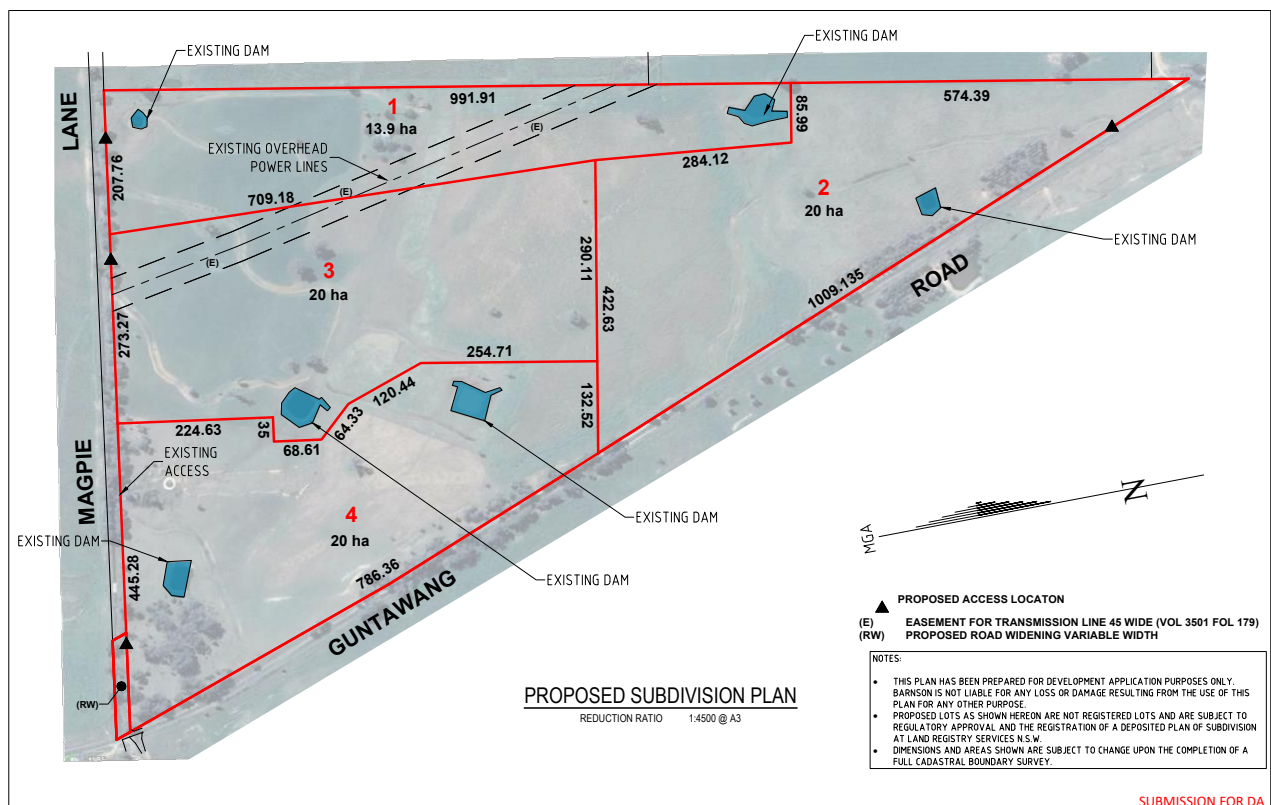
- Describe the existing property and its locality
- Describe the subdivision proposal
- Consider the environmental effects pertinent to the proposal
- Consider the suitability of the site for the proposed subdivision

Objectives of the Development

The development proposal aims to produce four lots from the existing lot and DP's listed above, the proposed subdivision is illustrated in table 1, a summary is as follows:

- The area as it currently exists is a total of 73.9ha.
- Proposed block #1 - 13.9ha
- Proposed block #2 - 20ha
- Proposed block #3 - 20ha
- Proposed block #4 - 20ha

Table 1 – Proposed Subdivision



BARNSON PTY LTD
 1 800 BARNSON (1 800 227 676)
 info@barnson.com.au
 www.barnson.com.au
 Bathurst | Dubbo | Mudgee | Sydney | Tamworth

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH GENERAL BUILDING DRAWINGS, SPECIFICATIONS & OTHER DOCUMENTS DRAWINGS APPLICABLE TO THE PROJECT. ALL DIMENSIONS IN MILLIMETRES. ON SITE BEFORE COMMENCEMENT OF WORK. REPORT INSTRUCTIONS TO BARNSON PTY LTD. NO PART OF THIS DRAWING MAY BE REPRODUCED IN ANY WAY WITHOUT THE WRITTEN PERMISSION OF BARNSON PTY LTD.

Client: GH MUDGEES PTY LTD
 Project: PLANNING PROPOSAL
 LOT 1 IN DP 174385 & LOT 1 IN DP 1003242
 313 MAGPIE LANE GALLAMBINE 2850
 Drawing Title: PROPOSED SUBDIVISION PLAN

Rev: A
 Date: 12-08-2021
 Description: SUBMISSION FOR DA

Design: EG
 Certification:

Drawn: MK

Check: JIM
 Original Sheet
 Size: A3

Drawing Number: 27447 - P11

Revision: B

SUBMISSION FOR DA

Source – Barnson’s Mudgee

Location

The proposed subdivision is located on the corner of Magpie Lane and Guntawang Road (in between Mudgee and Gulgong). It is specifically described as Lot 1 in DP 174385 & Lot 1 in DP 1003242313 Magpie Lane, Gallambine.

Climate

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Temperature														
Mean maximum temperature (°C)	31.0	30.2	27.8	23.3	18.8	15.2	14.4	16.0	19.6	23.4	26.9	29.8	23.0	84 1907 1995
Mean minimum temperature (°C)	15.5	15.4	13.0	8.5	5.0	2.6	1.3	2.3	4.4	7.6	10.8	13.7	8.3	84 1907 1995
Rainfall														
Mean rainfall (mm)	67.7	63.0	54.2	43.8	48.6	55.0	52.7	51.8	52.2	59.1	61.4	65.1	669.5	143 1870 2021
Decile 5 (median) rainfall (mm)	53.8	48.7	39.2	31.0	40.6	45.0	46.5	45.0	44.9	49.8	52.0	55.0	654.1	150 1870 2021
Mean number of days of rain ≥ 1 mm	5.4	5.0	4.6	3.9	5.3	6.6	6.5	6.2	5.7	6.2	5.7	5.7	66.8	150 1870 2021

Soils

Appendix A contains a recent soil test collected from the existing property. These tests were collected to ascertain the soils suitability to grow the proposed intensive agricultural crop. A summary of the results is as follows:

Soil Analyte	Results	Comments
Texture	Silty Loam	Lends itself well to garlic production.
Soil pH	Slightly low, 4.8pH (CaCl ₂)	Lime will be required to raise the pH to a desired level
Aluminium %	Low 1.1%	Result is ideal, lime will further make aluminium unavailable
Phosphorous	Moderately low (Colwell 28 ppm)	Fertiliser has been allocated in the budget to amend the low phosphorous
Sulphur	Slightly low (6ppm)	As above
Organic Matter	Slightly low (3.7%)	Levels are adequate
Calcium	Slightly low (3.89 meq/100g)	Again, lime will address this slight deficiency
Trace Elements	Boron, Copper and Zinc are low.	Trace element spray has been allocated in the budget
Cation (CEC) /Soil Structure	Low CEC	Adding organic matter over time will help to improve the low CEC
Salinity/Sodicity	No issues	
Nitrogen (seasonally variable)	Low at the time of testing.	Nitrogen is seasonally dependent and can be easily addressed

Erosion Hazard

Slopes are sufficient enough on the property to see possible erosion under permanent cultivation and/or when ground cover is reduced to below 25%. Erosion control involves limiting continual cultivation practices and maintaining or establishing perennial pastures external to the intensive agricultural sites. During the site inspection, no major soil erosion was identified. Contour banks are strategically placed around the property to slow and divert water as required.

Contour banks are strategically located on the property to slow and divert water as required.



Salinity

An extensive soil salinity report was conducted on the property in 2004 (JSA Architects, 2004). The report is quite extensive, and reference can be found at the end of this document. Effectively it was confirmed that a small area of soil salinity is located at the North-West corner of proposed block #4. This area is quite small, and it is recommended that this area be left alone and not be entered into any intensive agricultural production. Once saline areas like this become colonized with plant species that handle these conditions, then soil degradation issues (soil erosion) are less likely.

Rural Capability

The proposed subdivision site neighbors existing vineyards that have been in production for many years. It is also close to the Cudgegong River and the soil is regarded as some of the best in the district. The soils lend themselves well to the proposed intensive crop.

Current Land Use

The property is currently running sheep and thoroughbred racehorses that are being spelled. It has been annually cropped with grazing oats and wheat for the last three years on a share farming basis.

Sheep grazing on the property



Spelling Thoroughbred horses



Finished oat crop



Existing pasture outside of farmed country



Water Resources

Currently the property only contains surface water stored in farm dams (see table 1). As it is understood, no water licenses are attached to the existing property or proposed lots. Further investigation would be required to see if irrigation licenses could be obtained.

