salvestroplanning
innovation . sustainability . excellence

Planning Proposal

Proposed Rezoning
Sutton Road and Faithfull Street, Gundaroo

Prepared for HRC & MR Meischke
March 2013

12095: Document History

Status	Date	Authorised Name/Position	Signature
Draft 1	**05/12/2012**	**Lizzie Olesen-Jensen** **Planning Supervisor** **Salvestro Planning**	
Internal Review	**06/12/2012**	**Garry Salvestro** **Director** **Salvestro Planning**	
Final	**29/01/2013**	**Lizzie Olesen-Jensen** **Planning Supervisor** **Salvestro Planning**	
Final Review	**29/01/2013**	**Garry Salvestro** **Director** **Salvestro Planning**	
Amended	**05/03/2013**	**Lizzie Olesen-Jensen** **Planning Supervisor** **Salvestro Planning**	

This report is prepared by
Salvestro Planning
16 Fitzmaurice Street
PO Box 783
WAGGA WAGGA NSW 2650

Telephone: (02) 69218588
Facsimile: (02) 69218388
Email: admin@salvestroplanning.com.au
Website: www.salvestroplanning.com.au

Disclaimer
While every reasonable effort has been made to ensure that this document is correct at the time of printing, Salvestro Planning and its employees make no representation, undertake no duty and accepts no responsibility to any third party who use or reply upon this document or the information contained in it.

TABLE OF CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

TABLE OF PHOTOS

1 INTRODUCTION

1.1 Purpose of this Report

This proposal is provided for Council's consideration, of the subject land, for future expansion of urban development in Gundaroo.

This report provides the results of site and desktop investigations, and its capability to sustain residential development.

The justification of the proposed landuse is explored with regard to environmental matters in conjunction with the supply and demand of housing in Gundaroo.

1.2 Report Structure

This report has been prepared in accordance with the:

- Yass Valley Council's Policy *SEP-POL-1 for Planning Proposals*; and
- The NSW Department of Planning and Infrastructure's *Guide to Preparing Planning Proposals (October 2012)*.

This Planning Proposal shall be read in conjunction with accompanying reports prepared by Consulting Engineer, Mr Rob Barker of Barker Harle. Reports include:

- *Report on Geotechnical Assessment* (January 2013) is included as Attachment 1 to this report.
  The report investigates key natural and essential infrastructure elements as they relate to the subject land with the aim of ensuring the provision of a sustainable living environment with minimal impacts on local ecosystems, community structure and local economy.
- *Report on Stormwater Management for Proposed Rezoning* (January 2013) is included as Attachment 2 to this report.
  The report presents the results of a review of stormwater management matters in relation to rainwater storage for domestic consumption, stormwater detention and stormwater management on access roads.

1.3 Gundaroo and its location within the Shire

Gundaroo is located in the Yass River Valley, approximately 50kms southeast of Yass and 35km north of Canberra, as indicated in Figure 1.

The village of Gundaroo is located on the western side of the Yass River and was established circa 1830's.

The governance of Gundaroo has been formerly administered between Queanbeyan, and Gunning Shires up until its amalgamation with the Yass Valley Local Government Area in 2004.

The village grid layout is typical of early settlement patterns, and its distinguishing heritage features define the character of the village. The village is listed by the National Trust and contains elements typical of a 19th century township including a number of slab buildings[1] and a village common, which is still used by villagers for grazing purposes. [2]

Gundaroo has grown in tourism popularity over the past 10 years, becoming a fashionable destination for tourists travelling along *The Poachers Way,* seeking acclaimed cuisine and cellar doors.

[1] http://www.visitnsw.com/destinations/country-nsw/yass-area/gundaroo
[2] Yass Valley Town and Villages Study, 2010 (Yass Valley Council)

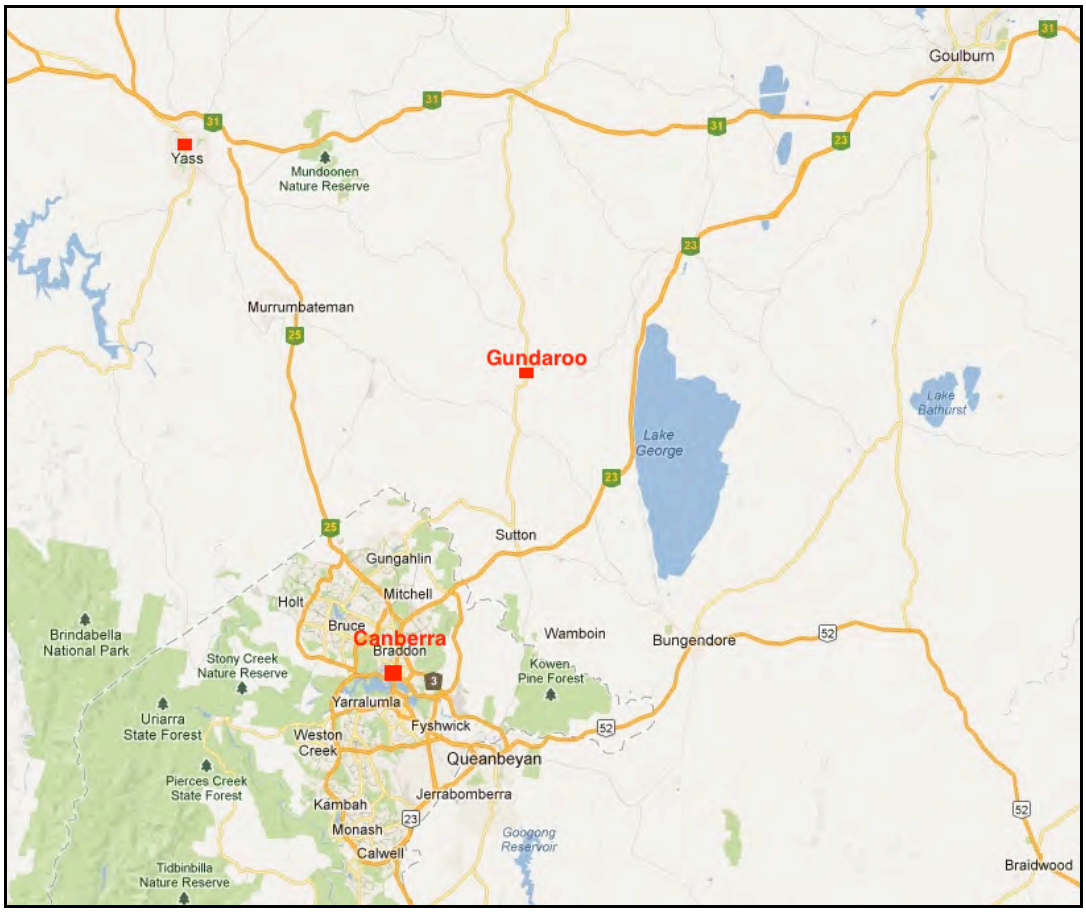


Figure 1: Location of Gundaroo (Source: Google Maps)

2 PLANNING PROPOSAL

2.1 Objectives or Intended Outcomes of the Planning Proposal

The objective of the planning proposal is to enable the future urban development of the subject land whilst maintaining the village and agricultural amenity of the area.

This planning proposal seeks Council's consideration to rezone an area of land, namely *Further Investigation Area (Section 10)*, adjoining the village of Gundaroo to the south, for the purpose of residential development. The subject land is indicated below in Figure 2.

The land was proposed for rezoning to RU5 Village under the (draft) Yass Valley Town and Villages Study as it was identified, and generally supported as the logical extension of the village. However, following review of submissions made during the draft exhibition, Council adopted to set the land aside for further investigation (ie Further Investigation Area 10) providing opportunity for a masterplan to be prepared for the investigation and to include appropriate staging for the land to be developed incrementally.

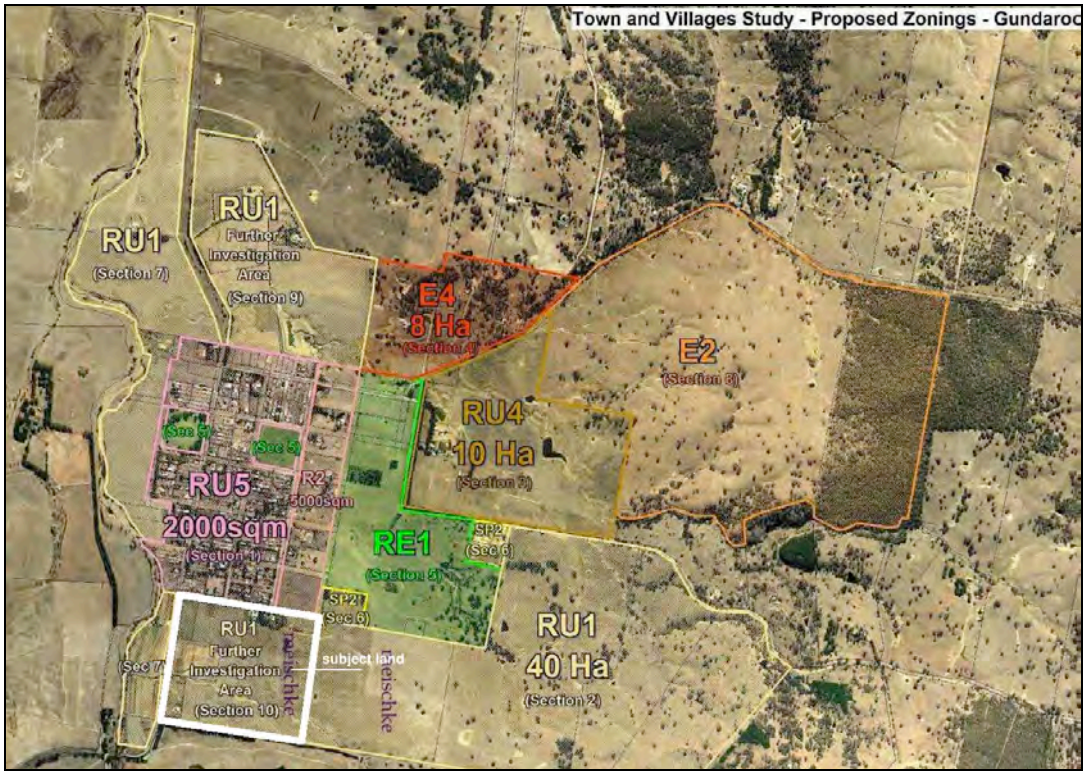


Figure 2: Further Investigation Area 10 (Source: Yass Town and Villages Study 2010)

The intended outcomes of the planning proposal seek to:

- Increase the supply and diversity of housing to meet growing demand by ACT residents for a variety of lifestyle choices;
- Assist in achieving the aims of the Sydney – Canberra Regional Corridor Strategy 2006 – 2031 by providing opportunities for village lifestyle within a more sustainable context, provided by careful infill development within the Gundaroo village;
- Provide land with high levels of residential amenity.

2.2 Properties Involved

The investigation area comprises holdings with an area of approximately 40 hectares, as indicated in Table 1. An aerial image indicating subject allotments is provided in Figure 3.

A copy of deposited plans and title searches are included for Council reference, as Attachment 3 to this report.

Table 1: Subject land (Source: NSW Land & Property Information)

Lot	DP	Street	Application Nos	Owner	Area Ha
PT 1	840631	3881 Sutton Rd Gundaroo	DA 94/8 SC 8/94	O & H Jabal	4.0
1	857918	3854 Sutton Rd Gundaroo	DA 95-6/36 SC 8/95-6	AR & SR Myers	2.011
4	881346	25 Faithfull St Gundaroo	SC 98/53	HRC & MR Meischke	0.40
5	1002259	15 Faithfull St Gundaroo	DA 98/68	J & H Nowak	0.48
7	1025196	Faithfull St Gundaroo	DA 99-0/14 SC 9/2001	HRC & MR Meischke	2.02
PT 8	1025196	Sutton Road & Faithfull St Gundaroo	DA 99-0/14 SC 9/2001	HRC & MR Meischke	31.089 (approx)
				Total Investigation Area	**40ha**

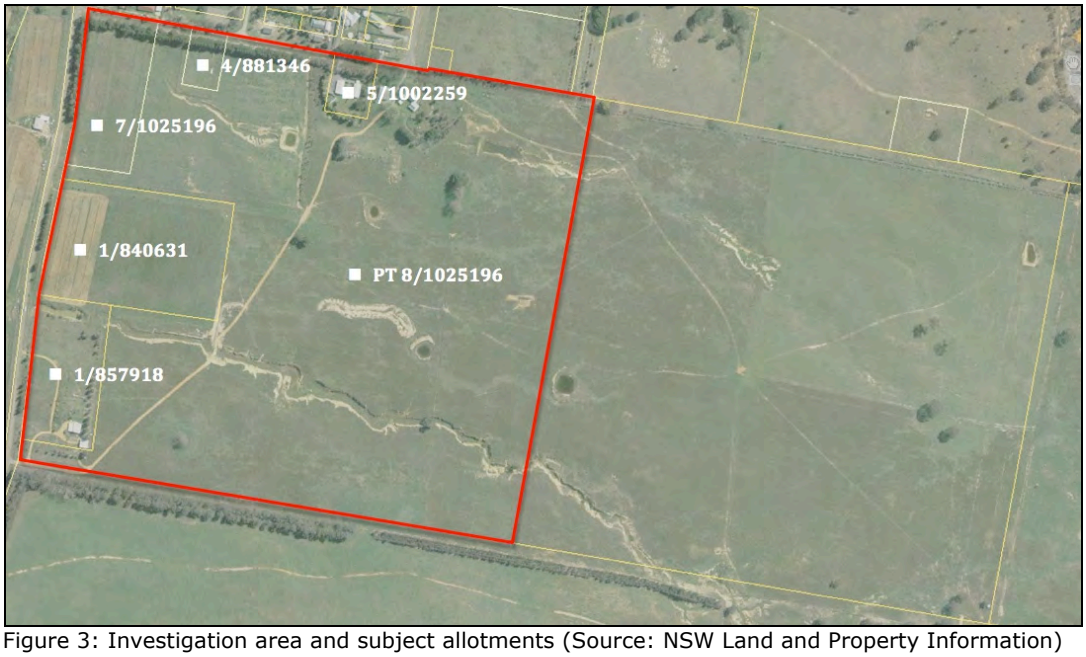


Figure 3: Investigation area and subject allotments (Source: NSW Land and Property Information)

3 EXPLANATION OF PROVISIONS

It is proposed that the draft LEP 2012 be amended, by rezoning the subject land for the purpose of residential development.

It is proposed that the draft Minimum Lot size be amended so that the minimum lot size of 2000m2 can be applied.

Existing zoning of the land is provided below in the following sections.

3.1 Existing Zoning – Gunning Local Environmental Plan 1997

The subject land is zoned 1(a) (Rural Zone) under the provisions of the Gunning Local Environmental Plan 1997 (GLEP).

The objectives of the 1(a) Rural Zone are as follows:

(a) To maintain the rural character of the area of Gunning,

(b) To encourage the use of rural land for agriculture and other forms of development which are associated with rural activity or which require an isolated or rural location,

(c) To ensure that the location, type and intensity of development is appropriate, having regard to the characteristics of the land, the rural environment and the need to protect significant natural resources, including prime crop and pasture land,

(d) To minimise the cost to the community of:

i. fragmented and isolated development of rural land, and

ii. providing, extending and maintaining public amenities and services,

(e) To ensure that the soils within this zone are protected and maintained in good condition, and that the water quality is maintained above a minimum standard determined by the Council.

The minimum lot size for a dwelling in the rural zone 1 (a) is 80ha.

Under the provisions of GLEP, Council must consider the following before granting consent to a subdivision of land in Zone 1 (a):

(a) Determine the main purpose for which each allotment is to be used, and

(b) Identify any allotment intended to be used primarily for agriculture, and

(c) Identify any allotment on which it is intended to erect a dwelling and decide whether building a dwelling is the main reason for creating the allotment, and

(d) Identify the approximate location of any existing dwelling on the land, and

(e) Identify the likely effects of the proposed use on the natural flow of any watercourse or stream, water quality, and aquatic and riparian habitat and fauna, and

(f) Identify standards for infrastructure items such as boundary fencing, access roads and water storage, and

(g) Identify the current use of the land, and

(h) (Repealed)

Under the provisions of the GLEP, the general principles for the consideration for development proposed in Zone 1 (a) are as follows:

(i) Any impact the development will have on the future or current agricultural use of the land and of adjoining land, and

(j) Whether an adequate water supply is available, and

(k) What services are or may be required, and

(l) Any natural hazards likely to affect the development on the land or other land as a result of the development, and

(m) What effect the development might have on water quality, and on land with environmental or conservation value, and

(n) The effect the development will have on aquatic fauna or habitat and the natural flow of any watercourse or stream, and

(o) The effect the development will have on riparian vegetation and habitat, and

(p) Whether the development will contribute to ribbon development or substantially change

the appearance or character of the amenity of the locality.

(q) When considering these matters, the Council must also take into account any measures that may be taken to minimise any adverse impact and also whether the benefits of the development outweigh any adverse effect.

3.2 Draft Zoning - Draft Yass Valley Local Environmental Plan 2012

The subject land is zoned RU1 Primary Production under the provisions of the draft Yass Valley Local Environmental Plan 2012, as indicated below in Figure 4.

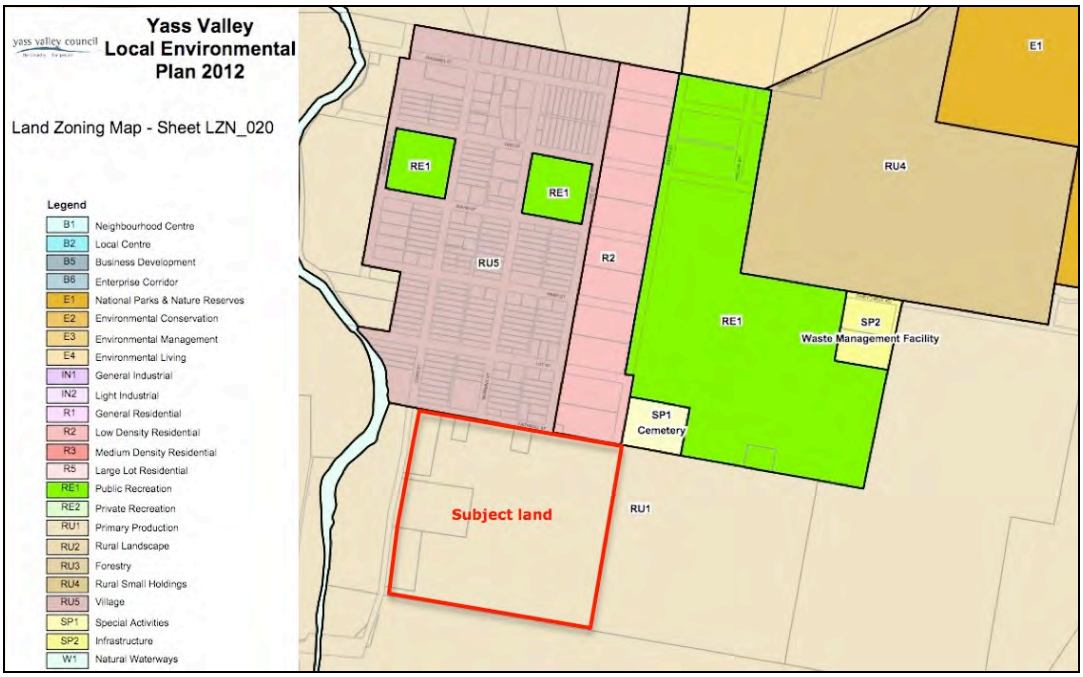


Figure 4: Map Extract – Draft Yass Valley LEP 2012 (Source: Yass Valley Council)

Objectives of RU1 zone are:

1. *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
2. *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
3. *To minimise the fragmentation and alienation of resource lands.*
4. *To minimise conflict between land uses within this zone and land uses within adjoining zones.*

The proposed minimum lot size for a dwelling in the RU1 zone is 80ha, as indicated below in Figure 5.