Proposed Intensive Agricultural Enterprise

Dryland garlic production with the target markets of:

1. Online marketing – examples are given on pages 12 to 16. Online marketing via a website allows maximum reach to all parts of Australia except Western Australia and Tasmania which have quarantine restrictions. If processed and stored correctly, garlic can store for 2-6 months.

2. Local farmers markets - for 2022 Mudgee will have 22 markets per year, this includes 12 x Farmers Markets and 10 x Makers Markets. This along with towns like Orange, Bathurst and Dubbo, it provides a number of options for direct marketing whilst the product is in season or is satisfactory for sale.

3. Direct to restaurants, cafes and food outlets – the Mid-Western Region has a thriving café a restaurant culture. This extends to places like Orange, Bathurst and Dubbo. Fresh local produce is something that the increasing tourist market is wanting to experience.


The following article illustrates the opportunities and fundamentals behind this proposal.

JANUARY 6 2012 - 2:15PM

Garlic growers get a whiff of healthy sales made online

Alexandra Back



 "I get people that actually peel it and it looks so good they eat it" ... Andrew Hearne, organic garlic farmer, in his drying shed on his farm near Wauchope.

AUSTRALIAN garlic is making a comeback. Since finding an unlikely marketplace online, a growing group of Australians is choosing to grow the labour-intensive yet "rewarding" crop.

"[Australian garlic] is not dry, it's not bleached with chlorine, it hasn't been fumigated ... and it's juicy," said Andrew Hearne from Hoisdale farm near Wauchope, who sold two tonnes of garlic last year and expects to double that this year.

"I get people that actually peel it and it looks so good they eat it."

The Australian garlic industry was nearly destroyed a decade ago by a wave of cheap imports, mostly from China. In the years that followed, up to 90 per cent of the garlic consumed in Australia was grown overseas.

Patrice Newell, a grower in the Upper Hunter region, estimates the production of garlic has quadrupled in the past five years.

She supplies bulbs to people starting out as growers and believes more people now "understand the difference between good and bad garlic".

"Anyone can grow my garlic and I encourage them to," she said.

Leon Trembath has been a grower for 20 years and is president of the Australian Garlic Industry Association.

Membership of the association was growing, albeit modestly, he said, and he had noticed that consumers had become more discerning, especially when it comes to Australian and imported garlic.

Mr Hearne's garlic will feature in dishes at Rockpool restaurant in Sydney.

"It's great to be able to find an organic alternative in Australia," the restaurant's owner and executive chef, Neil Perry, said.

In his search for ingredients, it is not unusual for Perry to receive produce in the mail. He said the availability of produce online was a "great way for small producers who care about what they sell to continue to stay in business".

"It's perfect," said Mr Hearne, who sells 90 per cent of his garlic online. Not just because when dried, garlic has a long shelf-life and is easy to post, but also because "customers have a connection to our farm, they can follow us online ... and meet the people who grow their food".

More than 300 varieties of garlic are grown in Australia, so it's a matter of choice, Mr Trembath said. "[Online shopping] takes people back to that volume of choice."

Source: *Narooma News*, 2012

Industry Overview

The following industry overview is sourced from the *DAFWA Farmnote prepared by John Burt*.

In the past 20 years the consumption of garlic in Australia has increased. It is used mainly as a flavouring for other foods and as a health food. Garlic contains alliin which is converted to allicin, a natural antibiotic compound, when garlic is cut or crushed. Various health claims including cardiovascular health have been made relating to allicin.

Garlic plants grow to 40–60cm high. The leaves are flat with a slight 'v' shape. The mature garlic bulb consists of modified storage leaves that contain six to 30 segments or cloves, held together by outer skins.

White, pink and purple-skinned varieties are available. Plants produce only a few flowers which are sterile and do not produce seed. Cloves are used as planting material.

Garlic has a high value compared to many vegetables because of the high labour requirement for production and preparation for market. The high cost of planting material also contributes to the cost of production for new growers. This seed stock can be difficult to source, *hence creates an opportunity to specialise and service this market*.

Garlic is imported into Australia throughout the year, but mainly from May to November. The chief source of imports is China, which produces about 75% of the

world's garlic and in 2010/11 supplied 75% of Australia's total imports of 10650 tonnes.

Although Chinese bulbs are only of moderate quality, they are in demand because of low price. Garlic is also imported out-of-season from Mexico, Argentina, USA, Spain and Chile.

The main areas of Australian garlic production are South Australia, Victoria and New South Wales. A significant amount is processed. Promotion and health benefits have increased consumer interest in buying Australian garlic.

- 0.6 to 1.0 tonne of cloves is needed to plant each hectare.
- Established growers must retain 15% of the crop for planting material.
- Growers may find it difficult to compete with cheap imports, therefore direct marketing and value adding is an important aspect in their business model.
- Growing garlic is labour intensive, particularly harvesting and trimming. It is an annual crop, taking six to eight months from planting to harvest.
- Yields are quite varied, up to 20 tonnes per hectare is possible but commercial yields are closer to 10t/ha. Because the proposed enterprise will be grown as a dryland crop, then yields of 5 tonnes per hectare will be used for budgeting purposes (Burt, 2016).

Climate

The best quality garlic grows in temperate climates. For initiation of cloves, the plants need cool winters. For good bulbing, this should be followed by increasing hours of daylight in spring and mild temperatures. If temperatures are too high, bulbs may not form, or side-shooting may be pronounced in certain varieties. If temperatures are too low, garlic has fewer, larger cloves. The tablelands climate is considered temperate and suits the production criteria.

Soils

Garlic grows well and can be harvested easily on light, well-drained, sandy soils. Waterlogged or heavy clay soils can restrict the roots, causing poor quality misshapen bulbs. The most suitable soils have a pH of 6 to 7 (measured in water) or 5.3 to 6.3 (measured in CaCl₂).

There should be a period of at least three years between successive crops of plants in the onion sub-family, to prevent a build-up of soil-borne diseases.

Types of planters

- Halls seeders have a drum with vanes that pick up the cloves.
- Trickle seeders use a belt passing under a hopper to feed the cloves out in a stream.
- Cup seeders collect the various sized cloves into cups of different sizes.
- Cloves are fed by hand from a hopper down a tube to a seeding wheel or tine which is slow but accurate.

Cloves larger than 5g are ideal for planting, but smaller ones weighing 2–5g can also be used. As a guide, the number of cloves recommended for planting 1 hectare, based on 320 000 cloves per hectare (32 cloves per square metre) and a bulb size of 50g is:

- up to 2t/ha for a variety with eight cloves per bulb
- 1.3t/ha for a variety with 12 cloves per bulb
- 0.5-1.0t/ha for a variety with 20 cloves per bulb.

Plant garlic 2.5-4cm deep in rows 25-30cm apart. Within rows, plant 8-10cm apart, to give a population of about 40 cloves/m². After allowing for tractor paths this layout uses 320 000 cloves per hectare. Increasing the clove density to 60/m² increases yields but reduces bulb size and increases cleaning time.

Weeds, pests and diseases

Garlic has a long growing period and does not compete well with weeds which can seriously affect yields. Controlling weeds prior to planting and in crop is important.

The herbicide chlorthal-dimethyl (available under a range of trade names) is the only residual herbicide currently registered for use on garlic. This post-planting herbicide controls many broad-leaved and grass weeds before they emerge but does not control some troublesome weeds such as fumitory, potato weed (*Galinsoga parviflora*), wild radish (*Raphanus raphanistrum*), clover and nutgrass.

For current registrations and minor use permits go to the Australian Pesticides and Veterinary Medicines Authority website. Young garlic may also be cultivated by machine between the rows.

Garlic attracts fewer pests and diseases than most vegetable crops. Thrips are the major pest, these are found beneath the leaves and between the leaf base and stem. Affected plants see small white patches on the leaves and the bulbs may shrivel. Other pests include red-legged earth mite, aphids, snails and nematodes. Downy mildew is the most common disease.

Care should be taken as plants may also be damaged by several diseases on the leaves and bulbs in the field and in storage (particularly with high relative humidity).

Yields and quality of garlic plants are reduced by virus infections. It is believed that most garlic in Australia is affected by three types of viruses which may appear as a yellow streaking of the whole plant, or have no visual symptoms. Work is continuing to obtain virus-free planting material in Australia.

Harvest and postharvest

Indications of garlic maturity are:

- The stems have not fallen down, but leaves have started to die back and are still slightly green. Bulbs are of good size.
- Cloves are seen easily from outside the bulb.

- In cross-section, the skin between the cloves becomes thin and well developed rather than fleshy.
- Internal clove colour is creamy rather than white.
- The neck softens above the bulb.
- Bulbs develop in the neck or on top of hard-necked varieties.

Do not allow bulbs to over-mature in the field, as too many skins will be discarded and bulbs will discolour, open up and become sunburnt or rot. Pull the bulbs by hand. Harvesting with an onion machine can cause excessive bruising.

Some harvesting is now done with a modified carrot harvester. Undercutting with a back blade to ease pulling and reduce labour is most common. If the plants are uniformly mature and well-cured, they can be topped and tailed at harvest. However, if they are still green, most of the stem will need to be retained to allow the cloves to mature as the plant dries.

Topping and tailing too early without sufficient curing can promote storage rots. If the plants are to be lifted whole, place them top over tails (to prevent sunburn) in rows in the sun for up to two weeks if no rain is imminent.

This produces white shiny bulbs, allows deeper stacking of plants on pallets in sheds and aids cleaning. If it is necessary to store bulbs immediately after harvest while the plants are green, care must be taken not to stack them too deeply and cause rotting.

Just before marketing, top and tail with secateurs or knives. Clean the bulbs of all loose scales and roots and grade them for size. Cleaning aids include brushes to remove loose scales. Continuous handling of garlic may cause skin dermatitis in some people.

Storage

If kept dry and well ventilated, garlic will keep well as whole bulbs at ambient temperatures for two to five months. They may shrink if kept too long, long-term storage at 0 to 1°C, at a relative humidity lower than 60 per cent will keep garlic in good condition for up to five months. It can rot if the relative humidity is too high and bulbs can sprout above 5°C.

Marketing

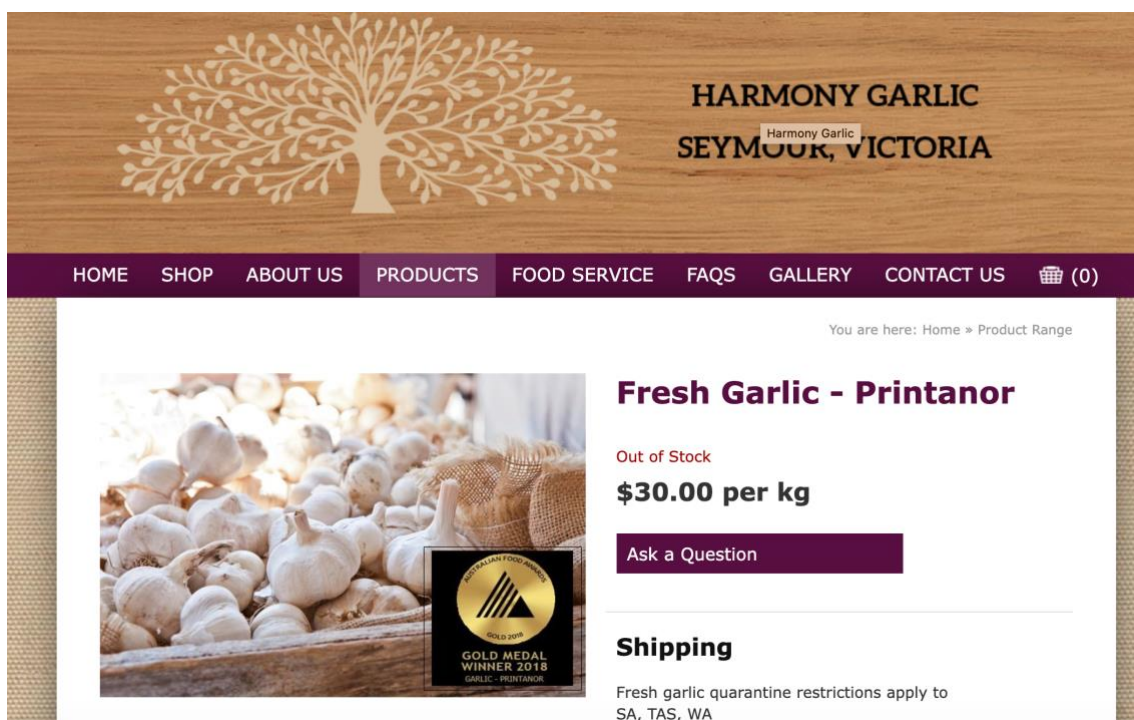
As previously mentioned, the basis of this study is to better understand the economic viability of growing and selling garlic to the below markets:

1. Online marketing – examples are given on pages 12 to 16 of this document. Online marketing via a website allows maximum reach to all parts of Australia except Western Australia and Tasmania which have quarantine restrictions. If processed and stored correctly, garlic can store for 2-6 months.

2. Local farmers markets – for 2022 Mudgee will have 22 markets per year, this includes 12 x Farmers Markets and 10 x Makers Markets. This along with towns like Orange, Bathurst and Dubbo it provides a number of options for direct marketing whilst the product is in season or is satisfactory for sale.

3. Direct to restaurants, cafes and food outlets – the Mid-Western Region has a thriving café a restaurant culture. This extend to places like Orange, Bathurst and Dubbo, fresh local produce is something that the increasing tourist market wanting to experience.

Harmony Garlic – Seymour Victoria



HARMONY GARLIC
Harmony Garlic
SEYMOOR, VICTORIA

HOME SHOP ABOUT US PRODUCTS FOOD SERVICE FAQs GALLERY CONTACT US (0)

You are here: Home » Product Range

Fresh Garlic - Printanor

Out of Stock
\$30.00 per kg

Ask a Question

Shipping

Fresh garlic quarantine restrictions apply to SA, TAS, WA



Fresh Garlic - Californian Late

Out of Stock
\$30.00 per kg

Ask a Question

Shipping

Fresh garlic quarantine restrictions apply to SA, TAS, WA

ACT NSW NT QLD SA TAS VIC WA





Fresh Garlic - Italian Purple

An heirloom hardneck garlic. The flavour is delicate with a sweet spiciness and mild grassy flavour. Slow to warm up, a burst of heat will creep up on you and then fade quickly. Italian Purple has a large bulb size with plump cloves, a good strong European flavour, off white to white coloured exterior, often with some purple. Outer cloves are occasionally red. Great to Eat. Long lasting. It's also great for plaiting as the purple-streaked papers are so attractive.


Out of Stock
\$30.00 per kg

Ask a Question


 <p>Fresh Garlic - Italian White</p> <p>Italian White is a popular variety that stores well. This garlic is a must in the kitchen with a creamy texture, warm zesty flavour, little after taste and is great for your health. Kept in the right conditions this garlic is a long lasting soft neck variety that will keep for at least 6 months.</p> <p>Out of Stock \$30.00 per kg</p> <p>Ask a Question</p> <p>Shipping</p> <p>Fresh garlic quarantine restrictions apply to SA, TAS, WA</p>	 <p>Fresh Garlic - Italian White</p> <p>Italian White is a popular variety that stores well. This garlic is a must in the kitchen with a creamy texture, warm zesty flavour, little after taste and is great for your health. Kept in the right conditions this garlic is a long lasting soft neck variety that will keep for at least 6 months.</p> <p>Out of Stock \$30.00 per kg</p> <p>Ask a Question</p> <p>Shipping</p> <p>Fresh garlic quarantine restrictions apply to SA, TAS, WA</p>
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Source: *Harmony Garlic, 2021*

Tolley Garlic NSW



0 item(s) - \$0.00

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Buy Australian Garlic Online, Direct From The Farm To Plate

[Shop Online Now](#)



Best Sellers

 <p>Australian Red Garlic 25mm-40mm Bulb Diameter - 1KG</p> <p>Australian Garlic selected from Victoria in the year 2000, a beautiful hardneck garlic variety...</p> <p>\$16.00</p> <p>ADD TO CART ♥ ⇄</p>	 <p>Australian White Garlic 25-40mm Bulb Diameter - 1KG</p> <p>Australian Garlic selected from South Australia in the year 1997, this an excellent Californian...</p> <p>\$16.00</p> <p>ADD TO CART ♥ ⇄</p>	 <p>Australian Red Garlic 40mm - 60mm Bulb Diameter - 2KG</p> <p>Australian Garlic selected from Victoria in the year 2000, a beautiful hardneck garlic variety...</p> <p>\$38.00</p> <p>ADD TO CART ♥ ⇄</p>	 <p>Australian Red Garlic 40mm - 60mm Bulb Diameter - 10KG</p> <p>Australian Garlic selected from Victoria in the year 2000, a beautiful hardneck garlic variety...</p> <p>\$170.00</p> <p>ADD TO CART ♥ ⇄</p>
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Source: *Tooley Garlic, 2022*

Organic garlic

Growing garlic organically is certainly an option, typically a premium price is achieved, however yields can be lower and bulbs can be smaller than conventionally grown garlic. Organic garlic offers a unique marketing advantage compared to conventionally grown garlic.

Organic garlic is grown without synthetic fertilisers and pesticides and is best grown under the directions of an organic certifying organisation such as the National Association for Sustainable Agriculture. Without the use of synthetic pesticides and fertiliser, the labour costs are significantly increased. Below are examples of organic garlic that is being marketed online.

Fresh Creek Garlic – Torquay Victoria

Click & Collect or Delivery: Free Shipping in Australia for orders \$90 and over [Dismiss](#)



FRESHWATER CREEK GARLIC

100% Australian Garlic, Certified Organic

[Organic Garlic Shop](#) [Freeze Dried Organic Garlic](#) [Certified Organic](#) [Growing](#) [Cooking & Preserving](#) [Our Story](#) [Contact Us](#) [Cart](#) [My Account](#)




1 kg Australian Garlic, Certified Organic

\$40.00

1kg of our certified organic garlic, *Italian Late* cultivar.

This fresh garlic has a full robust flavour and is ready for all your culinary needs. It is grown in Freshwater Creek, Victoria, and stores well into August/September.