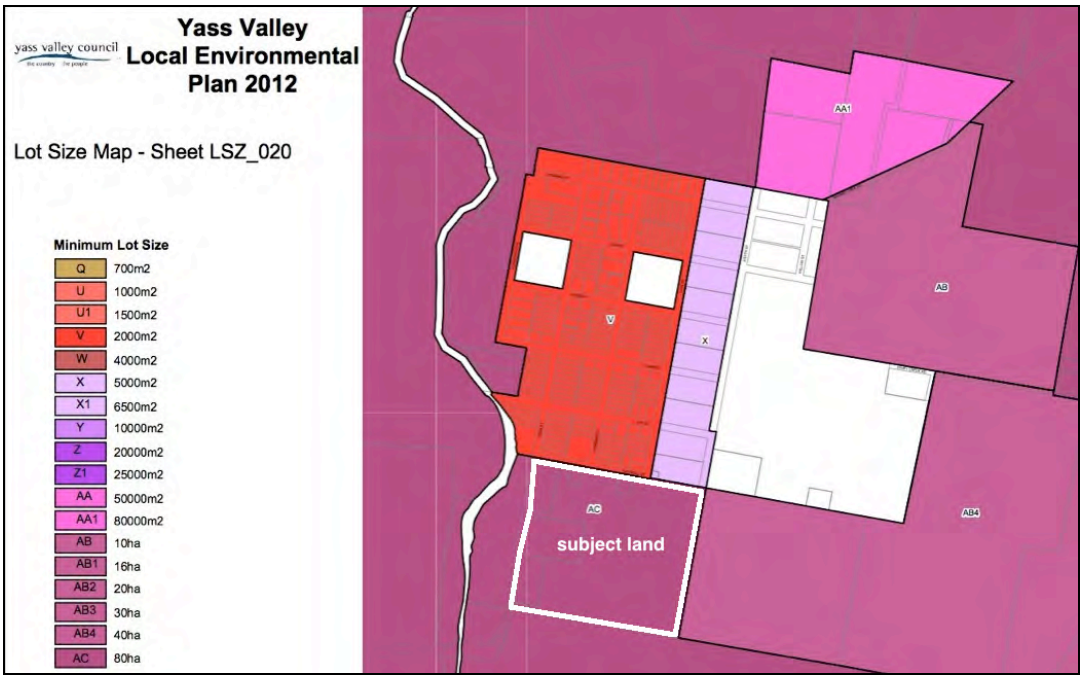


Figure 5: Map Extract – Minimum Lot Size Map (Source: Yass Valley Council)

4 ENVIRONMENTAL ANALYSIS

4.1 Site Locality and Description

The subject land adjoins the village of Gundaroo at its southern boundary, as indicated below in Figure 6.

The land is bound by Faithfull Street and the village to the north, to the east and south by agricultural land, and to the west by Sutton Road (Cork Street).

Figure 6: Location of subject land (Source: Google Maps)

4.2 Landform, Character and Amenity

The land is gently undulating, falling from east to west toward the Yass River.

A topographical map is provided below as Figure 7, and a Site Analysis Plan is included as Attachment 4 to this report.

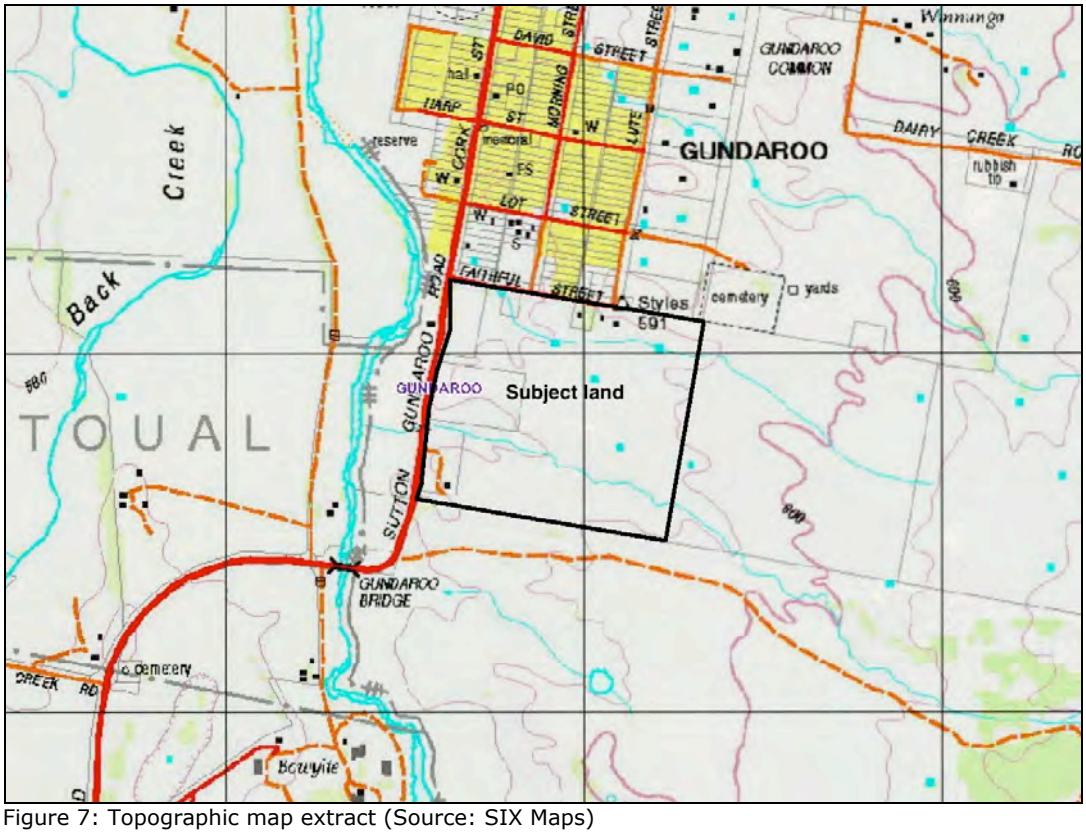


Figure 7: Topographic map extract (Source: SIX Maps)

The land contains four (4) farm dams constructed across drainage depressions, and an erosion gully containing an intermittent watercourse traverses the site in an east – west direction.

Site vegetation is sparse due to historical landuse, and improved pastures have been cultivated for the purpose of grazing stock. The current landowners have planted stands of native and exotic trees and shrubs to improve vegetation cover across the site.

The existing character is defined as a mix of rural small holdings and small parcels for agricultural use, with a backdrop of agricultural hillscape to the east and village to the north. The land provides panoramic views to the west and southwest over the Yass River valley.

The immediate local amenity is described as an existing rural small holdings setting within an undulating natural landscape. Faithfull Street separates the northern portion of the land from the village, and higher density urban activity.

The following photos 1 to 7 are provided for visual reference.

Photo 1: View of subject land from southwest corner (Sutton Rd) (Source: Google 2010)

Photo 2: View of site + market garden from Sutton Rd (Source: Google Maps 2010)

Photo 3: View west along Faithfull Street adjacent to village (Source: Google 2010)

Photo 4: View west over Yass River Valley from northeastern corner (Source: Barker Harle)

Photo 5: View east to west along southern boundary (Source: Salvestro Planning)

Photo 6: View of intermittent gully (Source: Salvestro Planning)

Photo 7: View of land from northeastern corner to southeast (Source: Barker Harle)

4.3 Existing Landuse

Existing landuses include a combination of small parcels for agricultural use, a commercial veterinary practice and dwellings on rural small holding lots created as concessional allotments under a previous plan. Lot 4 DP881346 was created as a result of DA approval for a conceptual childcare centre, however the consent was not acted on, and has since lapsed.

Part Lot 1 DP 840631 contains a productive, environmentally sustainable market garden, which cultivates cyclical crops for the Canberra market.

5 NATURAL ENVIRONMENT

In determining a change of land use, the following considerations have been made on the natural environment.

5.1 Biodiversity Sensitivity

The objectives of *Biodiversity Sensitivity* mapping are to protect and improve the biological diversity of flora and fauna when considering development.

Biodiversity Sensitivity mapping prepared for the Yass Valley Council, indicated the subject land did not include sensitive biodiversity, as shown in Figure 8.

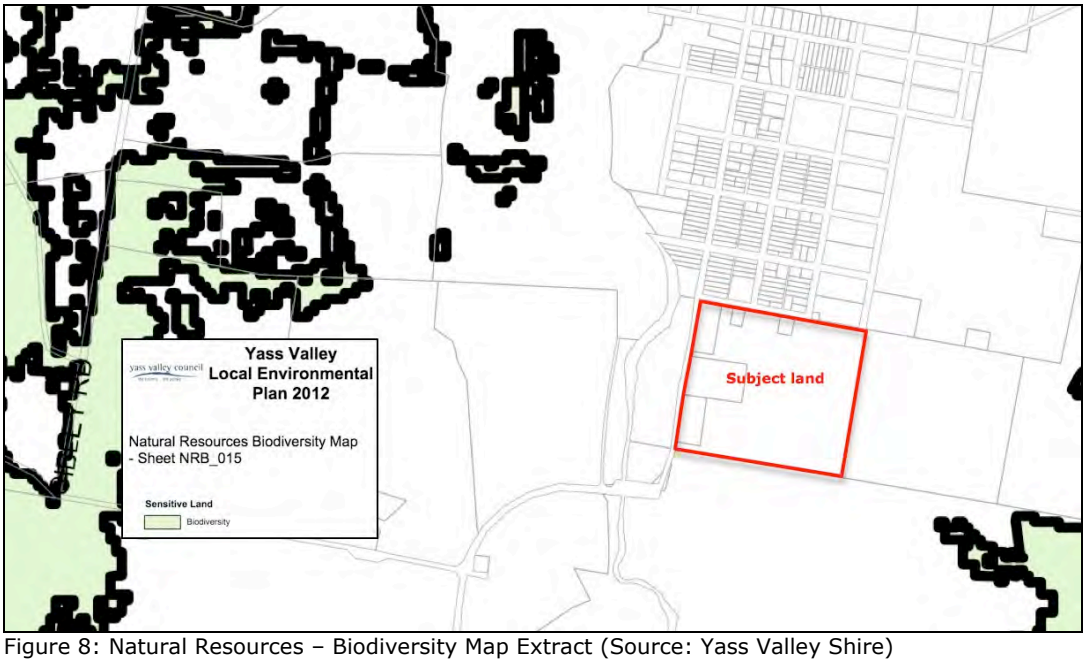


Figure 8: Natural Resources – Biodiversity Map Extract (Source: Yass Valley Shire)

As the Gundaroo Common, located adjacent to the subject land, has been referenced as containing natural temperate grassland populations of threatened species, including the Superb Parrot and Golden Sun Moth[3], and is part of the Southern Tablelands Grassy Ecosystem Conservation Management Network, further consultation was undertaken with the Office of Environment and Heritage NSW (OEH). It was advised that biodiversity mapping for the subject land and the wider precinct, included mapping based on wooded species data only, and not the presence of sensitive grasslands.

In view of the above, together with the non-evident presence of sensitive native grasses during site inspection, further consultation was undertaken with the current landowner to determine the potential for *Sensitive Biodiversity* on the subject land.

It was advised that since the purchase of the land in 1979, continuous pastoral improvement and cultivation had been undertaken, which also includes the adjoining land to the east (totaling approximately 90ha), and that every part of the land has been cultivated or sown for improved pastures.

[3] http://www.environment.act.gov.au/__data/assets/pdf_file/0003/234462/actionplans7.pdf & http://www.environment.act.gov.au/__data/assets/pdf_file/0007/234475/actionplans17.pdf

Pastures were reseeded following the drought in the early 1980's and subsequent cultivation has been continuous, including:

- Ryegrass, Phalaris, subclover, Oates and Barley;
- Arrowleaf clover, for bailing, and
- Millet cropping, for fat lamb grazing.

The local environment has been significantly modified through these and historical agricultural activities, therefore the potential for sensitive natives grasses and vegetation on the subject land is minimal.

Significant, mature species planted by the current landowner should be retained and incorporated into any proposed future development design where appropriate.

In conclusion, it is considered that future development, for the purpose of residential development, will not unduly impact the biological diversity of the subject land.

5.2 Water Sensitivity

The objectives of *Groundwater Sensitivity* mapping are to protect and preserve groundwater sources when considering development.

The subject land is identified as being *Groundwater Sensitive* as indicated below in Figure 9. Therefore the proposed development of the land will incorporate effective measures to minimise adverse impacts on groundwater and the potential contamination of waterways.

In this regard the Consulting Engineer, Barker Harle, has prepared a report that provides a strategy for responding to a groundwater sensitive environment for the disposal of effluent. The report is included as Attachment 1 to this report, for Council reference.

Findings of the report are discussed in further detail in Section 7.3 of this report, Effluent Disposal.

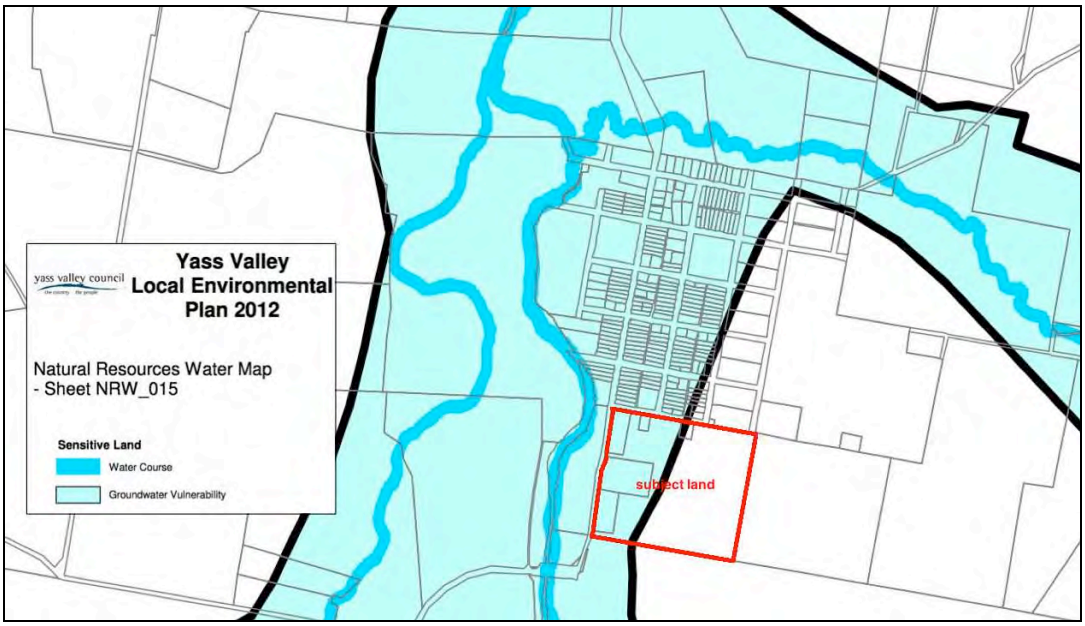


Figure 9: Natural Resources – Sensitive Water Map Extract (Source: Yass Valley Shire)

5.3 Land Sensitivity

The objectives of *Land Sensitivity* mapping are to protect and improve the diversity and stability of landscapes when considering development.

The subject land is identified as being *Groundwater Sensitive* as indicated below in Figure 10, and refers to an erosion gully that traverses the subject land.

Barker Harle has prepared a report that responds to the geotechnical constraints on the land. The report is included as Attachment 1 to this report, for Council reference.

Findings of the report conclude:

The existing erosion gully that extends from east to west across the site, should be stabilized as part any proposed development of the site. The stabilization will require the eroded cut batters to be reshaped and flattened to provide batters that may be effectively vegetated and managed. Slopes of less than 1:4 would be anticipated. Some local protection works, including gabion blankets and cages, may be required to protect the reshaped batters from high velocity water flows that could re-initiate erosion.

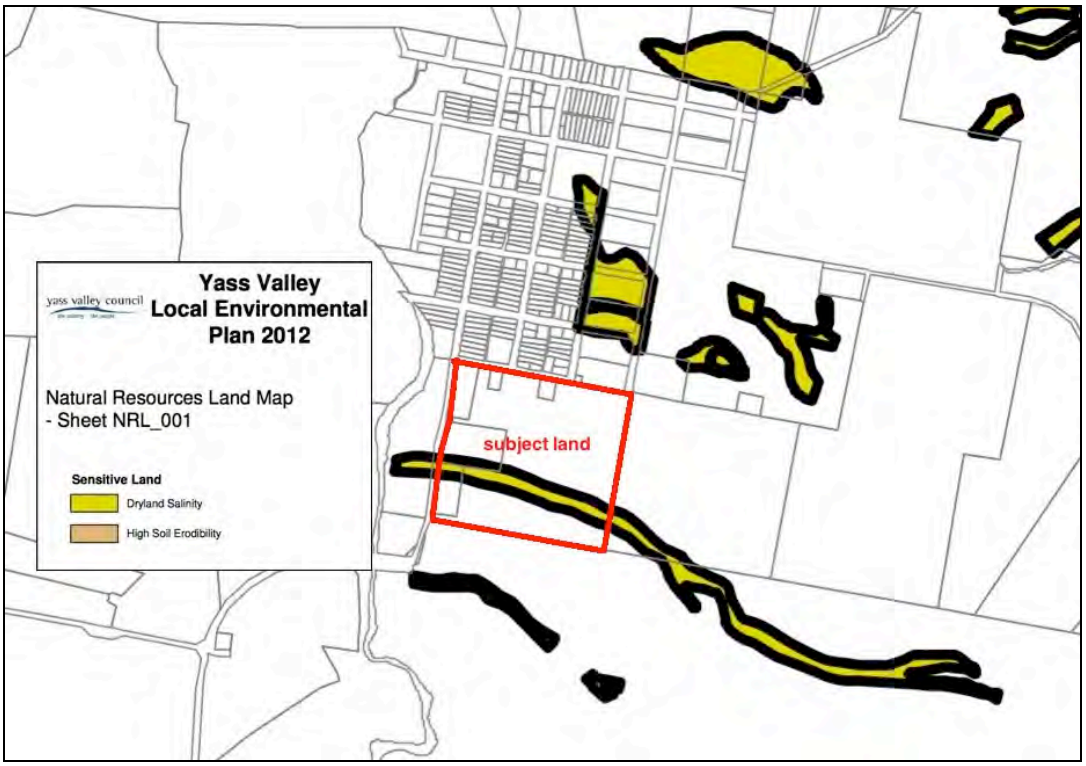


Figure 10: Natural Resources – Sensitive Land Map Extract (Source: Yass Valley Shire)

5.4 Soil Landscape

The site comprises a complex soil landscape. Quaternary Age alluvial deposits comprising gravel, sand, silt clay and black organic clay underlie the site with bedrock generally >2m below the soil surface level.[4]

Soil testing has been undertaken to determine limitations as defined by the NSW Government Environmental and Health Protection Guideline *On-site Sewerage Management for Single Households*, as well as preliminary sampling and analysis to determine the presence of contaminants.