2.5 kg Australian Garlic, Certified Organic

\$100.00

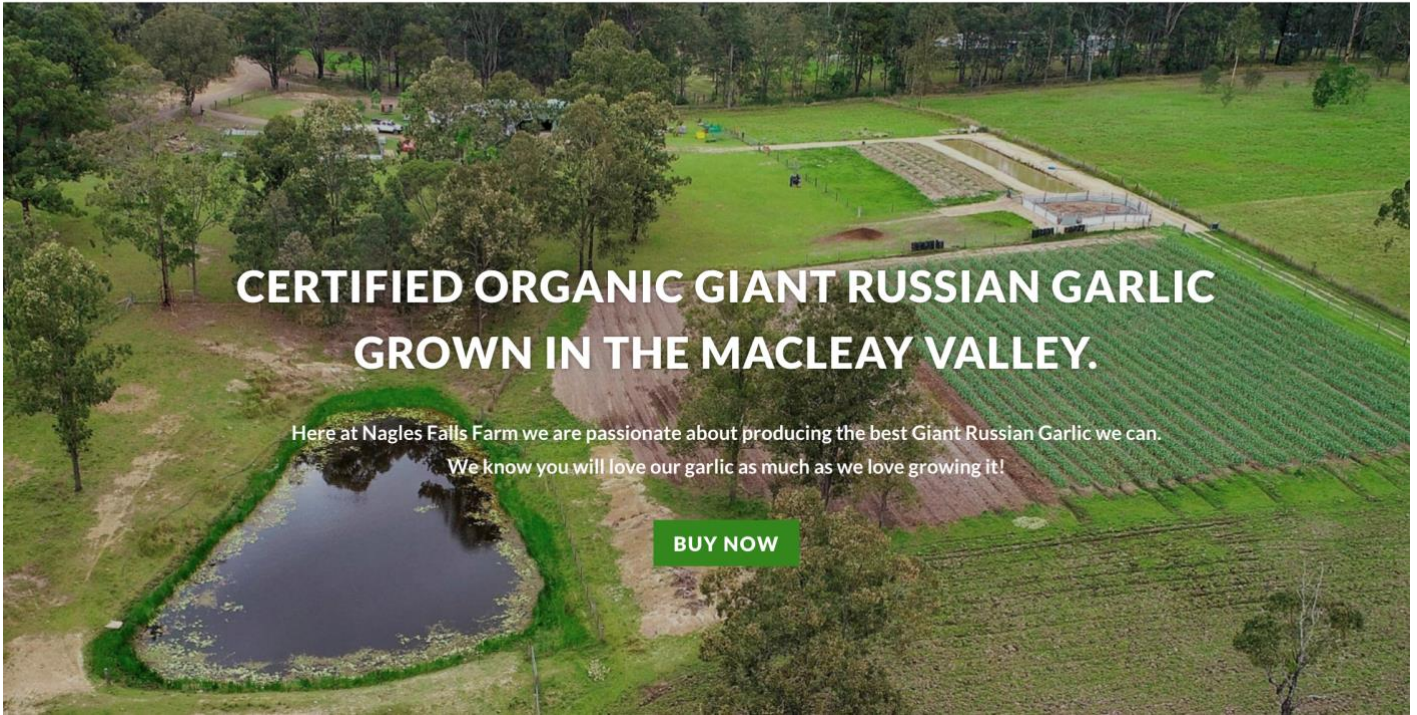
2.5kg of our certified organic garlic, *Italian Late* cultivar.

This fresh garlic has a full robust flavour and is ready for all your culinary needs. It is grown in Freshwater Creek, Victoria, and stores well into August/September.

Store in a light airy place: not in direct sunlight and not in the fridge.

\$40/kg

Source: *Fresh Water Creek Garlic, 2021.*



CERTIFIED ORGANIC GIANT RUSSIAN GARLIC GROWN IN THE MACLEAY VALLEY.

Here at Nagles Falls Farm we are passionate about producing the best Giant Russian Garlic we can.
We know you will love our garlic as much as we love growing it!

[BUY NOW](#)

FEATURED PRODUCT

Order online in Australia



Giant Russian Garlic

Bulbs, Cloves or Rounds?

They all will store equally well.

Due to Giant Russians Garlic milder flavour, ease of use and versatility in the kitchen you will find yourself using more of it more often.

Choose

Bulb

Weight

1kg

[Clear](#)

New season garlic ready on Monday the 10th of January 2022

\$37.00

Available on backorder

1

[PREORDER NOW](#)



Barrington River Organic Farm



Products

Garlic

Organic GARLIC

WINNER! Our "Italian Pink" has won GOLD at the Melbourne Fine Foods Awards! For details see our ["News"](#) page.

This beautiful hard-neck Italian, pink skin variety is generally available between October and March - whilst stocks last.

If you are tired of the white, bleached, dry, imported Chinese garlic found in supermarkets you can now purchase beautiful, sweet, lovely-smelling garlic. You'll taste the difference - ours is home-grown, dense and fresh. Italian Pink garlic produces a medium sized bulb of about 12 cloves per bulb with thin, pink-purple skin. It is a full-flavoured, sweet garlic that lacks the sting of some other varieties and stores well for up to five months, if kept in ideal conditions. As garlic is naturally a slow growing annual crop, it is only genuinely fresh once a year. The cloves are planted out in Autumn - they finally multiply to a new bulb for harvest in October. The garlic is then dried in the air to remove excess moisture and form its dry outer protective skin. If the garlic is kept dry and reasonably well ventilated, this once a year crop will keep for many months. It is however at its very best just after harvest.

OUR GARLIC IS ONLY AVAILABLE FOR A LIMITED TIME EACH YEAR AND WHILE STOCKS LAST.

If you would like to purchase garlic from this year's crop please [email us](#)

Pricing:

\$35.00 per kilo
\$20.00 for 500g
\$12.50 for 250g

Plus \$9.90 for p/h within Australia.

Note we cannot supply customers in Tasmania.

Include your name, address, email and phone number and we will raise a Paypal invoice. Alternatively, you can deposit funds into our bank account.



Hard-neck Italian Pink Skin variety of garlic



Delicious smooth Black Garlic

Source: *Barrington River Organic Farm, 2022*

Gross Margin Budget – Year 1

Area Unit = 1ha

Income	Item	Quantity	Rate	Price	Budget	
Anticipated yield	1st grade	2000 kg/ha	Large	@	\$25.00 /kg	\$50,000.00
	2nd grade	2000 kg/ha	Medium	@	\$20.00 /kg	\$40,000.00
	Retained seed	700 kg/ha		@	\$0.00 /kg	\$0.00
	Unusable seed	300 kg/ha		@	\$0.00 /kg	\$0.00
	Total	5000 kg/ha				
A. Gross Income/ha					\$90,000.00	
Operating Costs						
Seed	Large Bulbs (10 cloves/bulb)		938kg/ha	\$15.00/ kg	\$14,070.00	
Fertiliser	Lime		2.5t/ha	\$60.00 /t	\$150.00	
	Single Super		400kg/ha	\$0.40 /kg	\$160.00	
	Urea		60kg/ha	\$0.70 /kg	\$42.00	
	Micro-nutrients		5l/ha	\$6.50 /L	\$32.50	
Fuel	Ground preparation	15 L/hr	2.0 hr/ha	\$1.50 /L	\$45.00	
	Bed preparation (if required)	15 L/hr	1.0 hr/ha	\$1.50 /L	\$22.50	
	Chemical application	12 L/hr	5.0 hr/ha	\$1.50 /L	\$90.00	
	Fertiliser application	12 L/hr	2.0 hr/ha	\$1.50 /L	\$36.00	
	Harvesting	12 L/hr	32.0 hr/ha	\$1.50 /L	\$576.00	
	Farm vehicles	12 L/hr	0.4 hr/ha	\$1.50 /L	\$72.00	
	Fuel to farmers markets	10,000km/year	\$0.15/km	\$1.50 /L	\$1,500.00	
Chemicals	Pre-emergent herbicide	1 application	1.5l/ha	\$10.10 /L	\$34.50	
	Post-emergent herbicide	1 application	2.0kg/ha	\$83.31 /kg	\$166.62	
	Post-emergent herbicide	1 application	3.0kg/ha	\$83.31 /kg	\$166.62	
	Post-emergent herbicide	2 applications	0.5l/ha	\$14.35 /L	\$14.35	
	Insecticide	2 applications	0.04L/ha	\$154.80 /L	\$12.38	
	Fungicide	2 applications	2.2kg/ha	\$8.24 /kg	\$36.26	
	Fungicide	2 applications	0.29L/ha	\$28.70 /L	\$16.65	
Water	N/A					
Labour	Tractor driving	1 person	7.0hr/ha	\$25.00 /hr	\$175.00	
	Weeding/Chipping	1 person	40.0hr/ha	\$18.00 /hr	\$720.00	
	Contract clove separation	1 person	938kg/ha	\$1.00 /kg	\$938.00	
	Manual harvest	4 people	\$32.00hr/ha	\$25.00 /hr	\$2,944.00	
	Topping, tailing & packing	4 people	\$54.0hr/ha	\$25.00 /hr	\$5,400.00	
	Shed/Forklift	1 person	\$0.5hr/ha	\$25.00 /hr	\$12.20	
Electricity	Packing shed		\$10.0hr/ha	\$1.05 /hr	\$10.50	
Packaging	Packaging cartons		3000/ha	\$1.50 /carton	\$4,500.00	
Freight	Consumer pays, postage and handling added to online orders.				\$0.00	
Other Costs	Farmers market associated costs, websites etc.				\$3,000.00	
	Other				\$4,000.00	
B. Total Operating Costs					\$38,942.00	
Gross Margin per ha (A-B)					\$51,058.00	

Notes:

- This budget was prepared with the assistance of the 2013 gross margin budget sourced from the NSW DPI (Napier, Kelly & Watts, 2013).
- The basis of this budget is direct to the consumer via the below channels and not via the commercial markets as illustrated on the example gross margin budget listed in appendix B.

1. Online marketing – examples were given on pages 12 to 16. Online marketing via a website allows maximum reach to all parts of Australia except Western Australia and Tasmania which have quarantine restrictions. If processed and stored correctly, garlic can store for 2-6 months.

2. Local farmers markets - for 2022 Mudgee will have 22 markets per year, this includes 12 x Farmers Markets and 10 x Makers Markets. This along with towns like Orange, Bathurst and Dubbo it provides a number of options for direct marketing whilst the product is in season or is satisfactory for sale.

3. Direct to restaurants, cafes and food outlets – the Mid-Western Region has a thriving café a restaurant culture. This extend to places like Orange, Bathurst and Dubbo, fresh local produce is something that the increasing tourist market wanting to experience.

- **Production**

- 5.0t/ha yield calculated for this gross margin budget.
- 1st grade 2.0t/ha @ \$25.00/kg
- 2nd grade 2.0t/ha @ \$20.00/kg
- 700kg of garlic remained as seed for the following years crop
- 300kg of unmarketable seed and seed not suitable for planting
- Seed stock for the 1st years crop to be sourced from commercial growers in the Riverina.
- Early varieties can be planted from late February and later varieties to mid-May. Planting to late will not allow maximum yield to be achieved.
- Certain varieties are more adaptable to the grower-packer as they are easier to clean.
- Larger sized cloves are best for planting, more unique varieties that are not available through the commercial growers will be more expensive and own budgets should be completed.
- Weed control during the early stage is critical for adequate yields.
- Weather conditions should be monitored, and protective fungicide sprays should be applied as required.
- Water usage – this budget is based on dryland production, seasonal conditions can significantly affect yield and crop performance.
- Garlic production is very labour intensive and costs have been included in this budget. Activities such as clove separation, topping, tailing, cleaning, preparing, storing and packaging is substantial. The costs have been costed on a contract basis based of the gross margin budget listed in appendix B. Costs could be saved if this labour was completed by the owners.
- Investing capital in machinery and equipment to grow, handle, prepare and store garlic is significant but can make operations easier and reduce labour costs.

- **Pests, Disease & Disorders**

- The most common pest is thrips, the most common diseases are downy mildew, Stemphylium and rust.
- Post-harvest breakdown causes large losses.

- **Packaging**

- Packaging is based on a 2kg cartons cost, smaller or larger cartons will be cheaper or dearer but this average is assumed.

Economics

- This budget is a guide only and individuals should complete their own due diligence prior to commencement.
- Costs are based on average sourced from conventional retailers from online websites (see pages 12 to 16).
- Costs of fertiliser, herbicides and pesticides are indicative.

NSW DPI, 2013

Gross Margin Budget – Year 2

Area Unit = 1ha

Income	Item	Quantity	Rate	Price	Budget	
Anticipated yield	1st grade	2000 kg/ha	Large	@	\$25.00 /kg	\$50,000.00
	2 nd grade	2000 kg/ha	Medium	@	\$20.00 /kg	\$40,000.00
	Retained seed	700 kg/ha	Medium	@	\$0.00 /kg	\$0.00
	Unusable seed	300 kg/ha		@	\$0.00 /kg	\$0.00
	Total	5000 kg/ha				
A. Gross Income/ha					\$90,000.00	
Operating Costs						
Seed	Large Bulbs (10 cloves/bulb)		300kg/ha	\$15.00 /kg	\$4,500.00	
Fertiliser	Lime		2.5t/ha	\$60.00 /t	\$150.00	
	Single Super		400kg/ha	\$0.40 /kg	\$160.00	
	Urea		60kg/ha	\$0.70 /kg	\$42.00	
	Micro-nutrients		5l/ha	\$6.50 /L	\$32.50	
Fuel	Ground preparation	15 L/hr	2.0 hr/ha	\$1.50 /L	\$45.00	
	Bed preparation (if required)	15 L/hr	1.0 hr/ha	\$1.50 /L	\$22.50	
	Chemical application	12 L/hr	5.0 hr/ha	\$1.50 /L	\$90.00	
	Fertiliser application	12 L/hr	2.0 hr/ha	\$1.50 /L	\$36.00	
	Harvesting	12 L/hr	32.0 hr/ha	\$1.50 /L	\$576.00	
	Farm vehicles	12 L/hr	0.4 hr/ha	\$1.50 /L	\$72.00	
Chemicals	Pre-emergent herbicide 1 application		1.5l/ha	\$10.10 /L	\$34.50	
	Post-emergent herbicide 1 application		2.0kg/ha	\$83.31 /kg	\$166.62	
	Post-emergent herbicide 1 application		3.0kg/ha	\$83.31 /kg	\$166.62	
	Post-emergent herbicide 2 applications		0.5l/ha	\$14.35 /L	\$14.35	
	Insecticide 2 applications		0.04L/ha	\$154.80 /L	\$12.38	
	Fungicide 2 applications		2.2kg/ha	\$8.24 /kg	\$36.26	
	Fungicide 2 applications		0.29L/ha	\$28.70 /L	\$16.65	
Water	N/A					
Labour	Tractor driving	1 person	7.0hr/ha	\$25.00 /hr	\$175.00	
	Weeding/Chipping	1 person	40.0hr/ha	\$18.00 /hr	\$720.00	
	Contract clove separation	1 person	938kg/ha	\$1.00 /kg	\$938.00	
	Manual harvest	4 people	\$32.00hr/ha	\$25.00 /hr	\$2,944.00	
	Topping, tailing & packing	4 people	\$54.0hr/ha	\$25.00 /hr	\$5,400.00	
	Shed/Forklift	1 person	\$0.5hr/ha	\$25.00 /hr	\$12.20	
Electricity	Packing shed		\$10.0hr/ha	\$1.05 /hr	\$10.50	
Packaging	Packaging cartons		3000/ha	\$1.50 /carton	\$4,500.00	
Freight	Consumer pays, postage and handling added to online orders.				\$0.00	
Other Costs	Farmers market associated costs, websites etc.				\$3,000.00	
	Fuel to farmers markets	10,000km/year	\$0.15/km	\$1.50 /L	\$1,500.00	
	Other				\$4,000.00	
B. Total Operating Costs					\$29,372.00	
Gross Margin per ha (A-B)					\$60,628.00	

Notes:

- This budget was prepared with the assistance of the 2013 gross margin budget sourced from the NSW DPI (Napier, Kelly & Watts, 2013).
- The basis of this budget is direct to the consumer via the below channels and not via the commercial markets as illustrated in this example gross margin budget illustrated in appendix C.

1. Online marketing – examples were given on pages 12 to 16. Online marketing via a website allows maximum reach to all parts of Australia except Western Australia and Tasmania which have quarantine restrictions. If processed and stored correctly, garlic can store for 2-6 months.

2. Local farmers markets - for 2022 Mudgee will have 22 markets per year, this includes 12 x Farmers Markets and 10 x Makers Markets. This along with towns like Orange, Bathurst and Dubbo it provides a number of options for direct marketing whilst the product is in season or is satisfactory for sale.

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- **Production**

- 5.0t/ha yield calculated for this gross margin budget.
- 1st grade 2.0t/ha @ \$25.00/kg
- 2nd grade 2.0t/ha @ \$20.00/kg
- 700kg of unmarketable seed will be retained for seed for following years crop
- 300kg of unmarketable seed and seed not suitable for planting
- 300kg of seed stock required to be purchased from commercial growers in the Riverina (700kg of seed stock was kept from the previous year's crop).
- Early varieties can be planted from late February and later varieties to mid-May. Planting to late will not allow maximum yield to be achieved.
- Certain varieties are more adaptable to the grower-packer as they are easier to clean.
- Larger sized cloves are best for planting, more unique varieties that are not available through the commercial growers will be more expensive and own budgets should be completed.
- Weed control during the early stage is critical for adequate yields.
- Weather conditions should be monitored, and protective fungicide sprays should be applied as required.
- Water usage – this budget is based on dryland production, seasonal conditions can significantly affect yield and crop performance.
- Garlic production is very labour intensive, and the costs have been included in this budget. Activities such as clove separation, topping, tailing, cleaning, preparing, storing and packaging is substantial.
- Investing capital in machinery and equipment to grow, handle, prepare and store garlic is significant but can make operations easier and reduce labour costs.