Barker Harle's Report on Geotechnical Assessment responds to soil considerations and includes soil test result data. Documentation is included as Attachment 1 to this report.

Findings of the Report on Geotechnical Assessment are further referenced in the relevant sections of this report.

[4] Report on Geotechnical Assessment (Barker Harle 2013)

6 HERITAGE CONSIDERATIONS

6.1 Post European Heritage Considerations

The investigation area contains no items of environmental heritage, as indicated below in Figure 11. The land, however, is located adjacent to land within the conservation area, and to land identified as general heritage, which includes the cemetery and village common.

As a result, future development on land in the vicinity of a listed items or conservation area will be subject to the provisions of clause *5.2 Heritage Conservation* of the draft LEP, and will be required to incorporate appropriate design, where required, to enhance existing streetscape and visual amenity.

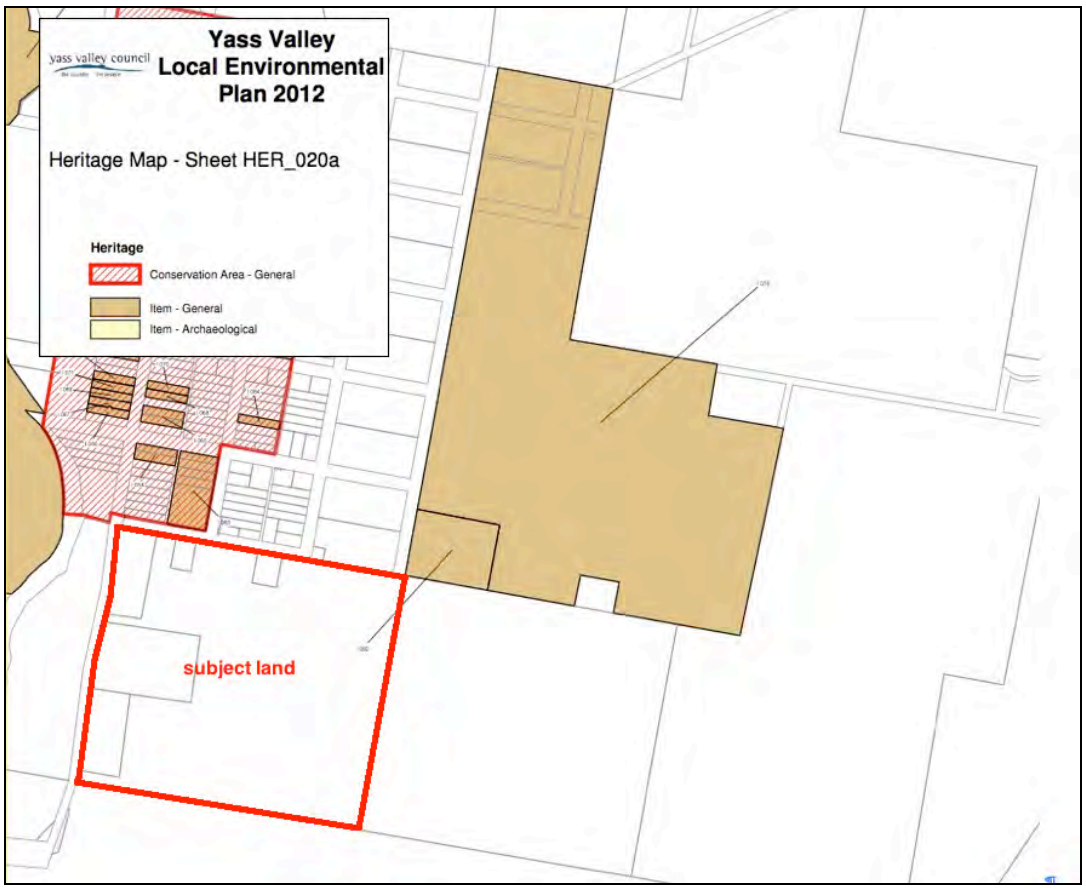


Figure 11: Map Extract – Heritage Map HER_020a (Source: Yass Valley Council)

6.2 Aboriginal Cultural Heritage Considerations

Council's records indicate there are no known archaeological items on the subject land, as shown above in Figure 11.

Preliminary investigations were undertaken via review of the Aboriginal Heritage Information Management Systems (AHIMS), which indicated no Aboriginal sites or places are recorded on or within a 1000m buffer of the investigation area.

A map indicating the subject search area, and an extract of the AHIMS investigation report are provided below as Figures 12 and 13. Full copies of these documents are included as Attachment 5, to this report.

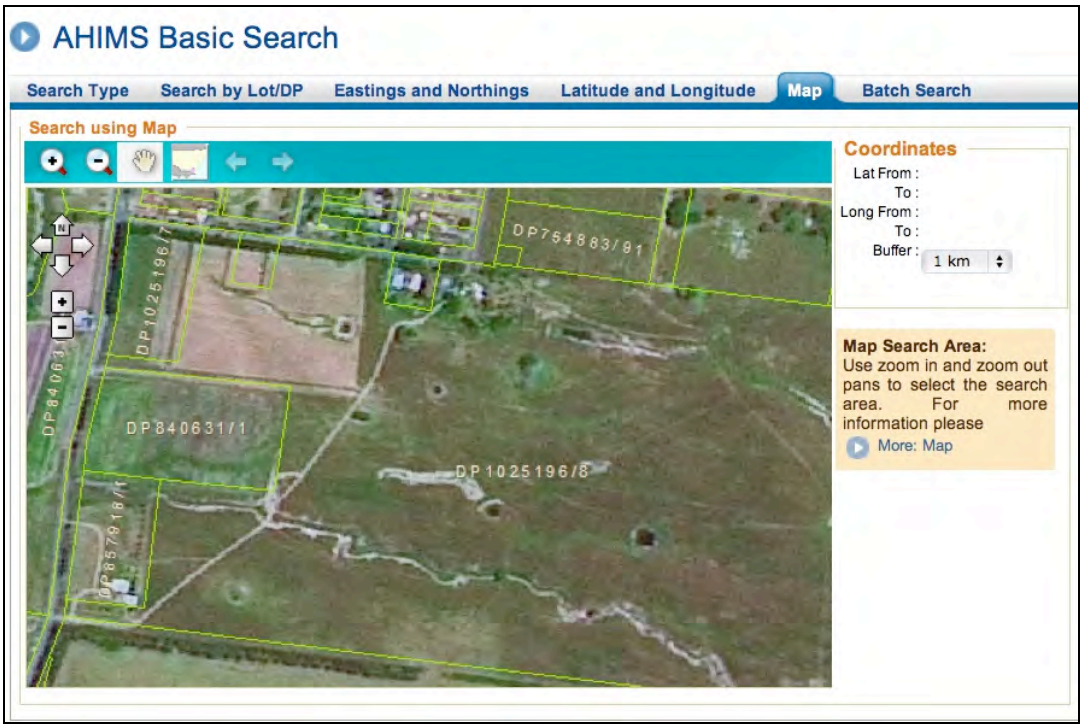
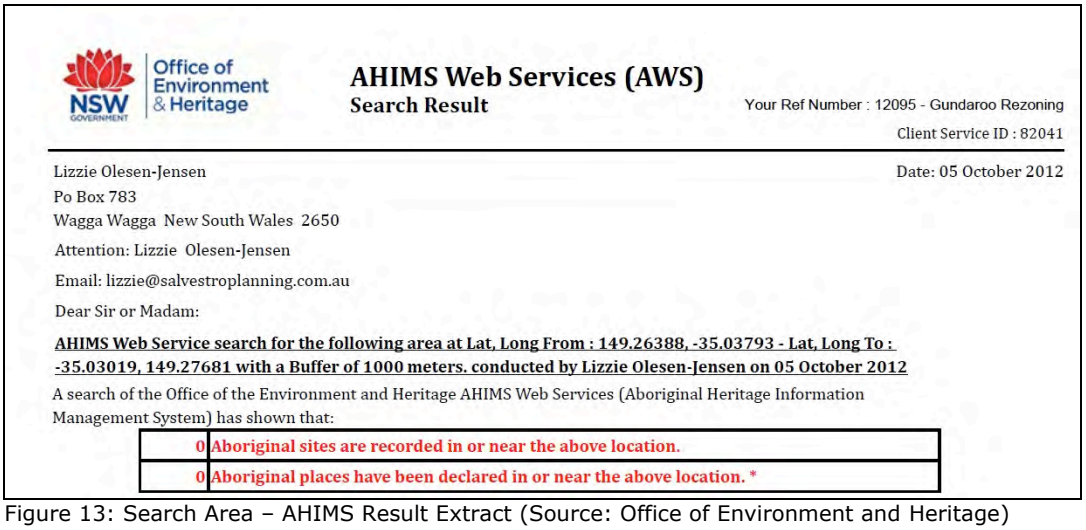


Figure 12: Search Area – AHIMS
(Source: http://www.environment.nsw.gov.au/awssapp/MySearches.aspx)



Office of Environment & Heritage

AHIMS Web Services (AWS)
Search Result

Your Ref Number : 12095 - Gundaroo Rezoning
Client Service ID : 82041

Lizzie Olesen-Jensen
Po Box 783
Wagga Wagga New South Wales 2650

Date: 05 October 2012

Attention: Lizzie Olesen-Jensen

Email: lizzie@salvestroplanning.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : 149.26388, -35.03793 - Lat, Long To : -35.03019, 149.27681 with a Buffer of 1000 meters. conducted by Lizzie Olesen-Jensen on 05 October 2012

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

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

Figure 13: Search Area – AHIMS Result Extract (Source: Office of Environment and Heritage)

Consultation documentation and maps were forwarded to the Ngambri Local Aboriginal Land Council (NLALC) to determine Aboriginal concerns in respect to the subject land and the strategic project. NLALC advised that the investigation area was not subject to Aboriginal land claims and prior to any future development, a 'walk over' of the subject land, by members of the local Aboriginal community, would be required.

7 HAZARDS

7.1 Flooding

The subject land is not flood prone. Discussions with the long-term landowner and resident (with more than 30 years knowledge of the land) confirmed the land was not subject to flooding.

7.2 Bushfire

The subject land is not classed as bushfire prone land as indicated below in Figure 14.

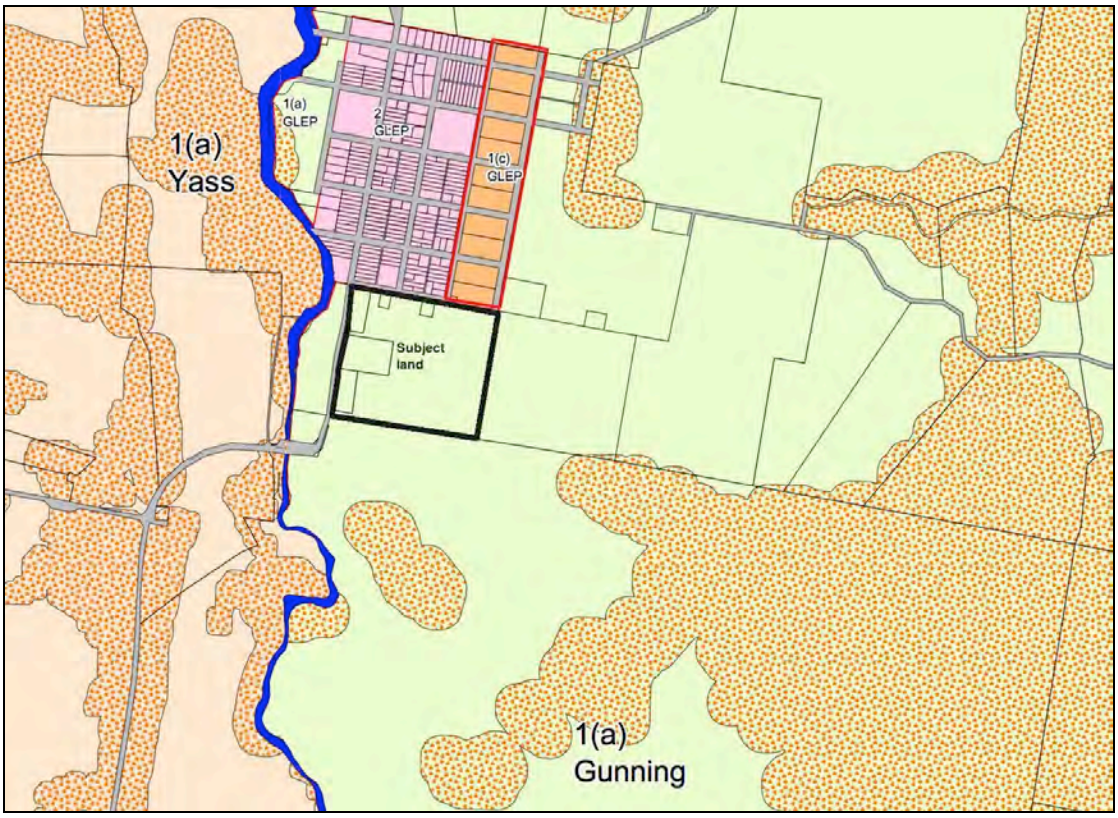


Figure 14: Bushfire Map Extract – (Source: Yass Valley Council)

However, the introduction of Amendment II of the Australian Standard AS3959-2009 Constructions of Buildings in bushfire prone areas now includes grasslands as a hazardous vegetation category, and any future development will be required to consider this at the design and construction stage.

In consultation with the NSW Rural Bushfire Service, the following was advised:

Although the land is not identified as bush fire prone land on the council map there is still a risk in this area of grass fire. The following bush fire protection measures are worthy of consideration in respect of the proposed subdivision:

Asset Protection Zones (APZ)

Following the Victorian Royal Commission into bushfires the RFS has adopted the APZs for grassland areas as specified in AS3959-2009. In brief, if land between the grassland hazard and the dwelling can be managed as an APZ for 50m within the property boundary then no construction level requirements apply. If the available APZ is less than 50m then construction to the relevant Bushfire Attack Level (BAL) will be required. The Service has recommended a 1.8m non flammable heat shield (fence) and a 10m APZ in instances where the hazard is only grassland.

Construction Standards

These are specified in AS3959-2009 Construction of buildings in bushfire prone areas. These are determined based on slope calculation and fire danger index as well as predominant vegetation.

Access Standards

For new subdivisions public and property access roads should enable safe access, egress and defendable space for emergency services as well as residents evacuating the area.

Water Supply and Utility Services

Gas and electricity should be located so as not to contribute to the risk of fire or impede the fire fighting effort. A water supply should include a provision of water available for fire fighting purposes in addition to the household water supply. This does not have to be separate water supply i.e. a second tank, but should be a tank with sufficient capacity to store household and fire fighting volumes.

Emergency Management Arrangement

For subdivision purposes this is usually accommodation within safe access requirements. If any lot within the subdivision is to be used for a Special Fire Protection Purpose, i.e. aged care, child care or tourist accommodation, then consideration would need to be given to the evacuation of these sites where assistance in the evacuation process may be necessary.

Landscaping

The type, location and ongoing maintenance of landscaping with the APZ is a necessary consideration to ensure the merit of the APZ as a valuable bush fire protection measure. It is worthy of note that many of the houses lost during the Canberra fires 10 years were lost as a result of landscaping providing fuel for ignition from falling embers.

7.3 Erosion

The site comprises grasses resultant of continual improved pastures with no indication of soil erosion apart from an erosion gully that traverses the land in an east – west direction.

The soils are considered to be highly erodible and must be managed carefully to ensure the defined erosion gully does not initiate erosion.

As concluded previously in Section 4.3 - Land Sensitivity, mitigation measures should be undertaken in order to stabilise the gully as part any proposed development of the site. Stablilsation will require the eroded cut batters to be reshaped and flattened to provide batters that may be effectively vegetated and managed. Slopes of less than 1:4 would be anticipated. Some local protection works, including gabion blankets and cages, may be required to protect the reshaped batters from high velocity water flows that could re-initiate erosion.

7.4 Salinity

The potential for dryland salinity exists as a result of the erosion gully, and intermittent creek contained within.

Preliminary site inspection found no visual signs of salt crusting. Some waterlogging was present due to heavy rainfall, however there was no visible indication of irregular areas or waterlogged black soil associated with the presence of salinity.

Barker Harle, carried out testing to determine the potential for salinity, and resultant data provided in Attachment 1 of this report.

Results indicated:

- *The surface soils are non saline, having EC readings < 0.08dS/m.*
- *The sandy clay strata in TP5 between 500 and 900mm below surface level was found to be slightly saline, having an EC reading of 0.37dS/m.*
- *Searches with DIPNR and NRAtlas did not identify any reported outbreaks of salinity.*

7.5 Contamination Considerations

To determine the likelihood of contamination based on historical and current land use activities investigations were undertaken, by Consulting Engineers Barker Harle, and consisted of consultation with landowners, and subsequent soil sampling.

Investigations were carried out in accordance with *Managing Land Contamination-Planning Guideline SEPP 55 – Remediation of Land,* and relevant EPA Guidelines, and a full report and sample results are included as Attachment 1 to this report.

Preliminary testing was undertaken to establish the presence of any unidentified chemicals as a result of spray drift and / or wind, and to determine the presence of any residual pesticides or herbicides present that could be hazardous to continuing landuse.

Testing outcomes concluded that there were no measurable results obtained for any of the tested soil samples and further investigations are considered not warranted.

8 INFRASTRUCTURE AND SERVICE PROVISION

8.1 Road Access

The subject land has road frontage to both Sutton Road and Faithfull Street. Existing road access to the principle part of the property is via Faithfull Street. The alignment of the existing roads with the existing village is typical of a grid pattern arrangement.

Sutton Road is classified Main Road and the main arterial access road from Canberra and Murrumbateman. To maintain a safe and manageable road network system in this locality, principal vehicular access to this land when developed should be from Faithfull Street.

In order to reflect and retain the village character and feel of the local area, a grid approach, similar to the village layout, should be adopted for this area. Opportunity should also be given to offset lanes and roads, and incorporate sensitive traffic calming to ensure a safe vehicular network environment throughout the subject development area, particularly at the interface with the existing village area.

8.2 Traffic Generation Assessment

The proposed road hierarchy for the subject area will be similar in arrangement to the existing village layout. The density of development, however, will be significantly less. The resulting traffic volumes from the development of this land are expected to be well within the design capacity of the existing principle access roads, Faithfull Street and Sutton Road.

Any future Development Applications will include a traffic management assessment of the proposed subdivision layout of the land.

8.3 Stormwater Management

There is no drainage infrastructure in the village. Overland flow drains east to west, to the corner of Cork and Faithfull Street, where it discharges to the Yass River via a culvert.

Barker Harle have prepared a report on stormwater management for the proposed rezoning, which addresses:

- On-site rainwater storage for domestic consumption
- Stormwater detention on individual lots; and
- Stormwater management on access roads.

A full copy of the report is included as Attachment 2 to this report.

In relation to on-site stormwater detention, it is considered by Barker Harle that there would be sufficient storage volume available in a 100,000L tank under normal operating conditions to accommodate the peak flow that is likely to be generated by a 100 year 5 minute storm.

In relation to stormwater management on public roads, it is recommended by Barker Harle that at source stormwater infiltration be adopted for the management of stormwater runoff from the internal access road.

8.4 Effluent Disposal

Gundaroo village is not served by reticulated sewer. Existing and future development will be required to ensure sustainable on-site effluent disposal systems are utilised to service dwellings.

Barker Harle undertook a comprehensive geotechnical assessment of the subject land for the purposes of this rezoning proposal (see Attachment 1). The conclusions, in relation to effluent disposal, were that the site is suitable for future residential development subject to:

- The management and removal of nutrients from treated effluent prior to on-site disposal; and
- Determination of suitable building envelopes and on-site effluent dispersal areas on each lot.

The above actions would be incorporated into the detailed design of the proposed development areas.

8.5 Water Supply

The village of Gundaroo is not served by reticulated water. A study carried out in 1999 by the former Gunning Shire Council, was prepared on the basis that reticulated water and sewer could be provided for the village. The study focused more on the provision of rural residential land adjoining and around the existing village, however the Gundaroo community rejected this prospect at the time.

Barker Harle's *"Report on Stormwater Management for Proposed Re-zoning",* in relation to onsite rainwater storage requirements, concludes that rainwater tanks between 50,000L and 100,000L would provide sufficient capacity to be able to collect adequate water for onsite usage as well as incorporate detention storage for extreme storm events.

8.6 Electricity

Electrical infrastructure is located along Sutton Road and Faithfull Street, as indicated below in Figure 15.

Servicing provisions for future residential development can be extended in consultation with the servicing authority.

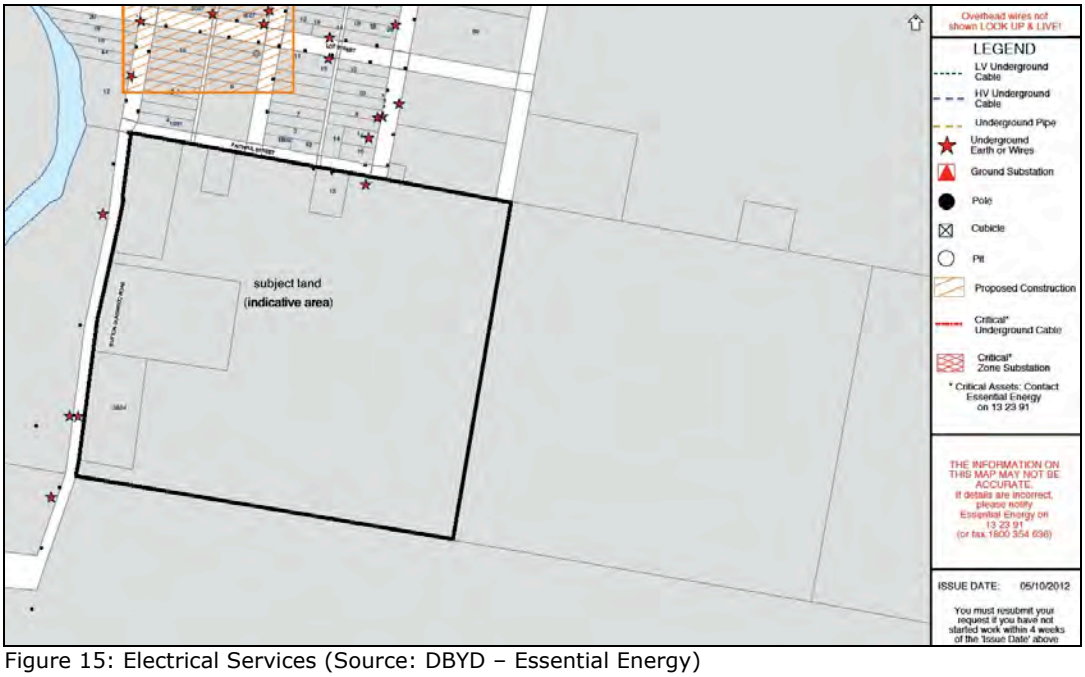


Figure 15: Electrical Services (Source: DBYD – Essential Energy)

8.7 Gas

The village of Gundaroo is not served by gas infrastructure.

8.8 Communications

Communication networks are available to the subject land. Communication lines servicing future development can be extended in consultation with the servicing authority.

9 JUSTIFICATION FOR THE PLANNING PROPOSAL

The planning proposal is consistent with the Council's local strategy, namely the Yass Valley Town and Villages Study, and is consistent with State Environmental Planning Policies, and the applicable Ministerial Directions under Section 117 of the Environmental Planning and Assessment Act.

9.1 Need for the Planning Proposal

The subject land is identified as an investigation area for residential development under earlier directions of the Yass Valley Town and Villages (YVTV) Study. This study forms part the principal planning framework for Yass Valley Council in their efforts to provide guidelines for the ongoing responsible management of landuse direction within the Shire ensuring certainty for future growth that acknowledges environmental sensitivities and enhances the quality of life for all residents.

The Town and Villages study sets out a Growth Plan for the Yass Valley, which aligns with the Sydney Canberra Corridor Strategy to 2031. It sets out to:

1. *Consider opportunities for further growth, focusing on the Yass Valley's proximity to the ACT, the availability of land, housing prices and existing community facilities.*
2. *Consider the constraints to further growth – namely, the provision of water, effluent disposal, areas of high biodiversity and bushfire prone areas.*
3. *Review all zonings in the town Yass and the surrounding Villages which have not been reviewed for over 23 years.*
4. *Review the history and settlement of Yass and the Villages with regard to their locations, their role within the region and historical issues.*
5. *Ensure that zones better reflect the existing patterns of land use and lot sizes as appropriate.*
6. *Identify areas for future residential, rural residential and village investigation – thus introducing a greater level of certainty for land owners and the community.*
7. *Review and plan for existing town and village expansion. The study has not considered the creation of additional settlement outside the defined investigation areas.*

9.1.1 Is the Planning Proposal a Result of any Strategic Study or Report?

In 2006, the NSW State Government issued a standard Local Environmental Plan (LEP) template to guide Councils, and to standardise planning instruments across the state.

Consequently, Yass Valley Council (YVC) authorised the preparation of a new Shire-wide LEP to bring the format of the existing instrument in line with the standard template, and to consolidate two other planning instruments, namely the Gunning LEP 1997 and the Yarrowlumla LEP 2002, inherited as a result of the amalgamation of Councils in February 2004.

Leading up to the preparation of the draft LEP, strategic studies were undertaken to guide the management of future landuse, which included the preparation of the *Town and Villages Study*, that specifically concentrated on Gundaroo, and other areas, to review the following primary issues, including:

- *Existing and proposed zones under the Standard Instrument— Principal Local Environmental Plan*
- *Population growth and property demand*
- *Potential expansion of zones for future 'residential' or 'village' uses - including existing requests for 'spot' re-zonings.*
- *Existing small allotments around village areas*
- *Water provision and effluent disposal*
- *The availability of essential infrastructure required for growth*

The Town and Villages Study sets out a Growth Plan for the Yass Valley, which aligns with the Sydney Canberra Corridor Strategy to 2031. It sets out to:

- *Consider opportunities for further growth, focusing on the Yass Valley's proximity to the ACT, the availability of land, housing prices and existing community facilities.*
- *Consider the constraints to further growth – namely, the provision of water, effluent disposal, areas of high biodiversity and bushfire prone areas.*
- *Review all zonings in the town Yass and the surrounding Villages which have not been reviewed for over 23 years.*
- *Review the history and settlement of Yass and the Villages with regard to their locations, their role within the region and historical issues.*
- *Ensure that zones better reflect the existing patterns of land use and lot sizes as appropriate.*
- *Identify areas for future residential, rural residential and village investigation – thus introducing a greater level of certainty for land owners and the community.*
- *Review and plan for existing town and village expansion. The study has not considered the creation of additional settlement outside the defined investigation areas.*

The Study was exhibited during September - October 2010, and following review of submissions was adopted in December 2010.

A portion of the subject land was proposed for rezoning to RU5 Village, indicated below in Figure 16, under the (draft) Yass Valley Town and Villages Study as it was identified, and generally supported as the logical extension of the village.

Figure 16: Subject land proposed for village zone in draft study (Source: Draft Yass Valley Town and Villages Study 2010)

However, following review of submissions made during the draft exhibition, Council adopted to set the land aside for further investigation (ie Further Investigation Area 10) providing opportunity for a masterplan to be prepared for the investigation area and to include appropriate staging for the land to be developed incrementally. The subject land is indicated below in Figure 17.

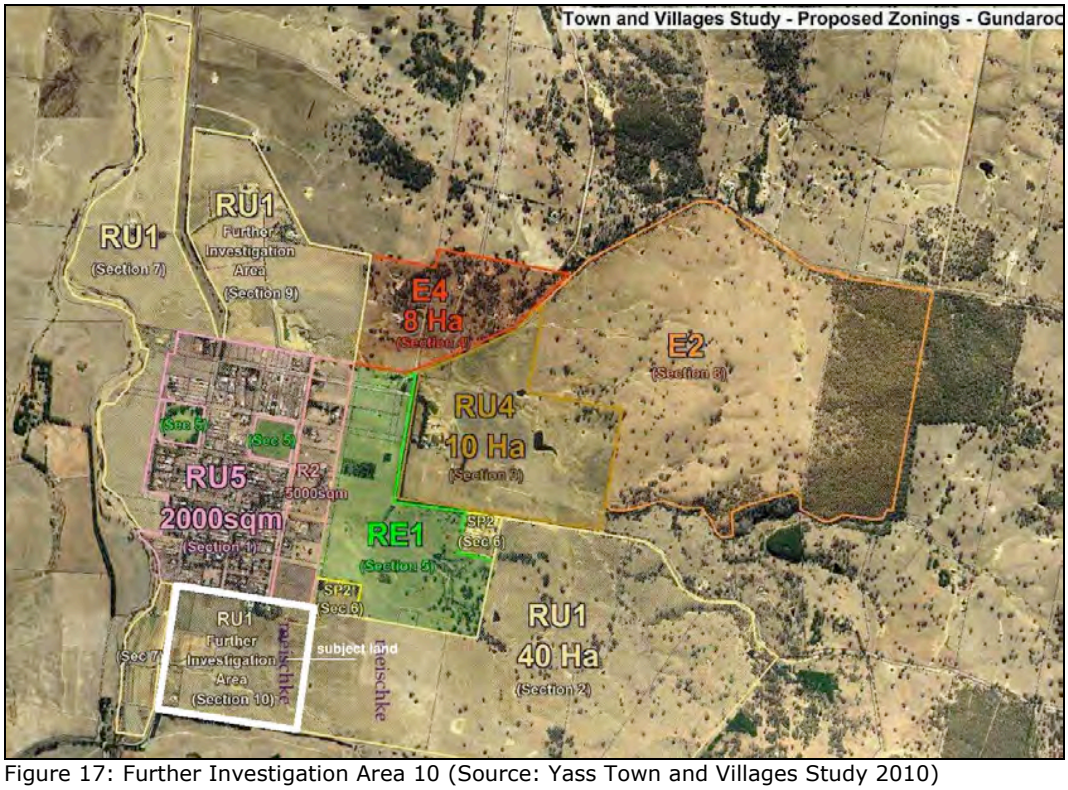


Figure 17: Further Investigation Area 10 (Source: Yass Town and Villages Study 2010)

At its meeting of 14 November 2012, Council resolved to endorse the amended draft LEP, and request the NSW Minister for Planning and Infrastructure to make the Plan under section 59 of the Environmental Planning and Assessment Act 1979, which now awaits ratification from the Minister.

9.1.2 Is the Planning Proposal the Best Means of Achieving the Objectives or Intended Outcomes, or is there a Better Way?

The objectives and intended outcomes of the planning proposal are best achieved by amending the draft Yass Local Environmental Plan 2012, to enable the land to be rezoned for the purpose of residential development, creating a variety of choice in lot type and size whilst responding to surrounding landuse.

9.1.3 Is the Planning Proposal Consistent with the Objectives and Actions of the Applicable Regional or Sub-Regional Strategy (inluding the Sydney Metropolitan Stategy and Exhibited Draft Strategies)?

Sydney – Canberra Coridor Regional Strategy 2006 - 2031

The Sydney - Canberra Corridor extends from the southern highlands and tablelands of NSW to the ACT border, therefore the Sydney - Canberra Regional Strategy 2006 - 2031 is relevant to the subject land. Benefits of the strategy, as detailed in NSW Department of Planning Fact Sheet - *How the Sydney-Canberra Corridor Regional Strategy Will Help Yass Valley* (July 2008), are listed below:

Employment

- *The Strategy targets 2,500 new jobs in the Yass Valley local government area (LGA) over the period to 2031. Increases are expected in the areas of logistics, warehousing and transport, manufacturing and health and aged care.*
- *Along with Queanbeyan, Yass provides opportunities in the southern subregion for retail and business services, with the additional locational advantages of Canberra Airport and residential and commercial/retail areas both with good rail and road access.*
- *Due to capacity in existing employment lands having been reached, the Strategy supports the identification by Council of additional employment lands within the LGA to meet local service needs.*
- *A potential demand for 30 hectares of new employment land has been identified in forecasts for the subregion. The Department of Planning will work with the Department of State and Regional Development and the Yass Valley Council to plan for the employment land needs for Yass.*

Housing

- *Yass Valley's anticipated population growth of approximately 4,000 by 2031 – and the resulting demand for 2,000 new dwellings – can be accommodated in existing vacant urban land within the LGA and limited expansion in Yass and Murrumbateman.*
- *The Strategy recognises the area of Gooromon Jeir as a longer term urban development option, beyond the life of the Regional Strategy.*
- *The key determinant of growth in Yass will be access to local water resources. Through local planning measures, the future housing mix will be better matched to the needs of smaller households and aged residents.*

Environment and Resources

- *The rural landscapes of the Yass Valley LGA are a key resource for a range of economic contributors to the Region. Traditionally the rural landscapes have been, and continue to be, predominantly made up of agriculture, though now also involve tourism, mineral extraction, energy production through wind farms and a home for people seeking a rural lifestyle.*
- *Existing villages, such as Murrumbateman, Sutton, Binalong and Gundaroo play an important role in providing for housing choice, a rural lifestyle and often more affordable housing. The rural character of many villages is a significant local and regional asset.*
- *By encouraging the majority of urban growth in existing major towns such as Yass, the Strategy ensures the character of rural areas well away from urban centres is not lost to inappropriate development.*
- *Existing rural residential zones have the capacity to meet the demands for rural lifestyle housing within the LGA. Additional development areas will only be considered if justified by a Local Settlement Strategy that assesses the net benefit of additional rural residential land against the loss of valuable agricultural lands.*

Transport and Infrastructure

- *Regional infrastructure requirements listed in the State Infrastructure Strategy are included in the Sydney–Canberra Corridor Regional Strategy, to align growth and infrastructure.*

Water

- *The Regional Strategy gives effect to agreements between the ACT and NSW Governments regarding the supply of water within the Southern subregion.*
- *New residential development in Yass Valley is contingent on a secure water supply.*
- *The Regional Strategy recognises the ability of Yass to supply its own water to enable growth. However, it also recognises that future development at Gooromon Jeir is likely to be serviced by ACT controlled water.*

9.1.4 Is the planning proposal consistent with a Council's Local Strategy or other Local Strategic Plan?

As indicated previously in section 9.1.1 of this report, the planning proposal responds to matters resultant of the strategic Town and Villages Study, which was undertaken to guide the management of future landuse leading up to the preparation of the draft LEP. The study specifically concentrated on Gundaroo, to review the following primary issues, including:

- *Existing and proposed zones under the Standard Instrument— Principal Local Environmental Plan*
- *Population growth and property demand*
- *Potential expansion of zones for future 'residential' or 'village' uses - including existing requests for 'spot' re-zonings.*
- *Existing small allotments around village areas*
- *Water provision and effluent disposal*
- *The availability of essential infrastructure required for growth*

The planning proposal is consistent with the local strategy given investigations undertaken respond to primary issues outlined in the study, and proposed landuse is consistent with the outcomes of the draft Study.

9.1.5 Is the Planning Proposal Consistent with Applicable State Environmental Planning Policies?

The following State Environmental Planning Policies are relevant to the subject land, and have been considered as part of the rezoning proposal for the purpose of residential development.

State Environmental Planning Policy No 44 - Koala Habitat Protection

SEPP 44 relates to the protection of koala habitat. However, having regard to the historical use of the land for agricultural purpose, sparse vegetation and the proximity of the village, the subject site is not considered a potential koala habitat.

Therefore, the provisions of SEPP 44 do not apply to the proposal.

State Environmental Planning Policy No 55 – Remediation of Land

As discussed in Section 6.5 of this report (Contamination Considerations), preliminary testing was undertaken in compliance with SEPP 55, to establish the presence of any unidentified chemicals as a result of spray drift and / or wind, and to determine the presence of any residual pesticides or herbicides present that could be hazardous to continuing landuse.

Testing outcomes concluded that there were no measurable results obtained for any of the tested soil samples and further investigations are considered not warranted.

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

The policy is relevant to the proposal as it encourages sustainable residential development to ensure consistency in the implementation of the BASIX scheme. Proposed lots sizes, being > 1000m2, provide for optimal solar access, without the need for rating.

9.1.6 Is the Planning Proposal Consistent with Applicable Ministerial Directions (s.117 Directions)?

The planning proposal is consistent with the applicable Ministerial Directions under Section 117 of the Environmental Planning and Assessment Act. Refer to Table 2 – Ministerial Directions Compliance Table.

Table 2: Ministerial Directions Compliance Table

Ministerial Directions	Requirement	Compliance
1. Employment Resources		
1.2 Rural Zones	A planning proposal must not rezone land from a rural zone to a residential zone unless it is justified under clause 5 of the direction. Such justification includes the identification of the land in a strategy.	Justified Inconsistency. The subject land was identified, in the Yass Valley Town and Villages Study, for further investigation to assess its potential for residential landuse.
1.4 Rural Lands	The planning proposal must be consistent with the Rural Planning Principles listed in SEPP (Rural Lands) 2008. **Rural Planning Principles** The Rural Planning Principles are as follows: (a) the promotion and protection of opportunities for current and potential productive and sustainable economic activities in rural areas, (b) recognition of the importance of rural lands and agriculture and the changing nature of agriculture and of trends, demands and issues in agriculture in the area, region or State, (c) recognition of the significance of rural land uses to the State and rural communities, including the social and economic benefits of rural land use and development, (d) in planning for rural lands, to balance the social, economic and environmental interests of the community, (e) the identification and protection of natural resources, having regard to maintaining biodiversity, the protection of native vegetation, the importance of water resources and avoiding constrained land, (f) the provision of opportunities for rural lifestyle, settlement and housing that contribute to the social and economic welfare of rural communities, (g) the consideration of impacts on services and infrastructure and appropriate location when providing for rural housing, (h) ensuring consistency with any applicable regional strategy of the Department of Planning or any applicable local strategy endorsed by the Director- General.	Consistent. The configuration of the subject land, and in particular the land located along Faithfull Street, allows for the natural extension of the village. Appropriate staging of land release based on demand, rollout of infrastructure and duration of agricultural activities will provide for future residential development whilst protecting rural amenity and agricultural activities. To minimise the potential landuse conflicts, appropriate setbacks have been incorporated within larger allotment sizes according to best practice landuse management. Variations to this setback can be considered where it can be demonstrated that the agricultural potential of the land will be protected, taking into account alternative measures such as landscaping or other relevant factors. Rural residential areas have traditionally been used to provide a transition from typically fulltime farming land to general urban residential neighbourhood areas. The size of the resultant rural residential / large lot residential will be relevant to the adjoining farming activity and be able to incorporate mitigation measures, such as planting buffer areas, as well as suitable building envelopes to accommodate a desired rural residential living space.