- **Pests, Disease & Disorders**

- The most common pest is thrips, the most common diseases are downy mildew, Stemphylium and rust.
- Post-harvest breakdown causes large losses.

- **Packaging**

- Packaging based on a 2kg cartons cost, smaller or larger cartons will be cheaper or dearer, but this average is assumed for budgeting purposes.

Economics

- This budget is a guide only and individuals should complete their own due diligence prior to commencement.
- Costs are based on average sourced from conventional retailers from online websites.
- Costs of fertiliser, herbicides and pesticides are indicative.

Value adding opportunities:

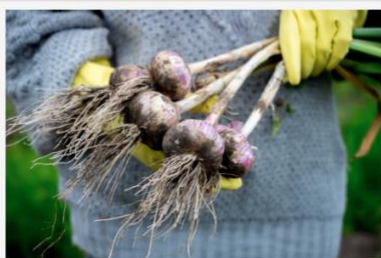
Once the farming operation is set up, then future value adding can be explored. As with all fresh produce, storage life is limited. By developing products that can be sealed and stored then more opportunities become available for all year-round sales. Examples of this are illustrated below:

- Garlic Salt
- Garlic powder
- Minced garlic (see appendix C)
- Garlic granules
- Garlic oil
- Garlic seasoning
- Garlic flakes
- Pickled garlic

The following article illustrates some of the value adding opportunities with garlic separate to the fresh product to be sold.

Profit From Garlic With These Eight Value-Added Products

january 26, 2019 by [craig wallin](#)



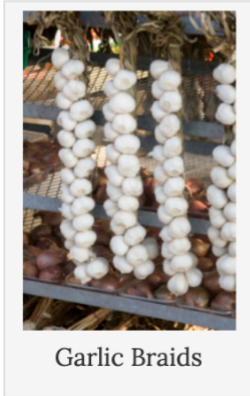
Profitable Gourmet Garlic

Gourmet garlic growers always end up with harvested garlic bulbs that are not quite good enough for fresh sales to consumers. The bulbs may have cosmetic defects, or you may have an occasional surplus of smaller bulbs. One of the best ways to turn those garlic bulbs into profits is to make value-added products that can will keep until sold.

Growers have several ways to boost their income from garlic by processing the harvested cloves, adding garlic to other products, or creating new value-added products. By taking a few simple additional steps, they can turn their harvested garlic from a simple food item to valuable products that can bring top dollar from consumers and double, even triple profits.

For example, the market for gourmet foods, like garlic chutney or garlic vinegar, is growing fast, as more and more consumers are choosing to buy locally-produced foods instead of mass-processed foods shipped in from thousands of miles away. Here are eight value-added products proven to be in demand by gourmet garlic growers around the U.S:

1. Braided garlic.



Garlic Braids

Although most of your customers at the farmer's market will buy garlic bulbs, quite a few love the artistic look of garlic braids, and will pay the premium price for them. Be sure to braid several sizes, from as few as 5 bulbs, to longer braids of 8 to 20 bulbs, so there's a size and a price for every shopper.

2. Garlic scapes.



Garlic Scapes

Because garlic scapes are only available once a year, you will have a line of customers at the farmer's market clamoring to buy yours. Since these false seedheads must be trimmed to encourage bulb growth, why not make some money on what otherwise would go to waste. These delicious greens, with just a hint of garlic flavor, are also popular with restaurant chefs.

3. Gourmet garlic powder.

Once you've tasted the superior flavor of real home-made garlic powder, you'll never want to buy the mass-produced product at the supermarket. Making it is a simple process – the only expensive piece of equipment needed is a sturdy food dehydrator. Homemade garlic powder has a superior flavor, a much higher allicin content (allicin is the health-enhancing ingredient found in garlic) and is free of the unhealthy contaminants often found in commercial garlic powders.

4. Pickled garlic.



Pickled Garlic

Americans have a long way to go before they catch up to the pickled garlic consumption of Koreans, currently about 60 pounds a year! But home-made pickled garlic is always a popular seller at the farmer's market, and easy to make. This is a great way to use the small cloves that may not have sold fresh, as their smaller size allows the flavor of your pickling solution to be fully absorbed in each clove.

5. Garlic pesto sauce.

Freshly made garlic pesto sauce is another simple to make, easy to sell food product. A California grower makes it fresh every week, using the garlic and herbs grown in her market garden. She distributes it to food stores in the San Francisco area, and direct to consumers at two area farmer's markets. Gourmet cooks love it, and are willing to pay a premium price for convenience.

6. Garlic vinegars.

Flavored vinegars are hot. You'll see trendy chefs on all the Food TV shows using their favorite vinegar, and of course, in all the cooking magazines. But have you priced them? Champagne is cheaper! That's why it makes sense for garlic growers to make a few bottles of this gourmet product, using a few simple ingredients, and put them along side your gourmet garlic bulbs at the next farmer's market.

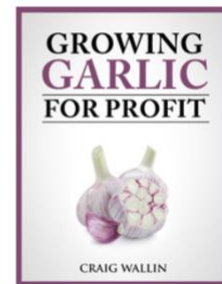
7. Garlic jelly.

At first, most folks are hesitant to try garlic jelly. That's why you must do samples with crackers at the farmer market. Once they try this unique combination of "sweet and heat," it's love at first bite, and most will want to take a jar home with them. At the garlicstore.com, their garlic-pepper jelly is one of the top three best-sellers.

8. *Garlic insecticide.*

Researchers have found that garlic can provide an effective, safe and cheap insecticide. Studies indicate that a basic garlic spray can kill up to 95% of common pests such as crickets, onion fly larvae, houseflies, mosquitoes, pea weevils and slugs. Why does garlic work as an insecticide? The active ingredient, allicin, stops protein synthesis in many bugs, which quickly kills them. It's simple, easy and inexpensive to make and non-toxic. Put a few bottles on consignment in health food stores, garden centers, retail nurseries – any place that carries conventional insecticides. Profit margins on this are huge – as much 800%.

These are just a few of the dozens of garlic-based value-added products that you can make from garlic that can double or triple your profits, as the markups are so high. To discover more about how to grow and market gourmet garlic and value-added garlic products, read: *Growing Garlic For Profit*.

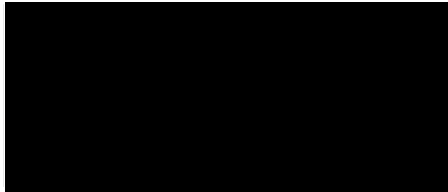


Source: *Garlic Growing for Profit*, 2022.

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Appendix A



Analysis Results (SOIL)

Customer



Distributor



Sample Ref

MAGPIE LANE 0-10cm

Date Received

09/12/2021 (Date Issued: 14/12/2021) (Date Sampled: 06/12/2021)

Sample No

B125958A / SDA1273

Crop

GARLIC

Analysis	Result	Guideline	Interpretation
pH [1:5 H2O]	5.8	5.8 - 8.5	Normal
pH [1:5 CaCl2]	4.8	5.2 - 7.9	Slightly Low
Organic Matter (%)	3.7	3.0 - 8.0	Normal
CEC (meq/100g)	6.05	12.00 - 40.00	Low
EC [1:5 H2O] (dS/m)	0.07	0.90 - 3.00	Very Low
NO3-N (ppm)	5.0	15.0 - 70.0	Low
NH4/N (ppm)	< 1.0		
Phosphorus [Colwell] (ppm)	28	64 - 214	Low
Potassium[Am. Acet.] (meq/100g)	0.77	0.50 - 1.50	Normal
Calcium[Am. Acet.] (meq/100g)	3.89	6.00 - 15.00	Slightly Low
Magnesium[Am. Acet] (meq/100g)	1.19	1.00 - 4.50	Normal
Sulphur [MCP] (ppm)	6	8 - 20	Slightly Low
Boron[CaCl2] (ppm)	0.4	1.0 - 5.0	Slightly Low
Copper [DTPA] (ppm)	0.9	2.5 - 20.0	Low
Iron [DTPA] (ppm)	118	5 - 120	Normal
Manganese [DTPA] (ppm)	59.2	5.0 - 60.0	Normal
Zinc [DTPA] (ppm)	1.6	5.0 - 15.0	Very Low
Sodium[Am. Acet.] (meq/100g)	0.1	0.3 - 3.0	Low
Aluminium[KCl] (meq/100g)	0.06	1.00 - 2.50	Very Low
Chloride (ppm)	56	200 - 1100	Low
Ca base saturation (%)	64.4	<75	Normal



CERTIFIED

Quality Checked: per Rob Cirocco (Lab Manager) – RC

Accredited for compliance with ISO/IEC 17025 – Testing #20543





Analysis Results (SOIL)

Customer



Distributor



Sample Ref

MAGPIE LANE 0-10cm

Date Received

09/12/2021 (Date Issued: 14/12/2021) (Date Sampled: 06/12/2021)

Sample No

B125958A / SDA1273

Crop

GARLIC

Analysis	Result	Guideline	Interpretation
K base saturation (%)	12.7	<5	High
Mg base saturation (%)	19.7	<15	High
Na base saturation (%)	2.2	<2	High
Al base saturation (%)	1.10		
Ca:Mg Ratio	3.3	2.5 - 3.0	High
Texture	SILTY LOAM		
Colour	BROWN		
Aluminium (ppm)	6.0		
Sodium (ppm)	31.0		
Calcium (ppm)	779.0		
Magnesium (ppm)	143.0		
Potassium (ppm)	299.0		
Lime Requirement (t/ha)	< 0.50		

Additional Comments

Soil analyses performed and reported on samples dried at 40°C and sieved to <2mm; Plant tissue analyses performed and reported on samples dried at 70°C and ground (NB/ Fruit, Fruitlet & Tuber reported on fresh weight basis)

Please Note

Whilst every care is taken to ensure that the Results from Analysis are as accurate as possible, it is important to note that the analysis relates to the sample received by the laboratory, and is representative only of that sample. No warranty is given by the laboratory that the Results from Analysis relates to any part of a field or growing area not covered by the sample received. It is important to ensure that any soil, leaf, silage or fruitlet sample sent for analysis is representative of the area requiring analysis and that samples are obtained in accordance with established sampling techniques. A leaflet containing instructions on how to take soil, leaf, herbage, silage and fruit samples for analysis is available from the laboratory on request.