2. Environment and Heritage		
2.1 Environmental Protection Zones	▪ The planning proposal must include provisions that facilitate protection of environmentally sensitive areas. ▪ Must not reduce protection standards for environmental protection zones.	Consistent. The planning proposal does not involve existing or proposed environmental protection zones. However, the land has been identified as land and groundwater sensitive therefore appropriate mitigation and management provisions are included as part of the planning proposal to ensure the protection of environmentally sensitive areas. Refer to section 5 (Natural Environment) of this report and accompanying stormwater and geotechnical studies completed by Barker Harle.
2.3 Heritage Conservation	The planning proposal must incorporate provisions for the conservation of post European and Aboriginal cultural heritage items and places.	Consistent. Preliminary investigation indicates the subject land does not contain items of environmental heritage however the land is located adjacent to the village conservation area. Future development on land in the vicinity of listed items will be subject to the provisions of the draft LEP, and require incorporation of appropriate design to enhance streetscape and visual amenity. Refer to Section 6.1 (Post European Heritage Considerations) of this report. Preliminary investigations undertaken via review of AHIMS register indicated no recorded sites or places within a 1000m buffer of the subject land. Further consultation with Ngambri Local Aboriginal Land Council advised the land was not subject to Aboriginal land claims and prior to future development a 'walk over' by members of the local Aboriginal community would be required. Refer to Section 6.2 (Aboriginal Cultural Heritage Considerations) of this report.
4. Hazard and Risk		
4.4 Planning for Bushfire Protection	Not applicable	Consistent. The land is not classed as bushfire prone land however the introduction of Amendment II of the Australian Standard AS3959-2009 Constructions of Buildings in bushfire prone areas now includes grasslands as a hazardous vegetation category, and any future development will be required to consider this at the design and construction stage. Therefore provisions have included in respect of proposed subdivision. Refer to Section 7.2 (Bushfire) of this report.

5. Regional Planning		
5.1 Implementation of Regional Strategies	The planning proposal must be consistent with the Sydney – Canberra Corridor Regional Strategy	Consistent. The proposal responds to the provision of housing for future anticipated population growth resulting in the demand for new dwellings.
6. Local Plan Making		
6.1 Approval and Referral Requirements	▪ A planning proposal should not contain provisions requiring concurrence, consultation or referral of a Minister or public authority without approval from the relevant Minister or public authority; and the Director General of DoPI. ▪ Not identify development as designated development unless justified.	Consistent. The planning proposal does not introduce concurrence, consultation or referral requirements. Not applicable – not designated development.

9.2 Environmental, Social and Economic Impact

9.2.1 Is there any Likelihood that Critical Habitat or Threatened Species, Polulations or Ecological Communities, or their Habitats will be Adversely Affected as a Result of the Proposal?

In determining a change of land use considerations have been made on the natural environment, which are discussed in Section 5 (Natural Environment) of this report.

Preliminary investigations considered that future development of the land for the purpose of residential development would not unduly impact the biological diversity of the subject land.

9.2.2 Are there any other Likely Environmental Effects as a Result of the Planning Proposal and How are they Proposed to be Managed ?

Considerations have been made on potential hazards, and preliminary investigations indicate the subject land has minimal environmental constraints as discussed in Sections 4 (Natural Environment) and 7 (Hazards) of this report.

9.2.3 Has the Planning Proposal Adequately Addressed any Social and Economic Effects?

The incorporation of this land into the Gundaroo Village environs will respond to a growing demand within the local area for additional lifestyle allotments. The identified demand is a direct result of regional strategies that are responding to growth that is being experienced in areas such as the ACT.

In particular, the planning proposal supports the Sydney – Canberra Regional Corridor Strategy 2006 – 2031 by creating a variety of lifestyle choices by way of infill development in regional villages.

The Sydney – Canberra Regional Corridor Strategy advises that opportunities for village lifestyle within a more sustainable context will be provided by careful infill development within the numerous rural villages in the Region and existing villages such as Gundaroo, will play an important role in providing housing choice as well as offering more affordable housing. The rural character and built form character of many villages is a significant local and regional asset. [5]

[5] http://www.planning.nsw.gov.au/plansforaction/pdf/sydcancorridor_regional_strategy_final.pdf

An increase in available allotments within the Village environs will help support retail and business services in the village, and contribute to its unique social fabric.

9.3 State and Commonwealth Interests

9.3.1 Is there adequate public infrastructure for the planning proposal?

The subject land is accessed via existing road network. The configuration of the investigation area allows for the natural extension of the village.

Existing electricity and communication networks serve the subject, and can be extended in consultation with the service provider.

Reticulated water or sewer does not serve the village, however adequate provisions can be made for on-site disposal management and the provision of water for future residential development. Geotechnical assessment reports for the provision of stormwater and sewer management have been prepared, and are included as Attachments 1 and 2 to this proposal. These reports investigate key natural and essential infrastructure elements as they relate to the subject land with the aim of ensuring the provision of a sustainable living environment with minimal impacts on local ecosystems, community structure and local economy.

9.3.2 What are the views of the State and Commonwealth Public Authorities consulted in Accordance with the Gateway Determination?

The preparation of the planning proposal has not sought preliminary views of any Commonwealth or State agency prior to lodging the planning proposal with Council.

The proposed agency consultation will be confirmed with the Gateway determination and reported back to Council.

9.4 Mapping

Reference mapping has been provided throughout the planning proposal.

A draft Yass Valley LEP 2012 Gundaroo Land Zoning map illustrating the indicative extent of the proposed RU5 Village and R2 Low Density Residential zoning is provided as Attachment 7 to this report.

9.5 Community Consultation

Community consultation will be undertaken by Council.

10 LAND USE MATTERS

The following matters have been taken into consideration for the study area, as well as adjoining and adjacent landuses, which are discussed in the following sections. A Site Analysis Plan is included as Attachment 4 to this report.

10.1 Interface Considerations

To minimise the potential landuse conflicts, which may interfere with the 'right to farm' on adjoining or adjacent land, a setback of 150 metres to the curtilage of proposes residential development is desirable and generally applied according to best practice landuse management.

Variations to this setback can be considered where it can be demonstrated that the agricultural potential of the land will be protected, taking into account alternative measures such as landscaping or other relevant factors.

Rural residential areas have traditionally been used to provide a transition from typically fulltime farming land to general urban residential neighbourhood areas. The size of the resultant rural residential / large lot residential area must be relevant to the adjoining farming activity and be able to incorporate mitigation measures, such as planting buffer areas, as well as suitable building envelopes to accommodate a desired rural residential living space.

The configuration of the investigation area, and in particular the land located along Faithfull Street, allows for the natural extension of the village. Appropriate staging of land release based on demand, rollout of infrastructure and duration of agricultural activities will provide for future residential development.

10.2 ABS Statistics and General Housing Demand

Population statistics indicate continual growth between 2001 and 2011.

2011 Statistics recorded a population of 402 Gundaroo (Urban based locality) as indicated below in Figure 18.

Figure 18: Source:http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011

Increasing demand for residential properties in Gundaroo appears to be generated by lifestyle choice, primarily due to Gundaroo's proximity to Canberra.

It is considered that existing demand will increase as a result of the Regional Sydney – Canberra Corridor Strategy 2031.

Median incomes remain above State and National percentages.[6]

[6] http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/SSC11047?opendocument&navpos=220

11 SITE CONSTRAINTS AND OPPORTUNITIES

The land offers a range of constraints and opportunities that assist in developing options for future residential development. Analysis of the site indicates the following constraints:

- Buffers imposed by the land and its proximity to:
    - Productive agricultural land – 'right to farm' policy;
    - Management of gully erosion associated intermittent creek (Harrow);
- The soils are considered to be highly erodible and must be managed carefully to ensure the defined erosion gully does not initiate erosion.
- There are no apparent occurrences of salinity or acid sulphate soils, however groundwater sensitivity is high, and requires appropriate mitigation measures to ensure future development does not negatively impact on the local groundwater environment and waterways.
- There is no drainage infrastructure in the study area.
- No water reticulation
- No sewer reticulation

The land, however, provides the following opportunities in relation to future residential development:

- Investigations indicate that the subject land has minimal constraints such as flooding, bushfire, soil contamination and salinity, and is well located for the roll out of other essential infrastructure to service residential development, as an extension to the village.
- Potential land release area within land fronting Faithfull Street can be staged accordingly to respond to agricultural activities, as well as provide for housing, in stages, to satisfy growth requirements. The configuration of the land within the investigation area offers minimal interface issues between landuses as the natural progression of development will occur from north to south.
- The investigation area is accessible via existing road networks ie Faithfull Street, a developed road and in good condition and not requiring upgrade for village development.
- The land is capable of sustainable rainwater harvesting for onsite water supply and supporting effluent disposal systems.
- Sustainable drainage infiltration systems can be integrated into the overall development layout of the land.
- The land offers unique living opportunities, providing a natural setting and backdrop to encourage sustainable housing choices.
- All potential dwelling sites would be within convenient distance to existing Village facilities, helping to consolidate the village centre.
- The natural expansion of the village theme will add to the unique social fabric of Gundaroo.

12 CONCEPT LAYOUT PLAN

A concept layout plan has been prepared in response to the investigations and recommendations discussion in the sections above (see Attachment 6). This plan is indicative only and may be refined prior to any formal application being made to initiate staged construction of future development.

Features of this concept plan include:

- Potential for approximately 66 lifestyle lots ranging in size from 2000m2 – 10000m2.
- Creating variety of choice in lot type and size by including RU5 Village and RU2 Low Density Residential zonings.
- Potential for additional lot yield from other adjoining larger lots that can be easily linked to essential infrastructure.
- Primary access roads to be from Faithfull Street – noting that there is allowance made for an alternative internal access road to facilitate access to the southern larger lots if direct access to these lots proves unachievable (subject to further RMS comment).
- Maintaining the village "grid" subdivision pattern including use of rear "green lanes" to facilitate pedestrian circulation throughout the area – a distinct feature of the Gundaroo lifestyle.
- Concentrating smaller lots closer to the existing village to ensure a transition from village to rural style lots.
- Retaining existing mature plantings and incorporating them into the subdivision design.
- Protecting the natural features of the existing creek system.
- Creating a linked network of pedestrian movement throughout the subdivision to enable maximum public access to the natural features of the land, flora and fauna.
- Creating an open road system network to facilitate any future expansion to adjoining land, if and when required.
- Total response to site constraints and opportunities that enables the creation of sustainable lifestyle lots of varying sizes.
- Incorporation of fire-trail access for emergency services.
- Including 40m exclusion zones surrounding gullies and dams (noting that most existing dams will be filled in as they are no longer necessary).

The concept plan is provided also as a guide for applying appropriate future zones to the site as part of the rezoning process.

13 CONCLUSIONS

The location of the investigation area provides an open landscape with panoramic views over the Yass River Valley, and connection to the existing village.

Investigations indicate that the land presents an opportunity for the natural extension of existing infrastructure to service a future residential living area of similar density to the existing village, whilst creating a buffer to the adjoining active rural landscape.

This land has minimal environmental constraints, and interface issues between existing residential land and agricultural activities and future development can be staged accordingly, responding to community needs / housing demand as well as making provision for limited agricultural activities, whilst operational.

Onsite disposal systems can be managed through the incorporation of planning and design guidelines appropriate to the site. The indicative masterplan provided with this report, details an appropriate environmental response and subdivision design to ensure the sustainable placement of dwellings and private open space within new allotments.

The incorporation of this land into the Gundaroo Village environs will respond to a growing demand within the local area for additional lifestyle allotments. The identified demand is a direct result of regional strategies that are responding to growth that is being experienced in areas such as the ACT.

An increase in available allotments within the Village environs will help support retail and business services in the village, and contribute to its unique social fabric.

Council is encouraged to support the intent of this rezoning planning proposal as it fulfills the criteria for environmentally responsible development in accordance with local and state planning criteria.

ATTACHMENT 1: REPORT ON GEOTECHNICAL ASSESSMENT FOR REZONING

Report on Geotechnical Assessment
Proposed Rezoning

At

Lot 7 & Part Lot 8 DP1025196
and
Lot 4 DP881346

Sutton Road and Faithfull Street
Gundaroo

For

Mr R & Mrs M Meischke

29 January 2013
BH Ref: 2916

barker harle
consulting engineers

29 January 2013
BH Ref: 2916

Dr R & Mrs M Meischke
C/- Salvestro Planning
PO Box 783
WAGGA WAGGA NSW 2650

Attention: Ms Lizzie Olesen-Jensen

Dear Dr & Mrs Meischke,

Re: Report on Geotechnical Assessment
Proposed Rezoning;
Lot 7 & part Lot 8 DP1025196 & Lot 4 DP881346
Sutton Road and Faithfull Street, Gundaroo

The following report presents the results of a geotechnical investigation and assessment undertaken to investigate:-

- The potential for on-site dispersal of treated domestic effluent on the site and its potential impact on the groundwater, and
- The potential for contamination of the site as a result of previous activities.

This report presents details of the site investigation and resultant recommendations.
If you have any further enquiries please do not hesitate to contact the undersigned.

Yours faithfully
Barker Harle

Rob Barker
Principal
FIE Aust, CPEng, NPER

Table of Contents

Attachments

1. Drawing 2916/1
2. Engineering Logs
3. Laboratory Test Results
4. Groundwater Chemical Analysis
5. General Notes
6. Useful Background Information
7. Land Application Areas
8. Vegetation Suitable For Land Application Areas

History Of This Document

Document status and review

Revision	Author	Reviewer	Date Issued
0	Rob Barker	Mark Sasaki	30 January 2013

Distribution of copies of this document

Revision	Digital	Printed	Issued to
0	1	3	Salvestro Planning
	1	1	Dr R & Mrs M Meischke
	1	1	Barker Harle file/archives

Report on Geotechnical Assessment

Proposed Rezoning

Lot 7 & part Lot 8 DP1025196 & Lot 4 DP881346 Sutton Road and Faithfull Street, Gundaroo

1 Introduction

This report presents the findings of a geotechnical assessment for proposed rezoning of Lot 7 & part Lot 8 DP1025196 & Lot 4 DP881346, Sutton Road and Faithfull Street, Gundaroo. The investigation was undertaken at the request of Ms Lizzie Olesen-Jensen of Salvestro Planning, on behalf of Dr R and Mrs M Meischke.

It is understood that an application will be made to Yass Valley Shire Council for re-zoning of the site for the purpose of residential development in accordance with Yass Valley Shire Council's Draft LEP 2012. The proposed development comprises a mix of lots with a minimum area of 2000m^2 and 5000m^2

The purpose of the assessment was to provide the following:

- Subsurface conditions;
- Geotechnical constraints to development;
- On-site effluent disposal assessment in accordance with *AS 1547-2012 On-site domestic wastewater management* and NSW Government Environmental & Health Protection Guideline *On-site Sewage Management for Single Households*;
- Recommendations on effluent treatment and dispersal options;
- Potential impact of on-site dispersal of effluent on groundwater.

The assessment comprised the following tasks:

- Desktop study, including review of topographic, geological and soil landscape and groundwater vulnerability maps;

- Review of historical records of periodical chemical analysis of groundwater recovered from registered bore GW062165 on Faithfull Street, Gundaroo;
- Site inspections on 5 and 13 October 2012 and 14 December 2012.
- Excavation of 14 testpits across the site to assess the subsurface conditions;
- Laboratory testing of selected soil samples recovered for the testpits for a range of geotechnical parameters and chemicals.

This effluent disposal assessment was undertaken with reference to *AS1547:2012 On-site domestic wastewater management* and the Environment and Health Protection Guidelines '*On-site Sewage Management for Single Households*' (1998).

For the purposes of the investigation Salvestro Planning provided a conceptual subdivision layout for the site, drawing No SP01, and a Detail and Contour Survey plan prepared by Capital Surveys, drawing 47569I_s500, showing the existing site features.

This report should be read in conjunction with Barker Harle's attached 'General Notes', 'Useful Background Information', 'Land Application Areas' and 'Vegetation Suitable For Land Application Areas'.

2 Site Description

The subject site was located to the south of Faithfull Street and to the east of Sutton Road, as shown on Salvestro Planning's drawing SP01. The site was bordered by rural property to the east, south and west and by residential properties within the Gundaroo village to the north.

At the time of the investigation, the site proposed to be re-zoned contained a residence "Strathallan" on Faithfull Street and a residence on Sutton Road. Each residence had a number of associated ancillary outbuildings. The remainder of the site was rural land used for grazing/cropping and market gardens. There were 4 farm dams formed by earthen embankments walls across shallow drainage depressions and a large, 2m to 3m x 6m to 12m wide deep erosion gully running centrally through the site in an east – west direction.

P1 - Looking south at from NE corner

P2 - Looking north from centre of southern boundary

P3 – Looking west from centre of site

P4 – Erosion gully looking east from causeway

At the time of the investigation the farm dams were full and there was water flowing in the intermittent creek within the erosion gully. The banks of the erosion gully were typically sub-vertical with scree slopes transitioning to a terraced base.

P5 – Dam to the south of Lute Street

P6 – Erosion gully bank to west of causeway

Topographically the site sloped down from the east to the west with undulating slopes varying between 1% and 5% with some local slopes up to 10% on the flanks of small rises. Surface levels on the site ranged between AHD RL 573m and RL 592m.

Vegetation on the site consisted of improved grasslands over the area of the site used for grazing, with a mixture of native and exotic trees and shrubs forming gardens in close vicinity to the commercial and residential properties. The market garden area was intensively farmed with 2 summer crops of zucchinis being produced annually.

3 Desktop Review

3.1 Topography

Reference to the Department of Environment, Climate Change & Water, 1:100,000 Canberra sheet, the 1:50,000 topographic map for Gunning and Google Maps aerial photographs, indicate that the site is gently undulating, falling to the west at a typical grade of 3%, with 2 dominant drainage paths trending east to west across the site. Elevations vary between approximately 573m and 592m AHD.

Detailed site topography and contours may be seen in drawing 2916/1, attached.

3.2 Drainage

The 2 drainage paths drain to the Yass River which varies from 100m to 200m to the west of Sutton Road, adjacent to the western boundary of the site.

The northern drainage path is poorly defined and is delineated by 3 farm dams that have been formed across the drainage depression (see photograph P5, above). The southern drainage path is along a well defined incised erosion gully extending from the eastern to the western boundary of the site (see photographs P4 and P6, above). A fourth farm dam was located on a shallow drainage depression that drained to the erosion gully.

The farm dams were full at the time of the investigation and there were intermittent puddles of standing water in the erosion gully.

40mm of rain was recorded on the site on 12 October 2012, the day prior to the site investigation. There was no rain recorded between 1 and 11 October 2012. 55mm of rain was recorded in September 2012.

3.3 Geology and Soil Landscape

Reference to the Department of Land & Water Conservation's (now Department of Environment, Climate Change & Water) *Soil Landscapes of the Canberra 1:100,000 Sheet* [BR Jenkins 2000] indicates that the site is underlain by Quaternary Age alluvium deposits comprising gravel, sand, silty clay and black organic clay. Bedrock is generally >2m below surface the soil surface level.