This laboratory has been awarded a Certificate of Proficiency for specific soil and plant tissue analyses by the Australasian Soil and Plant Analysis Council (ASPAC). Tests for which proficiency has been demonstrated are highlighted in this report with an asterisk.



CERTIFIED

Quality Checked: per Rob Cirocco (Lab Manager) – RC

Accredited for compliance with ISO/IEC 17025 – Testing #20543



ACCREDITED FOR TECHNICAL COMPETENCE

Appendix B



Area Unit = 1ha

GARLIC

2013

						standard budget	your budget
INCOME:							
	Item	Quantity	Rate	Price			
Anticipated Yield	1st Grade	2814 kg/ha	Large	@	\$ 6.00 /kg	\$ 16,884.00	
	2nd Grade	2680 kg/ha	Medium	@	\$ 4.00 /kg	\$ 10,720.00	
	Marketable Total	5494 kg/ha					
					Weighted Average	\$ 5.02 /kg	
A. Gross Income/ha						\$ 27,604.00	
OPERATING COSTS:							
					\$ Cost		
Seed and Plants	Large Bulbs (10 cloves/bulb)		938 kg/ha		\$ 8.00 /kg	\$ 7,504.00	
Fertiliser	Single Super		400 kg/ha		\$ 0.48 /kg	\$ 192.00	
	Calcium Nitrate		175 kg/ha		\$ 0.76 /kg	\$ 133.00	
	Potassium Nitrate		175 kg/ha		\$ 1.32 /kg	\$ 231.00	
	Magnesium Nitrate		125 kg/ha		\$ 1.28 /kg	\$ 160.00	
	Urea		60 kg/ha		\$ 0.86 /kg	\$ 51.60	
	Micro Nutrients		5 L/ha		\$ 6.50 /L	\$ 32.50	
Fuel	Ground Preparation	15 L/hr	2.0 hr/ha		\$ 1.15 /L	\$ 34.50	
	Bed Preparation	15 L/hr	1.0 hr/ha		\$ 1.15 /L	\$ 17.25	
	Chemical Applications	12 L/hr	5.0 hr/ha		\$ 1.15 /L	\$ 69.00	
	Fertiliser Applications	12 L/hr	2.0 hr/ha		\$ 1.15 /L	\$ 27.60	
	Harvesting	12 L/hr	32.0 hr/ha		\$ 1.15 /L	\$ 441.60	
	Farm Vehicles	12 L/hr	0.4 hr/ha		\$ 1.15 /L	\$ 5.52	
Chemicals	Pre-emergent Herbicide	1 application	1.5 L/ha		\$ 10.10 /L	\$ 15.15	
	Post-emergent Herbicide	1 application	2.0 kg/ha		\$ 83.31 /kg	\$ 166.62	
	Post-emergent Herbicide	1 application	3.0 kg/ha		\$ 83.31 /kg	\$ 249.93	
	Post-emergent Herbicide	2 applications	0.5 L/ha		\$ 14.35 /L	\$ 14.35	
	Insecticide	2 applications	0.04 L/ha		\$ 154.80 /L	\$ 12.38	
	Fungicide	2 applications	2.2 kg/ha		\$ 8.24 /kg	\$ 36.26	
	Fungicide	2 applications	0.29 L/ha		\$ 28.70 /L	\$ 16.65	
Water	Furrow Irrigation		4.5 ML/ha		\$ 60.00 /ML	\$ 270.00	
Labour	Tractor Driving	1 person	7.0 hr/ha		\$ 25.00 /hr	\$ 175.00	
	Weeding/Chipping	1 person	40.0 hr/ha		\$ 18.00 /hr	\$ 720.00	
	Irrigation	1 person	2.4 hr/ha		\$ 25.00 /hr	\$ 60.00	
	Contract Clove Separation	1 person	938 kg/ha		\$ 1.00 /kg	\$ 938.00	
	Manual Harvesting	4 people	32 hr/ha		\$ 18.00 /hr	\$ 2,304.00	
	Topping, Tailing & Packing	4 people	54.0 hr/ha		\$ 18.00 /hr	\$ 3,888.00	
	Shed/Forklift	1 person	0.5 hr/ha		\$ 25.00 /hr	\$ 12.50	
Electricity/Gas	Packing Shed		10.0 hr/ha		\$ 1.05 /hr	\$ 10.50	
Packaging	Packaging Cartons		549 cartons/ha		\$ 1.90 /carton	\$ 1,043.86	
Freight/Transport	Truck	88 cartons/ pallet space	\$ 115.00	cost per pallet space	\$ 1.30 /carton	\$ 714.22	
Other Costs	Agents Commission		15%			\$ 4,140.60	
B. Total Operating Costs						\$ 23,687.59	
Gross Margin per ha (A-B)						\$ 3,916.41	
Gross Margin /ML						\$ 870.31	

Break-even Price	\$4.19 / carton for	5494 cartons/ha
	(weighted average)	
Break-even Yield	4495 cartons / ha @	\$5.02 / carton

PRODUCT TRADE NAMES

The product trade names in this publication are omitted on the understanding that no preference between equivalent products is intended and that the inclusion of a product does not imply endorsement by NSW DPI over any other equivalent product from another manufacturer.



GARLIC

2013

SENSITIVITY ANALYSIS

TABLE 1- Effect of Yield and Price on Gross Margin /ha

YIELD (kg)	DELIVERED PRICE (\$/kg)					
	3.02	4.02	5.02	6.02	7.02	8.02
4494	-\$7,674	-\$3,854	-\$34	\$3,786	\$7,605	\$11,425
4994	-\$6,549	-\$2,304	\$1,941	\$6,186	\$10,431	\$14,676
5494	-\$5,423	-\$753	\$3,916	\$8,586	\$13,256	\$17,926
5994	-\$4,298	\$797	\$5,892	\$10,987	\$16,082	\$21,176
6494	-\$3,173	\$2,347	\$7,867	\$13,387	\$18,907	\$24,427

NOTES:

Authors - This budget was prepared by T.Napier, G.Kelly and S.Watts and outlines production for inland NSW.

Area - Small acreages are grown throughout NSW with larger production areas in the Riverina.

Production - Planting commences in February (early varieties) and continues to May (late varieties).
 - Certain varieties are more adaptable to the grower-packer as they are easier to clean.
 - Larger sized cloves are best for planting.
 - Plant cloves 10 cm apart. Beds 1.5 m to 1.8 m wide may have 2 to 4 rows about 30 cm apart.
 - Plant population of 134,000 plants per hectare.
 - Weed control during establishment and the early growth stages is essential to produce adequate yields.
 - Monitoring weather conditions and protective spray programs are critical to disease management.
 - Water usage is 4 to 6ML/ha and varies with soil, location and season.
 - The cost of manual operations such as clove separation and topping, tailing, cleaning, grading and packing of bulbs (costed in this budget) is substantial.
 - Initial capital costs for machinery and equipment to grow, handle, prepare and store garlic is significant but can make operations easier and reduce labour costs.

Pests, Diseases - Thrips are the main insect pests. Downy mildew, stemphylium and rust are common diseases.

& Disorders - Post harvest breakdown can cause large losses.

Harvesting - Judging maturity in garlic is more difficult than judging maturity in onions. The crop is ready to harvest when the neck softens and the tops fall over and progressively turn yellow and start to dry out.
 - Hand harvest occurs in November and December. Bulbs are then topped, tailed and cured.
 - Curing is very important and the crop can be lost to post harvest breakdown if not handled correctly.

Packaging - Garlic is marketed in **10 kg cartons**. The classification of sizes varies between growers.
 - Large, heavy and clean bulbs is required for markets.
 - In this budget: Large > 70 mm, Medium > 50 mm and Small < 50 mm.
 - Small and inferior quality garlic is graded out and is of no value on the fresh market.
 - If available, small garlic can be sold as factory grade without further processing.

Yields - Yields range from 4 to 8 tonne (dry packaged) per hectare.
 - Bulbs which are unmarketable but have large clove sizes can be kept as seed for growing the next crop.
 - Farmers need to achieve the top yields if Australia is to be internationally competitive.