The soil landscape is very complex as a result of the depositional nature of the formation of narrow floodplains and terraces of the Yass River. Each terrace represents a specific period of cut and fill of the Yass River. The terraces are successively older from lowest to highest. The oldest terraces are >1km from the current Yass River flood plain and are no longer flooded.

The soil profiles encountered on the site were consistent with the Terrace Profiles 1, 2 and 3, reported by Jenkins at p77. The majority of the site was consistent with the second highest terrace and consisted of fine sandy loam overlying reddish-brown light to medium clay with many fine gravels. The depths of soil varied from 1.25m to >1.5m.

The topsoils have very low available phosphorus. Soil pH varies from 4.8 to 9.1.

The soils are considered to be highly susceptible to erosion from both non-concentrated and concentrated water flows.

3.4 Groundwater

A groundwater bore search was undertaken using the NSW Government online Natural Resource Atlas (NRAtlas). NRAtlas is a combination of maps and data for environmental management, planning, research and education formed from a catalogue of authoritative, significant natural resource databases and geographic information held by the NSW Government.

During the NRAtlas search, 3 groundwater bores were identified within the site and 7 groundwater bores were identified were within a 250m radius of the site's perimeter. Figure 1 shows the location of the site and groundwater bore locations.

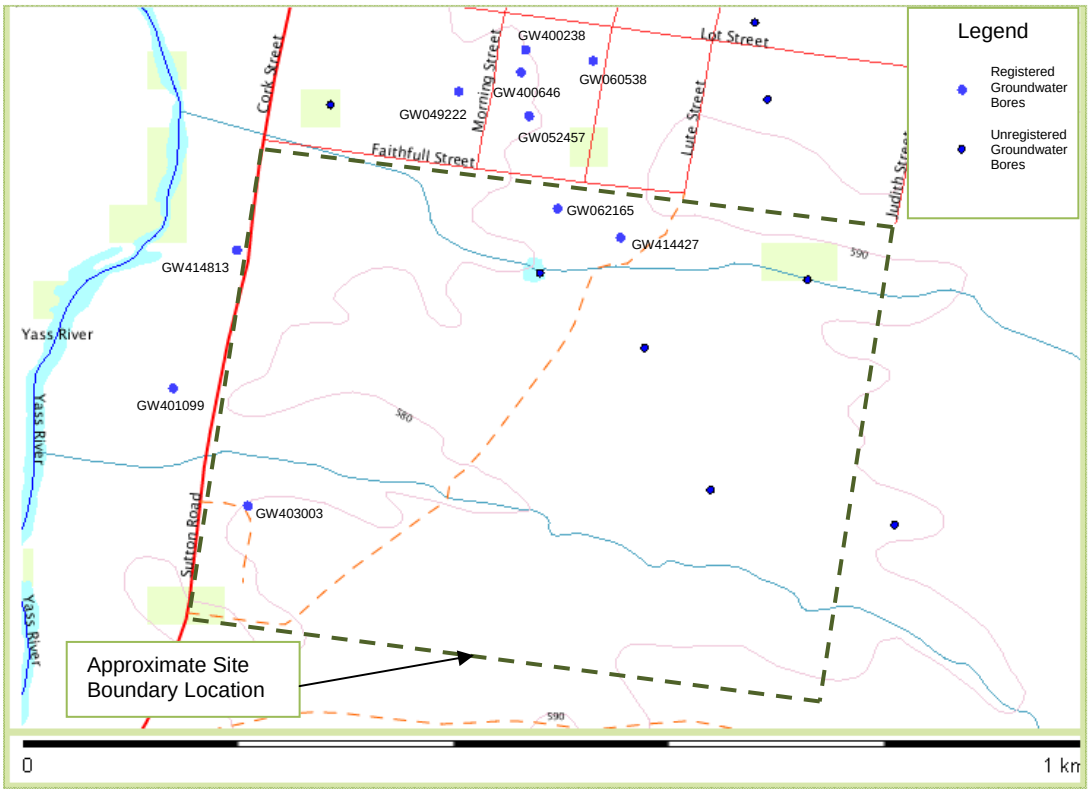


Figure 1 - NRAtlas image

Information was available for 10 of the identified registered groundwater bores within the site and within 250m of the site's perimeter. Details can be seen in Tables 1; 1-1; 2; 2-1; 2-2; 2-3 and 2-4.

Table 1 - Groundwater Bore Data – Within the Site

Groundwater Bore No	Authorised Purposes	Construction Method	Depth	Water Bearing Zones
GW062165	Domestic Irrigation stock	Rotary	No details	No details
GW414427	Domestic	Rotary Air	15.0	See Table 1-1
GW403003	Domestic	No details	5.0	No details

Table 1-1 GW414427 – Water Bearing Zone

From-Depth (m)	To-Depth (m)	Thickness (m)	Standing Water Level (m)	Yield (L/sec)	Salinity
17.00	19.00	2.00	15.00	0.13	-
23.00	24.00	1.00	15.00	0.25	-
37.00	39.00	2.00	15.00	0.38	-

Table 2 - Groundwater Bore Data – Within 250m of the Site's Perimeter

Groundwater Bore No	Authorised Purposes	Construction Method	Depth	Water Bearing Zones
GW401099	Domestic Forming Irrigation	No details	No details	No details
GW414813	Farming Irrigation	No details	80.0	No details
GW049222	Domestic	Rotary	No details	See Table 2-1
GW400646	Domestic	Rotary Air	8.0	See Table 2-2
GW400238	Monitoring Bore	No details	No details	No details
GW052457	Domestic	Rotary Air	No details	See Table 2-3
GW060538	Domestic	Rotary Air	No details	See Table 2-4

Table 2-1 GW049222 – Water Bearing Zone

From-Depth (m)	To-Depth (m)	Thickness (m)	Standing Water Level (m)	Yield (L/sec)	Salinity
9.50	9.80	0.30	4.60	0.13	Good
15.20	16.50	1.30	4.60	0.25	Hard
18.30	21.30	3.00	3.10	2.28	Hard

Table 2-2 GW400646 – Water Bearing Zone

From-Depth (m)	To-Depth (m)	Thickness (m)	Standing Water Level (m)	Yield (L/sec)	Salinity
14.00	14.10	0.10	8.00	0.25	Good
22.00	22.10	0.10	8.00	0.63	Good

Table 2-3 GW052457 – Water Bearing Zone

From-Depth (m)	To-Depth (m)	Thickness (m)	Standing Water Level (m)	Yield (L/sec)	Salinity
12.60	25.10	12.50	5.70	0.78	Fair

Table 2-4 GW060538 – Water Bearing Zone

From-Depth (m)	To-Depth (m)	Thickness (m)	Standing Water Level (m)	Yield (L/sec)	Salinity
21.60	25.60	4.00	6.90	0.68	Fair

Water quality chemical analysis has been undertaken on samples recovered from bore GW062165, adjacent to Faithfull Street within the proposed site. Details of the sampling are unknown. The results of the analysis, undertaken by Ecowise Environmental, of Fyshwick, ACT is summarised in Table 3, below. Copies of the analysis reports are attached.

Table 3 - Groundwater Bore GW062165 – Water Analysis

Sample Date	Suitable for Drinking and household Use	Suitable for Irrigation	Suitable for Stock
4 Sept 2003	Fail	Not reported	Not reported
29 Aug 2004	Fail	Fail	**Pass**
17 Aug 2011	Fail	**Pass**	**Pass**

It is understood the water from GW062165 is currently being used for non-potable domestic purposes (WC flushing, laundry and gardens).

4 Fieldwork

4.1 Methodology

The fieldwork undertaken on 13 October 2012, consisted of the following:

- a walk over and visual assessment of the site by an experienced geotechnical engineer to assess dominant geomorphologies, site slopes, site features such as eroded gullies, drainage depressions and existing farm dams;
- recording of boundary and testpit co-ordinate locations by using a GPS system to obtain accurate position of the fieldwork area;
- the excavation of 14 testpits (TP1 to TP14) to depths of 1.5m deep or refusal using a Bobcat E50 excavator with a 400mm wide bucket, to assess and map the general soil profile and subsurface conditions within the site;
- recovery of disturbed bulk soil samples from each strata within each testpit for laboratory and identification purposes;
- undertake laboratory and field testing of selected soil parameters on selected/representative soil samples.

The pits were set out by the geotechnical engineer who also logged the subsurface profile in each testpit.

Drawing 2916/1 shows the location of the testpits.

All fieldwork was conducted in accordance with the methodology outlined in *AS1547:2012 On-site domestic wastewater management* and the Environment and Health Protection Guideline *On-site Sewage Management for Single Households*.

The fieldwork undertaken on 14 December 2012, consisted of the following:

- A walk over and visual assessment of the farming activities undertaken on the market garden within Lot 1 DP840631, in conjunction with review of the farming activities undertaken on the site, with the current owner, Mr Omar Jabal.
- Determination of the relevant testpits and soil profiles to be assessed for potential chemical contamination from the farming activities on Lot 1 DP840631.

4.2 Results

The subsurface conditions encountered at each testpit, TP1 to TP14, are presented in the attached Engineering Logs. The engineering logs should be read in conjunction with the attached General Notes.

The subsurface conditions across the site could be generally divided into 3 Zones. **Zone 1** was limited to the northern portion of the site (1/3 of the entire site) and included TP1 to TP5. **Zone 3** was limited to the south side of the site to the south of the erosion gully and included TP9 to TP14**.** **Zone 2** was limited to between Zone 1 and Zone 3, and to the eastern boundary of Lot 1 DP 840631, the market garden farm land, and included TP6 to TP8.

Zone 1: the following typical natural sub-surface profile was revealed in TP1 – TP5.

0 – 250mm	Brown loam overlying
250 – 500mm	Reddish brown sandy clay loam with many fine gravels overlying
500 – 1500mm	Red - yellow silty clay with many fine gravels
1500mm	Terminated in light brown silty clay with many fine gravels

Zone 2: the following typical natural sub-surface profile was revealed in TP6 – TP8.

0 – 200mm	Brown Loam overlying
200 – 1200/1500mm	Light brown to yellow sandy clay with many fine gravels
1200/1500mm	Terminated in totally weathered shale/light brown sandy clay with many fine gravels

Zone 3: the following typical natural sub-surface profile was revealed in TP9 – TP14.

0 – 250mm	Brown Loam overlying
250 – 400mm	Reddish brown sandy clay loam with many fine gravels overlying
400 – 1250/1500mm	Yellow to orange sandy clay with many fine gravels
1250/1500mm	Terminated in totally weathered shale/light brown to yellow sandy clay with common gravels to cobbles

The above sub-surface profiles were anticipated to be representative of the natural sub-surface soil profile across the site.

Groundwater was encountered in TP6 and TP7 in Zone 2. Groundwater flowed into each pit at a depth of approximately 600mm below surface level at the base of the A2, sandy CLAY horizon. The ground water inflow was monitored in each pit for approximately 2.5 hours, during which time the inflows remained at a steady rate of approximately 0.25 - 0.5L/minute. The groundwater was attributed to the preceding rainfall that occurred during the 36 hours prior to the investigation.

5 Laboratory Results

5.1 On-Site Effluent Dispersal

Selected representative soil samples were analysed for:

- Electrical Conductivity (EC) to assess soil acidity/salinity;
- pH;
- Cation Exchange Capacity (CEC) (Sodium, Potassium, Calcium, Magnesium, Aluminium) to assess ability to retain nutrients;
- Phosphorus Absorption Capacity (P sorp) to assess ability to bind phosphorus, and
- Emerson Aggregate Test (EAT) to assess dispersivity.

Laboratory testing was undertaken by the Soil Conservation Service's, Scone Research Centre. The test results report is attached. The laboratory test results have been summarised in Table 4, below.

Table 4 – Summary of Laboratory Test Results

Sample ID	Soil Description	EC (dS/m)	$pH_{(w)}$	CEC	P sorp (mg/kg)	EAT
TP2 0 - 450	Silty Clay Loam	<0.01	**4.2**	**4.0**	**258**	3(1)
TP5 0 – 200	Loam	0.01	**4.5**	**4.2**	**261**	3(1)
TP7 100 – 300	Clay Loam	0.01	**5.2**	**1.9**	**219**	3(1)
TP9 0 – 250	Silty Clay Loam	0.01	**5.1**	**4.0**	**243**	3(1)
TP12 0 - 200	Loam	0.02	**4.8**	**4.1**	**329**	3(1)
TP4 300 – 500	Sandy Clay Loam	<0.01	6.9	16.5	**672**	5

TP5	500 – 900	Sandy Clay	0.37	9.1	31.9	**458**	2(3)
TP1	600 – 1500	Silty Clay	0.02	7.7	12.5	**292**	2(2)
TP12	300 - 1250	Sandy Clay	0.08	8.6	12.9	**471**	2(1)

Bold results indicate Moderate limitations as defined in reference 1
Bold and Shaded results indicate Major limitations as defined in reference 1.

5.2 Contamination

Selected representative soil samples from testpits TP1, TP2, TP3, TP6 and TP9 were selectively analysed for:

- Organochlorine Pesticides;
- Organophosphorous Pesticides;
- Triazines;
- Synthetic Pyrethroids;
- Acid Herbicides

Laboratory testing was undertaken by MGT LabMark at their NATA registered laboratory in Oakleigh, Victoria. The test results reports are attached. The laboratory test results have been summarised in Table 5, below.

Table 5 – Summary of Laboratory Test Results

Sample ID	Soil Description	OCP	OPP	Triazines	Synthetic Pyrethroids	Acid Herbicides
TP1 0 - 250	Loam	NT	NT	NT	NT	NMR
TP2 0 - 450	Silty Clay Loam	NMR	NMR	NT	NMR	NMR
TP3 0 - 250	Loam	NT	NT	NT	NMR	NMR
TP6 0 – 250	Loam	NMR	NMR	NMR	NMR	NMR
TP9 0 - 250	Loam	NMR	NMR	NT	NMR	NMR

OCP – Organochlorine Pesticides
OPP – Organophosphorus Pesticides
NMR – No Measurable Result
NT – Not Tested

6 Geotechnical Constraints

6.1 Slope Stability

The slopes on the site vary for 1% and 5% with some local slopes up to 10% on the flanks of small rises. The site does not exhibit any evidence of either deep seated or shallow slope instability.

The site is considered to have an overall LOW risk of slope instability. Localised area with higher potential for slope instability include the dam walls of the existing farm dams and the banks of the erosion gully.

Further assessment of the long term stability of the farm dams will be required if the farm dams are to be retained.

Development guidelines will need to be prepared if development is planned within 10m of the existing cut batters of the erosion gully.

6.2 Rock Outcrops

No extensive rock outcropping was noted within the site. Scattered coarse grained conglomerate stones were observed on the surface in the vicinity of testpits TP 13 and 14.

Testpits TP 13 and 14 both terminated in weathered conglomerate rock at 1.25m depth. TP12 encountered totally weathered conglomerate rock at 1.5m depth.

The depth of rock will not have an adverse effect on the surface or subsurface irrigation of treated effluent.

6.3 Footings

It is anticipated that the footings for residential structures for the majority of the site will comprise shallow footings in residual soils or cut to fill prepared building platforms.

Footing design should be confirmed by subsurface investigation prior to development of the site. Classification of the site in accordance with AS 2970 – 2011 *Residential slabs and footings* would facilitate the use of deemed to satisfy footing systems. It is anticipated that the majority of the site will be able to be classified as Class M or H1.

Sites located within Zone 2; in the vicinity of TP1 and TP2 or near the existing dams may be affected by saturated soils and may be classified as Class P.

6.4 Erosion Potential

Vegetation across the site generally comprised a good cover of grass, with no indications of soil erosion away from the defined erosion gully.

The Emerson Aggregate testing indicates that the soils are typically Class 2 and 3. Class 2 soils are slightly dispersive and can experience a reduction in permeability caused by blockage of the pores. The soils can exhibit poor micro-structure stability, which can be addressed by the introduction of organic matter or Gypsum.

The Class 3 soils are non-dispersive and have a more stable micro-structure. Class 3 soils can be adversely affected by ploughing which can cause them to become dispersive. Class 3 soils can be improved/stabilised by the addition of Gypsum.

The soils are considered to be highly erodible and must be managed carefully. Development of the site away from the defined erosion gully should not cause the initiation of erosion.

6.5 Existing Erosion Gully

The existing erosion gully that extends from east to west across the site, should be stabilized as part any proposed development of the site. The stabilization will require the eroded cut batters to be reshaped and flattened to provide batters that may be effectively vegetated and managed. Slopes of less than 1:4 would be anticipated. Some local protection works, including gabion blankets and cages, may be required to protect the reshaped batters from high velocity water flows that could re-initiate erosion.

The design and detailing of the remediated erosion gully should be undertaken as part of the detailed design of the infrastructure for the developed site. Consideration of the implications arising from the construction of vehicle crossings over or through the gully will need to be addressed.

6.6 Salinity Potential

The surface soils are non saline, having EC readings < 0.08dS/m.

The sandy clay strata in TP5 between 500 and 900mm below surface level was found to be slightly saline, having an EC reading of 0.37dS/m.

Searches with DIPNR and NRAtlas did not identify any reported outbreaks of salinity.

6.7 Groundwater Contamination

Provided wastewater treatment and dispersal options detailed in Section 7 of this report are incorporated into the proposed development and that regular maintenance of both the wastewater treatment system and dispersal area is undertaken in accordance with AS1547, Environment and Health Protection, Council and any system manufacturers guidelines, it is believed that the dispersal of treated wastewater on the site does not pose a significant risk to groundwater use on and around the site.

7 Preliminary Effluent Disposal Assessment

7.1 Site Information

Site specific information relevant to the assessment is set out in Table 6, below

Table 6 – Site Information

Address:	Lot 7 & part Lot 8 DP1025196 & Lot 4 DP881346 Sutton Road and Faithfull Street, Gundaroo
Client:	Dr Roger & Mrs Marion Meischke
Site Area:	Approximately 40 hectares. Proposed to be subdivided to 2,000m^2 and 5,000m^2 minimum sized lots with associated access roads. Development proposed to be undertaken in stages.
Intended Water Supply:	Tankwater. There are no expectations of reticulated water becoming available. Bore water may be available for non-potable uses.
Potential For Reticulated Sewerage System	There is no expectation that the site will be connected to a reticulated sewerage system.
Special Considerations:	Final lot layout and staging of development is still to be finalised.

7.2 Site Features and Limitations

Table 7 – Site features and Limitations

Site Feature	Rating/Assessment	Limitation
Flood Exposure	Unlikely. Proposed building envelopes will be above the 1:100 year flood levels.	Minor
Exposure	Generally high	Minor
Slope	Site slopes generally between 1% and 5% with some local slopes to 10%.	Minor to Moderate
Land Form	Site slopes generally planar with some convex divergent slopes. Slopes fall to drainage lines	Minor to Moderate
Run-on and Upslope Seepage	Generally low to moderate run-on potential. Properties along the eastern boundary could experience moderate run-on	Minor to Moderate
Erosion Potential	No obvious signs of erosion away from the defined drainage erosion gully.	Moderate
Site Drainage	Soils generally moist to wet at the time of the investigation. Some high level seepage observed in Zone 2 immediately after a period of heavy of rain, 24 hours prior to the investigation.	Minor to Moderate
Depth to High Episodic/seasonal Watertable (m)	Water table encountered in Zone 2 at a depth of 600mm below surface level	Moderate
Fill	No fill observed	Minor
Depth to Bedrock	Observed at 1.25m deep in TP 13 and 14. Elsewhere bedrock was > 1,5m below surface	Minor to Moderate
Rock Outcrops	Nil. Some surface stones were observed near TP 14.	Minor
Buffer Distances	See Section 7.6 for details of recommended development setbacks. Specifically designed lot size/layout and dispersal area placements may be required in the 2,000m^2 lot area	Minor to Moderate
Land Availability	Minimum 0.2Ha lots	Minor
Geology/Regolith	Quaternary Age alluvium deposits comprising gravel, sand, silty clay and black organic clay. Bedrock is generally >2m below surface the soil surface level.	Minor

Note: Limitations as defined by NSW Government Environmental & Health Protection Guideline *On-site Sewage Management for Single Households, Table 4.*

7.3 Subsurface Conditions

Table 8 – Soil Feature and Limitations

Soil Feature	Rating/Assessment	Limitation
Soil Permeability Category	Topsoil - typically category 2 or 3 "A & B " horizons – typically moderately structured category 4 & 5 soils.	Minor to Moderate
Course Fragments (%)	Less than 5%	Minor
$pH_{(CaCl)}$	3.9 to 8.2 PH increases with depth of soil.	**Major** to Minor
Electrical Conductivity (dS/m)	Generally < 0.02dS/m with some samples to 0.37dS/m	Minor
Sodicity (exchangeable sodium percentage)	Varies between 5% to 10%, increasing with depth	Minor to Moderate
Cation Exchange Capacity	Topsoil typically , 5% "A & B " horizons – typically >15%	**Major** to Minor
Phosphorus Sorption (kg/Ha) (0-100 cm for irrigation) (100cm below intended base of trench)	4800 to 9600 kg/Ha	Minor to Moderate
Emerson Aggregate Test	Class 2 and 3	Moderate to **Major**

Note: Limitations as defined by NSW Government Environmental & Health Protection Guideline *On-site Sewage Management for Single Households, Table 6*

The minor and moderate limitations will not require remedial measures. The major limitations could be addressed as follows:

7.3.1 Soil pH

Soil pH below 6.0 may be raised, thereby reducing the acidity of the soil and improved plant growth can be achieved. The pH may be adjusted by an annual application of lime. The rate of application should be assessed initially and then periodically throughout the life of the dispersal area. A typical application rate would be between 250 and 500gm/m^2.

7.3.2 Cation Exchange Capacity (CEC)

The topsoils have a low Cation Exchange Capacity (CEC). By increasing the CEC the available cations such as calcium, magnesium, potassium and sodium can be retained in the

soil, and made available as plant nutrients. The Cation Exchange Capacity may be overcome by increasing the organic matter (compost / humus), in the soil at the time of construction of the dispersal area.

7.3.3 Emerson Aggregate Test (EAT)

The soil has displayed a tendency for dispersion of clay particles. This can lead to the blockage of pores by the dispersed clay particles, reducing the soil permeability. Details of the required application rate would be determined as part of the detailed design process. A typical application rate of gypsum would be 1kg/m^2 during construction and this may be sufficient for up to 10 years of operation.

7.4 Levels of Effluent Treatment

The level of wastewater treatment is loosely divided into three separate categories, namely, primary, secondary and advanced secondary wastewater treatment systems. Details of each system can be seen below.

7.4.1 Primary Wastewater Treatment

A primary wastewater treatment system incorporates sewage passing through a primary settling/sedimentation tank. The settling/sedimentation tank is used to settle sludge while grease and oils rise to the surface and are skimmed off. A primary settling tank is usually equipped with mechanically driven scrapers that continually drive the collected sludge towards a hopper in the base of the tank where it is pumped to sludge treatment facilities. Grease and oil from the floating material can sometimes be recovered for saponification. A typical sedimentation tank may remove from 60% to 65% of suspended solids, and from 30% to 35% of BOD from the sewage.

A typical treated effluent quality from a septic tank:

- 150 mg/L (Biological Oxygen Demand)
- 50 mg/L (Total Suspended Solids)
- 10^5 - 10^7 cfu/100mL (Faecal Coliforms)
- 50 - 60 mg/L Nitrogen
- 10 - 15 mg/L Phosphorus

Septic systems do not incorporate disinfection of the treated effluent. Effluent that is not disinfected must be dispersed underground.

7.4.2 Secondary Wastewater Treatment

Secondary wastewater treatment systems are varied in their design however processes utilised by each of the designs is fundamentally the same. Typically, secondary treatment is designed to substantially degrade the biological content of sewage derived from human waste, food waste, soaps and detergent. The majority of secondary wastewater treatment systems treat the settled sewage liquor using aerobic biological processes. To be effective, the bacteria and protozoa require both oxygen and food to live. They consume biodegradable soluble organic contaminants (e.g. sugars, fats, organic short-chain carbon molecules, etc.) and bind much of the less soluble fractions into a floc.

Typical onsite secondary wastewater treatment systems include:

- Aerated waste water treatment system
- Septic tank system with an aerobic sand filter
- Septic tank system with effluent landscape mound
- Septic tank system with peat bed filter

A typical secondary wastewater treatment system will treat wastewater to an equivalent standard of:

- <20 mg/L (Biological Oxygen Demand)
- <30 mg/L (Total Suspended Solids)
- <30 cfu/100mL (Faecal Coliforms)
- 25 - 50 mg/L Nitrogen
- 10 - 15 mg/L Phosphorus

Secondary wastewater treatment systems generally incorporate a method of disinfecting the treated effluent prior to the effluent being discharged. Disinfected effluent may be discharged onto the surface of the ground.

Secondary wastewater treatment systems generally provide only minimal reduction in the level of Nitrogen and Phosphorus in the treated effluent.

7.4.3 Advanced Secondary Wastewater Treatment

The purpose of advanced secondary wastewater treatment is to provide a final treatment stage to improve the effluent quality before it is discharged to the receiving environment (sea, river, lake, ground, etc.). An advanced secondary treatment system typically uses either micro filtration or synthetic membranes following secondary treatment methods to “polish” the wastewater prior to disposal. More than one treatment process including disinfection may be used at any treatment plant.

A typical secondary wastewater treatment system will treat wastewater to an equivalent standard of:

- 10 mg/L BOD
- 10 mg/L TSS
- 10 cfu/100ml FC

7.4.4 Nutrient Removal

Nitrogen and phosphorus are nutrients in domestic wastewater that need to be managed as part of management of the treatment and on-site dispersal of domestic wastewater.

Nitrogen is generally present in treated effluent as nitrate (NO_3) which is a stable form of nitrogen. Nitrate is not bound by soil, therefore, if nitrate is not taken up by plants it will remain available to move with ground water flows.

Phosphorous is generally present in treated effluent as soluble orthophosphate (PO_4^{3-}) but is able to change forms readily. Soluble orthophosphates are able to be synthesised back into plant and animal tissue. Phosphorous is able to be bound by clayey soils.

In order to ensure that N and P nutrients are not able to leach from the proposed dispersal areas into ground water it will be necessary to provide post treatment removal of nutrients prior to on-site dispersal of treated effluent,. There are a number of viable options and they include recirculating sand filters, denifrification trenchs (removes nitrogen) and amended soil trenches (removes phosphorous).

The design of the nutrient removal processes should be included in the detailed design of the on-site management (treatment and dispersal) of domestic wastewater on the site.

7.5 Disposal Area Requirements

7.5.1 Hydraulic Loading

The site does not have access to reticulated town water supply and there are no current plans to provided reticulated water. The residences will be reliant on tank water. It may be possible to supplement the tank water with bore water for non-potable uses, however, this is not assumed to be applicable to all lots. The minimum site dispersal areas have been calculated on the basis of non-reticulated (ie tank water) water supply. The relevant hydraulic loadings resulting from the use of non-reticulated water supply in residences with 3, 4 and 5 bedrooms have been provided in Table 9, below.

Table 9 - Hydraulic Loading (Tank Water)

Residence	Maximum Number People in Residence	Hydraulic Loading per Person (L/day)	Total Hydraulic Loading (L/day)
3-bedroom	5	115	575
4-bedroom	6	115	690
5-bedroom	8	115	920

7.5.2 Dispersal Area Calculation Methods

Four methods were used to calculate the required dispersal areas. They were:

- Nitrogen Loading Method
- Phosphorus Loading Method
- Nominated Area Method
- Evapotranspiration/Absorption Trench Sizing Method

Each method uses different physical and chemical site characteristics to determine the required effluent dispersal area. The most suitable dispersal area sizing method will be determined with consideration to site specific limitations. Typically the method that produces the largest area is selected to enable the most effective on-site dispersal of effluent. Each of the above methods is described below in Table 10.

Table 10 – Methodologies Used for Calculating Required Effluent Dispersal Areas

Method	Description
Nitrogen Loading Method	Calculations are based upon treated effluent with a total nitrogen content of 30mg/L and 20mg/L, and an average maximum vegetation uptake rate of 25mg/m^2/day. The average maximum uptake rate for the vegetation is based on the ability of the vegetation to use the nutrient before it passes through the root zone.
Phosphorus Loading Methods	Calculations are based upon treated effluent with a total phosphorus content of 12mg/L and 8mg/L, and an average maximum vegetation uptake rate of 3mg/m^2/day. The phosphorus absorption capacity of the soil is also used to calculate the required area with the soil absorption rate based on the ability of the soil to bind the phosphorus and prevent it being washed through the soil profile (where it can become a source of pollution).
Nominated Area Method	Uses a combination of regional climatic records, design loading rate (ie effluent volume) and the design irrigation rate (ie soil percolation rate) to determine, using a water balance, the minimum required surface irrigation dispersal area that will not require wet weather storage.
Evapotranspiration/ Absorption Trench	Uses a combination of regional climatic records, weekly effluent volume and the long-term acceptance rate to determine the minimum required dispersal area given a nominated trench depth and storage void ratio.

7.5.3 Dispersal Areas

The rate at which hydraulic load of the treated effluent can be applied to an area is the Design Loading Rate. The Design Loading Rate cannot exceed the Long Term Acceptance Rate or Design Irrigation Rate of the soil. The Design Irrigation Rate is a function of the soil type, soil permeability, and other environmental factors such as evaporation and transpiration (if applicable) and ability for the plants or soil to absorb or bind the nutrients.

The applicable Design Irrigation Rates used in the calculation of the required effluent dispersal areas are set out in Table 11, below, and are based on the rates provided in AS 1547 Table 5.5.

Table 11 – Design Irrigation Rates

	Spray Irrigation and LPED (mm/day)	ETA (mm/day)
Zone 1	2.5	8
Zone 2 & 3	2.5	5

The resultant minimum Total Irrigation Areas calculated by each of the 4 methods, using the Hydraulic Loadings in Table 9 and the Design Irrigation Rates in Table 11 are summarised in Table 12, below. The appropriate minimum dispersal area for the type of dispersal system/method in each Zone on the site is shown in **bold** numbers in Table 12.

Table 12 - Calculated Total Irrigation Areas (m^2)

3 Bed using Tankwater	Spray Irrigation or LPED			ETA
	Nominated Area Method	Nitrogen (30 or 20 mg/l)	Phosphorus (12 or 8 mg/l)	
Zone 1 – 3	590	**690** / 460	577 / 385	
Zone 1				**85**
Zone 2 & 3				**145**
4 Bed using Tankwater	Nominated Area Method	Nitrogen (30 or 20 mg/l)	Phosphorus (12 or 8 mg/l)	ETA
Zone 1 – 3	710	**828** / 552	692 / 461	
Zone 1				**100**
Zone 2 & 3				**175**
5 Bed using Tankwater	Nominated Area Method	Nitrogen (30 or 20 mg/l)	Phosphorus (12 or 8 mg/l)	ETA
Zone 1 – 3	945	**1104** / 736	807 / 538	
Zone 1				**135**
Zone 2 & 3				**230**

7.6 Treatment Systems and Effluent Disposal Recommendations

It is recommended that all proposed lots use an Aerated Wastewater Treatment System to treat domestic wastewater.

It is also recommended that all lots, less than 5000m^2 in area, incorporate a method of nutrient removal prior to dispersal of the treated effluent to underground trenches or mounds.

The recommended dispersal method for each lot size and each Zone is summarised in Table 13 below:

Table 13 – Recommended Dispersal Methods

	2,000m^2 lot area*	5,000m^2 lot area
Zone 1	Evapotranspiration Absorption Trench (ETA)**	Subsurface Irrigation Using Low Pressure Effluent Distribution (LPED)
Zone 2	Mound	
Zone 3	Evapotranspiration Absorption Trench (ETA)	

* Nutrient removal is required to be undertaken prior to on-site dispersal of treated effluent.

** A raised ETA or mound could be used where it is considered that high ground water levels could be encountered.

Detailed design of on-site effluent management systems (including treatment systems, nutrient removal, dispersal method), should be undertaken following further more detailed site investigation and assessment of the proposed development.

7.7 Siting Considerations

Siting of the effluent dispersal areas relative to other site features must be considered as part of the detailed design process. The setback distances shown in Table 14, below, are considered to be acceptable guidelines for preliminary design purposes. Appropriate setback distances should be further reviewed in the detailed design phase.

Table 14 – Guidelines for Setback Distances

Site Feature	Horizontal Setback Distance Range (m)
Property Boundary	1.5 - 50 (subject to surface slopes)
Buildings/Houses	3 - > 6
Surface Water	15 - 100
Bore, Well	15 - 50

Recreational Areas	3 - 15
Swimming Pools	3 - 15
In-Ground Water Tank	4 - 15
Retaining Wall and Embankments/Cuttings	3
	Vertical Separation Distance Range (m)
Groundwater	0.6 - > 1.5
Hardpan or Bedrock	0.5 - > 1.5

7.8 Drainage

The surface of the dispersal areas should be graded to prevent effluent ponding on or running off the dispersal area. A raised soil berm should be provided down slope from the dispersal area to intercept any rainfall runoff from the dispersal area and encourage it to filter through the soil.

An uphill diversion drain should be constructed to protect the dispersal area from surface run off from upslope areas.

Upslope subsurface seepage should be intercepted and diverted away from the dispersal area by a subsoil drain.

7.9 Installation

The installation of the selected/designed treatment system is to be performed by a qualified agent of the manufacturer or experienced contractor, under the supervision of the system designer.

7.10 Vegetation

The effluent dispersal areas must to be vegetated in accordance with designer/manufacturer' specifications before effluent is applied. The vegetation can include grasses, shrubs and trees.

Vegetation should be regularly mowed and pruned to maintain the rate of evapotranspiration. Clippings and weeds removed from the dispersal area should be disposed of away from the

area to avoid increased nutrient loads on the irrigation area. Likewise, clippings and other vegetation should not be disposed of on the dispersal areas.

Setback (buffer) zones within the property (Table 14, above) adjacent to the dispersal areas should also be planted with suitable vegetation.

7.11 System Maintenance

The treatment and dispersal systems should be regularly serviced checked to ensure that they are operating correctly. Signs of failure include: odour; surface ponding; effluent run off; erosion; leaching of the soil; poor vegetation growth including burnt vegetation or the formation of surface crusts.

8 Preliminary Contaminated Site Assessment

8.1 Introduction

The purpose of the investigation was to identify whether historical site uses and associated activities have caused contamination of soils.

A Preliminary Contaminated Site Investigation is a collection and examination of information derived from records of the site, site inspections, limited sampling and chemical testing where the initial site assessment indicates that soil contaminating activities could have occurred.

The collection and examination of information pertaining to the prior use of the site, is to determine whether the site had previously or currently has potentially contaminating land uses, identify the probable contaminants and the possible location of the contaminants.

It is usual practise to undertake a limited sampling and testing program as part of a preliminary investigation where potentially contaminating activities have been identified a review of the historical usage of the site and a visual inspection of the current development on the properties.

A description of the expected scope of a Preliminary Investigation is set out in "*Managing Land Contamination- Planning Guideline SEPP 55 – Remediation of Land, Cl 3.5.2 Stage 1 – Preliminary Investigation*".

3.5.2 Stage 1—Preliminary Investigation

The preliminary investigation contains a detailed appraisal of the site's history and a report based on a visual site inspection and assessment. It is important that all relevant information about the site is assessed to determine the potential for site contamination.

Where contaminating activities are suspected to have had an impact on the land, sampling and analysis will be required to confirm and support any conclusion reached from the site history appraisal. Through the assessment of sampling results, an assessment of contamination can be established.

A preliminary investigation is an important step in deciding whether a more detailed investigation is needed. Where the results of a preliminary sampling program demonstrate the potential for, or the existence of contamination, a detailed investigation should be undertaken; not necessarily immediately after the preliminary investigation but before the new use commences. Where the preliminary investigation shows a history of non-contaminating activities at a site and, in the absence of other contrary evidence, there will be no need for further investigation.

Issues to consider

- *Is the information about the site's history adequate:*
  - *are the descriptions of activities on the site detailed enough to identify a use listed in Table 1?*
  - *are there any big gaps in the history that might hide a use listed in Table 1?*
  - *are the sources reliable?*
  - *is the information verifiable?*
- *Does the information conform with the relevant EPA guidelines?*
- *If contamination or a contaminating activity, whether previous or existing, is* ***confirmed should the proponent conduct a detailed investigation to further*** *define the extent and degree of contamination?*
- *If the site history suggests that the site is unlikely to be contaminated but there are gaps in the history and Table 1 uses were permissible under the zoning during those periods, is limited site sampling needed to confirm the site is not contaminated? Consult a site auditor if necessary.*
- *Does this site pose a significant threat to human health or the environment? If so, refer to the CLM Act in relation to duty to notify the EPA.*
- *Is a site audit of the preliminary investigation necessary? See section 3.6.1. If there is sufficient information to satisfy the planning authority that the site is suitable for the proposed use, the planning process should proceed in the normal way.*

8.2 Scope of Investigation

The scope of the work for this investigation included:

- A review of available information held by relevant state and local authorities, as well as present and past landholders. This review included (but was not limited to):
    - Ownership history- (not based on an IPO title search);
    - Zoning history;
    - Development history;
    - Contaminated Land Record and POEO Licensing Searches;
    - Local site knowledge; and
- A comprehensive site (walkover) inspection;
- A review of available published information regarding site conditions, e.g. geology sheets, soil maps and notes etc.; and
- Incorporation of these findings into a report.

Guidance considered during the preparation of this report included:

- "Guidelines for Consultants Reporting on Contaminated Sites", NSW Office of Environment & Heritage, 2003;
- "Managing Land Contamination" Planning Guideline SEPP 55 – Remediation of Land.

8.3 Site History

8.3.1 Department of Environment and Climate Change

8.3.1.1 Contaminated Land record

A search of the Department of Environment and Climate Change's "Contaminated Land Record" did not identify the subject site as being recorded on the Contaminated Land Record.

8.3.1.2 Protection of the Environment Operations Act Public Register

A search of the Department of Environment and Climate Change's "Protection of the Environment Operations Act Public register" did not identify any licences, applications or notices for the subject site.

8.3.2 Historical Usage

8.3.2.1 Personal Interviews

Personal interviews were undertaken with current owners. Details of possible contaminating activities undertaken on the site, based on personal interviews is summarised below.