Economic - **This budget is ONLY A GUIDE** and is specific to the regions specified. Costs and income can be altered for changes in crop management or input prices. Farmers should use their own figures.
 - The budget uses a format similar to the Method 2 calculator in the VegTool Gross Margin program.
 - Average prices for 2012 were used for this budget. Overhead costs or GST are not included.

Trim Reference: INT13/37814



Horticulture Australia



Australian Government

Australian Centre for
International Agricultural Research

Appendix C



Family puts garlic back on farming menu

A Victorian couple is growing a crop and spurring a new industry

Kate Dowler

Carving out a new intensive horticulture industry that can use rich soils and good rainfall in a region synonymous with dryland cropping and grazing is no mean feat.

What's more, the new crop had never been grown locally at commercial, broadacre scale, and nobody knew for sure if it could even be done.

But it is happening, and the force behind the venture is the husband-and-wife team Wayne and Tracey Schild, founders of Grange Garlic.

The pair - with son Daniel, who also works full-time in the family business, and Ballarat-based ICU nurse daughter Tara - faced numerous setbacks, with still some tricky hurdles ahead, to develop what they say is potentially a dynamic new industry for fellow farmers throughout Victoria's Western District.

Wayne Schild grew up in Hamilton and, while he and his family were always interested in farming, he took an entrepreneurial path into the garlic industry.

Initially he worked as a shearer, then a paramedic for 15 years, before starting a sawmill recovering otherwise waste material, but "my heart always wanted to be a farmer and our son Daniel also loves the land".

The "authenticity" of farming - growing plants or animals - and being engaged in nature as it produced life-giving food was the draw for Mr Schild. "To be involved with something so natural and wonderful, from the start - it's like it's the beginning of all authenticity," he said.

Tracey Schild, meanwhile, aside from the family businesses, has worked in retail part-time, which she said had been a reprieve from the all-encompassing nature of farming.

The farm the Schilds ended up buying was bought jointly with their neighbour - a close friend - and the two-title property split.

Mr Schild said he had "always been an ideas man" but the path to garlic started with some in-depth investigations of other enterprises - meat-direct and pastured poultry.

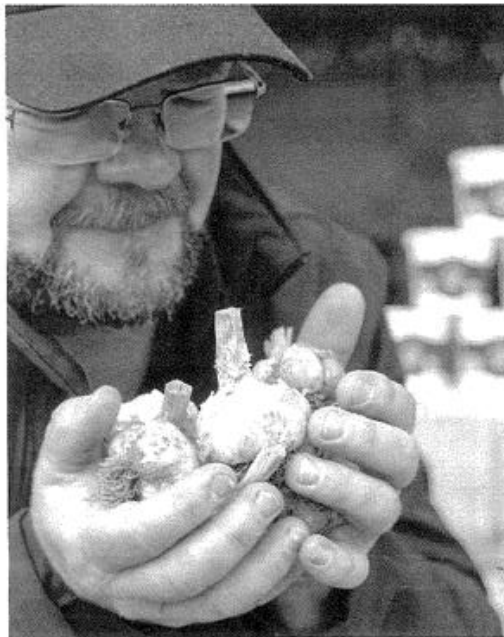
"But garlic was emerging - we started as home growers," he said.

The Schilds - who hail from Bundaberg in Queensland - searched for an enterprise they could make a living through a value-adding enterprise on their relatively small acreage of 48ha.

They saw garlic as a huge opportunity and a potential market for a locally grown product, high in quality and supplied in fresh, wet minced form.

Australia grows very little of its own garlic, importing most of it from countries such as China.

In six years, the Schilds have developed the three aspects of the



Wayne and Tracey Schild and, top, Wayne with some garlic bulbs

It has proven the health-giving attributes of the product

business - the horticulture (broadacre garlic growing); storage and handling; and a hi-tech processing facility.

The lack of garlic seedstock was the first barrier to entry, Mr Schild said, due to the infantile nature of the Australian industry. As an annual, garlic was a slow multiplier and growers cannot import seed.

A portion of the crop also needs to be reserved as seed, which also slows production.

Seed also must be acclimatised.

"There is a growing artisan arena of garlic growers, but at the end of the day there is absolutely no scale," Mr

Schild said. "In fresh whole bulbs we import more than 80 per cent of what we consume because our industry can only supply for a few months of the year. There are only three or four other commercial scale growers in Australia."

When it came to processed, dehydrated garlic, Mr Schild said 100 per cent was imported, with China controlling 97 per cent of that world market. Thirty years ago, Australia had 300 growers in the Riverina supplying fresh garlic, before China "decimated the price point".

He said: "The question is not why

is our food so dear, but why is their food so cheap."

Instead of competing purely on price, the Schilds decided to target the fresh, wet minced market, initially focused on the food service sector, producing a high-quality product.

"We want to be commercial, not artisan, and that means we will be mechanised, not hand sown, harvested and processed," Mr Schild said.

Garlic was also "scaleable", which matched the investment required for mechanisation.

The first year the couple sowed 5000 plants - now they have 350,000 plants per hectare, with 1ha sown this year, trailing 11 different varieties. Daniel is operations manager, and Tara the administration manager.

Mr Schild said garlic also attracted them as the best option on their small farm, because they "loved garlic, and its health-giving" attributes.

"You start to realise the contaminated (imported) sources; and that if we follow the authentic pathway, instead of chasing corporate profits, the exciting aspect for us is the health-giving properties," he said.

"If you are careful with the way you handle garlic, you can protect those properties, but if you don't you destroy them. There is no other alternative; the market desire for it is strong. Somehow the world has fallen asleep to the health-giving properties of garlic; it is the No.1 immune-boosting product in the paddock."

The Schilds saw the imported product as no competition in the high-quality category.

Whole fresh markets were difficult to supply year-round and, with garlic sold visually, at least 30 per cent of what is produced is unsaleable, which opened the door to opportunities for minced garlic.

"There is a huge space in this market," Mr Schild said. "We are able to provide 12-month supply, and we've achieved product stability - 12-month shelf life, unrefrigerated and untreated - that's what we have achieved."

"It has proven the health-giving attributes of the product - our process doesn't destroy those health-giving attribute, but protects them."

The returns per hectare of garlic production were "infinitely better than broadacre grazing", Wayne said.

The winter crop is dry sown into raised beds in April-May and harvested in November-December.

Soils are deep, heavy clay with high organic matter, tending to be acidic, with a consistent annual rainfall of 650mm. Ground preparation is crucial.

While the Schilds are growing the crop dryland now, they are seeking a water licence. "Irrigation is what we are embarking on to be supportive to avoid failed autumns and early shut-offs to spring - watering is sometimes required to lift the crop out of the ground for harvest," Mr Schild said.

The garlic will be sold to Victorian retail stockists, via e-commerce and building relationships with food services and food processing producers.

The goal was to become nationally available, and potentially exports.

They also see opportunities at the pharmaceutical level.

The Weekly Times

DEALS DIGEST

ISPT snags Burwood East offices for \$35.8m

Superannuation fund-backed manager ISPT has swooped on an office block in Melbourne's Burwood East that is the headquarters for Victoria's Country Fire Authority in a \$35.8m play.

The 5456sq m site at 8 Lakeside Drive in Burwood East will go into the manager's CIB Fund, after picking it up from the Singapore-based TE Capital Partners.

The transaction set a new price benchmark for the Tally Ho Business Park in Melbourne's eastern suburbs, at a yield of just under 4.5 per cent on the fully-leased net income.

CBRE's Tom Ryan and Scott Orchard managed the off-market sale campaign.

Cook buys Bunnings Hervey Bay for \$58.6m

Retail chain Bunnings has off-loaded one of its signature warehouses in Queensland's Hervey Bay to NZ's Cook Property for \$58.6m.

The deal showed a record 4 per cent yield amid strong investor demand for the centres. The 17,421sq m Bunnings Warehouse is being built and will be finished late next year.

It carries a 10-year net lease to Bunnings, with options extending until 2080. The deal was jointly negotiated by Stonebridge's Phil Gardill and Justin Dowers and Savills' Peter Tyson.

AMP Capital to sell Stockland stake

AMP Capital is looking to off-load a half stake in Stockland Townsville, a regional shopping centre offering the opportunity for redevelopment, in North Queensland.

It is anchored by retail heavyweights Myer, Woolworths, and Big W, secured by long leases and is on a 9.9ha landholding.

The complex also has six mini-majors, a 700-seat food precinct and more than 150 specialty stores.

The offering via Stonebridge and JLL includes 2.6ha of town centre development land across multiple lots and presents a wide range of value-add and development opportunities.

Stockland held its half share of the centre at \$156.5m on a 6.25 per cent capitalisation rate.

AOF merger plan gets expert's nod

An independent expert has concluded a planned merger between Australian Unity Office Fund and the Australian Unity Diversified Property Fund, creating an entity with \$12bn of real estate, which is "in the best interests" of AOF unitholders.

KPMG Corporate Finance assessed the proposal to be "fair and reasonable for AOF unitholders" in the absence of any other superior proposal. AOF investors will vote on the deal at a meeting on December 10.