8.3.2.2 Dr Roger Meischke

Dr & Mrs Meischke have owned Lot 7 & part Lot 8 DP1025196 & Lot 4 DP881346 since 1979. Dr & Mrs Meischke were also the owners of Lot 1, DP 840631, from 1979 to 1994. Lot 1 DP 840631 was sold to Mr Omar Jabal in 1994.

Dr & Mrs Meishke have operated the property for sheep grazing with limited fodder cropping. There have been no broad acre crops cultivated since approximately 1998, as a result of the extended period of drought affecting the area.

There are no sheep dips located on the property.

There have been no herbicide or pesticide chemicals applied to the property whilst owned by Dr & MrsMeischke.

8.3.2.3 Mr Omar Jabal

Mr Jabal purchased Lot 1 DP 840631 from Dr & Mrs Meischke in 1994 and has subsequently operated the lot as a market garden. The market garden produces 2 crops of zucchinis each summer growing period (October to April) and lies fallow during winter. Zucchinis are fast growing and are not affected by pests.

Proprietary fertilizer is applied to the crops (Campbell's Rustica Plus) as well as chicken manure and lime.

"Roundup" (glyphosate) is used along the boundary fence line to control weeds.

8.4 Site Inspection

Site inspections were undertaken on 13 October and 14 December 2012 to visually assess and identify any potential indicators of contamination that may present within the site. The site was traversed on foot and inspected for the following:

- Areas of discoloured soil, polluted water, odours, and affected plant growth;
- The presence of stockpiled material, imported soil or fill material;
- Location of all visible features including foundations, tanks, pits, wells and bores;

- Chemical storage and transfer areas, including the presence of waste or chemical containers;
- The direction of surface water runoff from the site;
- Adjacent land use(s); and
- Any differences between existing conditions and the information obtained during the site history review.

Based on the available site history information and observations made during the site inspection, the potential for gross contamination due to past and present site activities is considered to be very low to negligible.

8.5 Preliminary Sampling and Analysis Program

As a result of the desktop assessment, site history and site inspection, a Preliminary Sampling and Analysis Program was undertaken on the site around the perimeter of Lot 1, DP 840631 in order to establish if any unidentified chemicals have been transported by wind drift onto the subject site.

The topsoil from testpits TP1, TP2, TP3, TP6 and TP9 were selectively analysed for:

- Organochlorine Pesticides;
- Organophosphorous Pesticides;
- Triazines;
- Synthetic Pyrethroids;
- Acid Herbicides

Laboratory testing was undertaken by MGT LabMark at their NATA registered laboratory in Oakleigh, Victoria. The test results reports are attached. The laboratory test results have been summarised in Table 5, in section 5.2, above.

A targeted sampling and testing program has been undertaken on the above property in order to determine if there are any residual pesticides or herbicides present that could be considered to represent a hazard to the ongoing use of the property.

There were no measurable results obtained for any of the contaminants in any of the tested soil samples.

It is our opinion that no further investigations are warranted and no remedial action is required.

9 Conclusions

The results of the geotechnical assessment confirm that the site is suitable for future residential development, subject to appropriate investigation, design and construction.

Development of the site should address the issues identified above, namely:-

- The management and removal of nutrients from treated effluent prior to on-site dispersal;
- Stabilisation and reshaping of the erosion gully, and
- Implementation of standard erosion and sediment control measures during construction activities.

The above matters are considered to be readily addressed by standard investigation, design and construction methods.

It is recommended that further investigations be undertaken to enable more detailed design of the development including:-

- Determination of suitable building envelopes and on-site effluent dispersal areas on each lot;
- Site Classification for each lot in accordance with AS2870-2011, for footing design purposes;
- Earthworks procedures and specifications;
- Pavement thickness design for new access roads.

The above investigations could be undertaken concurrently and would involve subsurface investigation, in situ and laboratory testing of soil samples and engineering analysis.

Yours faithfully
Barker Harle

Rob Barker

FIE Aust,
CPEng
NPER 322333
RPEQ 1963,
RBP EC24316

References

1 Environment & Health Protection Guidelines "On-Site Sewage Management for Single Households": NSW EPA; NSW Health: Land & Water Conservation; Dept of Local Government; Dept of Urban Affairs and Planning, 1998

2 AS/NZS 1547-2012 *On-site domestic-wastewater management*

3 'Site Investigations for Urban Salinity" Dept of Infrastructure Planning and Natural Resources, 2002

4 AS 2870-2011 *Residential slabs and footings*

5 "Managing Land Contamination" Planning Guideline SEPP 55 – Remediation of Land, 1998

6 "Guidelines for Consultants Reporting on Contaminated Sites", NSW Office of Environment & Heritage, 2011

7 "Review of Coliforms As Microbial Indicators of Drinking Water Quality" National Health and Medical Research Council, 2003

barker harle
consulting engineers

www.barkerharle.com.au

Yass | Sydney | Gosford | Newcastle

t: (02) 6226 1222 e: admin@barkerharle.com.au p: PO Box 645 Yass NSW 2582

Barker Harle is a division of Water Agents Pty Ltd ABN 76 126 306 689

civil structural geotechnical environmental

Attachments

1 Drawing 2916/1

*NOTE:
EXTENT OF VULNERABLE GROUND WATER
PLOTTED FROM YASS VALLEY COUNCIL L.E.P. 2012
"Natural Resources Water Map" - Sheet NRW_015

CONTOUR PLAN PROVIDED BY 'CAPITAL SURVEY'

NORTH

FAITHFULL STREET

SUTTON ROAD

ZONE 1

ZONE 2

ZONE 3

7
DP1025196
2.002ha

4
DP881346
4000@

GW 062165 BORE

5
DP1002259

8
DP1025196
77.66ha

1
DP840631

1
DP857918

TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14

*APPROX. EXTENT OF VULNERABLE GROUND WATER

40m BUFFER EROSION GULLY

LIMIT OF SURVEY

GRAZING LAND

100°33'50" 345.77
10°26'10" 3.88
100°06'10" 433.19
100°58'10" 491.39
190°33'50" 80
10°33'50" 80
100°33'50" 60
12°16'30" 80.62
278°16'40" 240.39
8°16'40" 162.88
98°16'40" 147.97
7°16'20" 202.35
7°16'20" 28.44
99°37'40" 100.06
279°37'40" 440.9
190°58'30" 619.66
280°09'30" 930.83

LEGEND
TP1 - TESTPIT LOCATION
- INTERMITTENT DRAINAGE PATH
- AREA OF VULNERABLE GROUND WATER
- CONTOUR LINES - 0.5m INTERVALS
② - PHOTOGRAPH LOCATION AND DIRECTION

40m BUFFER ON EACH SIDE OF GULLY ℄

0 100 200 300

SITE PLAN

ISSUE	DATE	DESCRIPTION	DESIGN	DRAWN
A	28.01.13	REPORT ISSUE	RB	JF

barker harle
consulting engineers

Suite 1
8 Glover Drive, Yass
PO Box 645, Yass 2582

Tel : (02) 6226 1222
Mob : 0414 584 133

website : www.barkerharle.com.au

SITE PLAN
PROPOSED RE-ZONING
Cnr SUTTON RD & FAITHFULL ST, GUNDAROO
DR R. & MRS M. MEISCHKE

Drawing: 2916
Sheet: 1
Issue: A
Original Sheet Size: A3

Attachments

2 Engineering Logs

ENGINEERING LOG

barker harle
consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP1
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency / Rel. Density (VS S F St VSt H / Fb VL L M D VD)	Moisture (D SM M W)	Plasticity	Structure and Additional Comments
0.00–0.25			B			BROWN TOPSOIL LOAM				
0.25–0.60			B			RED SANDY CLAY LOAM				
0.60–1.50			B			MOTTLED YELLOW/GREY SANDY CLAY LOAM				
1.50						TERMINATED IN ABOVE				

Depth scale: 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25, 2.50, 3.00

Key

Water
seeping
free standing

Plasticity
NP Non Plastic
T Trace
VL Very Low
L Low
M Medium
H High
VH Very High
EH Extra High

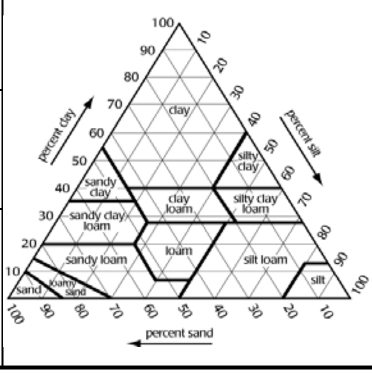
Moisture
D dry
SM slightly moist
M moist
W wet

Sampling Data
U50 undisturbed sample 50mm diameter
D disturbed sample
NC cone penetrometer
B bulk sample

Consistency / Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP2
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Drilling Information			Sampling Data			Profile Description				Structure and Additional Comments
Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency / Rel. Density (VS Fb VL S L F M St VSt D H VD)	Moisture (D SM M W)	Plasticity	
0.25			B			DARK GREY TOPSOIL/SILTY CLAY				
0.50			B			YELLOW w/ORANGE MOTTLE SILTY CLAY, VERY FEW GRAVEL INCLUSIONS TO 6mm				
0.75										
1.00			B			ORANGE SILTY CLAY, FEW GRAVEL INCLUSIONS TO 20mm				
1.25										
1.50										
1.75						TERMINATED IN ABOVE				
2.00										
2.25										
2.50										
3.00										

Key

Water

seeping

free standing

Plasticity

NP	Non Plastic
T	Trace
VL	Very Low
L	Low
M	Medium
H	High
VH	Very High
EH	Extra High

Moisture

D	dry
SM	slightly moist
M	moist
W	wet

Sampling Data

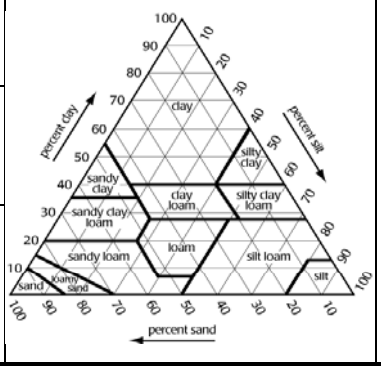
U50	undisturbed sample 50mm diameter
D	disturbed sample
NC	cone penetrometer
B	bulk sample

Consistency

Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle
consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP3
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency / Rel. Density (VS Fb, S VL, F L, St M, VSt D, H VD)	Moisture (D, SM, M, W)	Plasticity	Structure and Additional Comments
0.00–0.25			B			GREY/BROWN TOPSOIL	S	M		
0.25–0.45			B			RED SILTY CLAY	S	M		
0.45–0.75			B			BROWN SANDY CLAY, FEW GRAVEL INCLUSIONS TO 6mm	S–F	SM–M		
0.75–1.55			B			YELLOW SILTY CLAY WITH RED MOTTLE	F	SM		
1.55						TERMINATED IN ABOVE				

Depth scale: 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25, 2.50, 3.00

Key

Water
- seeping
- free standing

Moisture
- D dry
- SM slightly moist
- M moist
- W wet

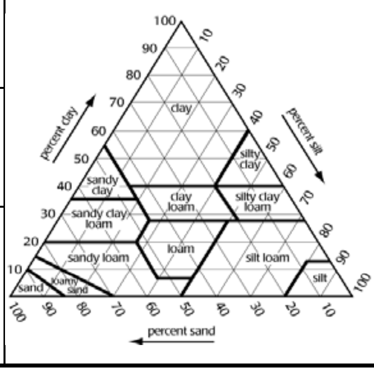
Sampling Data
- U50 undisturbed sample 50mm diameter
- D disturbed sample
- NC cone penetrometer
- B bulk sample

Plasticity
- NP Non Plastic
- T Trace
- VL Very Low
- L Low
- M Medium
- H High
- VH Very High
- EH Extra High

Consistency / Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle
consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP4
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Drilling Information			Sampling Data			Profile Description					Structure and Additional Comments
Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency Rel. Density (VS Fb, S VL, F L, St M, VSt D, H VD)	Moisture (D, SM, M, W)	Plasticity		
0.25			B			BROWN LOAM					
			B			RED SANDY CLAY LOAM					
0.50 – 1.50			B			MOTTLED YELLOW/GREY FOR 200mm THEN BECOMING GREY SILTY CLAY					
1.75						TERMINATED IN ABOVE					

Depth scale: 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25, 2.50, 3.00

Key

Water
seeping
free standing

Plasticity
NP Non Plastic
T Trace
VL Very Low
L Low
M Medium
H High
VH Very High
EH Extra High

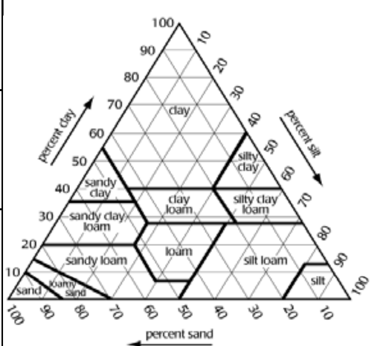
Moisture
D dry
SM slightly moist
M moist
W wet

Sampling Data
U50 undisturbed sample 50mm diameter
D disturbed sample
NC cone penetrometer
B bulk sample

Consistency
Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP5
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency / Rel. Density (VS S F St VSt H / Fb VL L M D VD)	Moisture (D SM M W)	Plasticity	Structure and Additional Comments
0.00–0.20			B			BROWN CLAY LOAM - TOPSOIL	VS–S	D–SM		
0.20–0.50			B			YELLOW SANDY CLAY	S	SM / M		
0.50–0.95			B			MOTTLED YELLOW/GREY SANDY CLAY	S / F	M		
0.95–1.50			B			RED SANDY CLAY WITH GREY MOTTLES	F / St	SM / D–SM		
1.50						TERMINATED IN ABOVE				

Depth scale: 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25, 2.50, 3.00

Key

Water
seeping
free standing

Plasticity
NP Non Plastic
T Trace
VL Very Low
L Low
M Medium
H High
VH Very High
EH Extra High

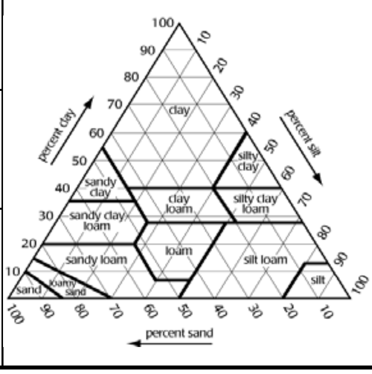
Moisture
D dry
SM slightly moist
M moist
W wet

Sampling Data
U50 undisturbed sample 50mm diameter
D disturbed sample
NC cone penetrometer
B bulk sample

Consistency
Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP6
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Drilling Information			Sampling Data			Profile Description														Structure and Additional Comments
Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency Rel. Density								Moisture				Plasticity	
							VS	Fb	VL	L	M	D	VD	H	D	SM	M	W		
0.25			B			DARK GREY LOAM TOPSOIL		S												
0.50		▽	B			YELLOW SANDY CLAY WITH RED/GREY MOTTLE FEW GRAVEL INCLUSIONS TO 20mm		S	F											WATER IN GRAVEL @ BASE OF LAYER
0.75								S	F											
1.00		▽	B			MOTTLED YELLOW/GREY SANDY CLAY		S	F		St	D					M	W		LEVEL OF FREEWATER AFTER 2.5 HOURS
1.25								S	F		St	D					M	W		
1.50								S	F		St	D					M	W		
1.75						TERMINATED IN ABOVE														
2.00																				
2.25																				
2.50																				
3.00																				

Key

Water

seeping

free standing

Plasticity

NP	Non Plastic
T	Trace
VL	Very Low
L	Low
M	Medium
H	High
VH	Very High
EH	Extra High

Moisture

D	dry
SM	slightly moist
M	moist
W	wet

Sampling Data

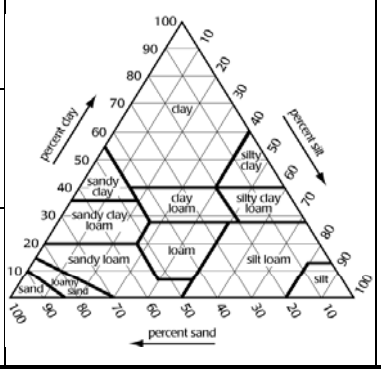
U50	undisturbed sample 50mm diameter
D	disturbed sample
NC	cone penetrometer
B	bulk sample

Consistency

Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle
consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP7
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency / Rel. Density (VS S F St VSt H / Fb VL L M D VD)	Moisture (D SM M W)	Plasticity	Structure and Additional Comments
0.00–0.10			B			DARK BROWN LOAM - TOPSOIL				
0.10–0.30			B			BROWN CLAY LOAM				
0.30–1.00		▽ (approx. 0.65)	B			RED BROWN SANDY CLAY				WATER ENTRY
1.00–1.50		▽ (approx. 1.35)	B			MOTTLED YELLOW/GREY CLAY				LEVEL OF FREEWATER AFTER 5 HOURS
1.50						TERMINATED IN ABOVE				

Depth scale: 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25, 2.50, 3.00

Key

Water
- seeping
- free standing

Moisture
- D dry
- SM slightly moist
- M moist
- W wet

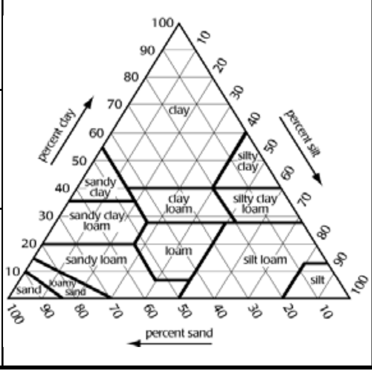
Sampling Data
- U50 undisturbed sample 50mm diameter
- D disturbed sample
- NC cone penetrometer
- B bulk sample

Plasticity
- NP Non Plastic
- T Trace
- VL Very Low
- L Low
- M Medium
- H High
- VH Very High
- EH Extra High

Consistency / Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP8
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency / Rel. Density (VS Fb, S VL, F L, St M, VSt D, H VD)	Moisture (D, SM, M, W)	Plasticity	Structure and Additional Comments
			B			BROWN LOAM -TOPSOIL				
						GREY LOAM				
0.25			B			GREY SANDY CLAY WITH YELLOW MOTTLE				
0.50										
0.75			B			YELLOW SANDY CLAY WITH GREY & ORANGE MOTTLE				
1.00										
1.25						YELLOW/GREY SHALE - TOTALLY WEATHERED				
						TERMINATED IN ABOVE				
1.50										
1.75										
2.00										
2.25										
2.50										
3.00										

Key

Water

- seeping
- free standing

Plasticity

NP	Non Plastic
T	Trace
VL	Very Low
L	Low
M	Medium
H	High
VH	Very High
EH	Extra High

Moisture

D	dry
SM	slightly moist
M	moist
W	wet

Sampling Data

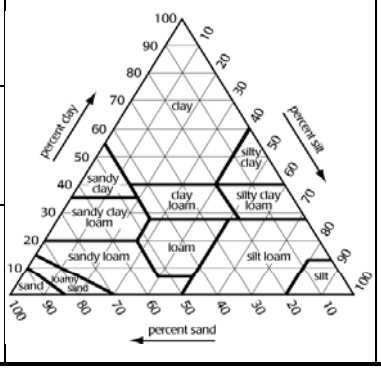
U50	undisturbed sample 50mm diameter
D	disturbed sample
NC	cone penetrometer
B	bulk sample

Consistency

Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP9
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Drilling Information			Sampling Data			Profile Description			Structure and Additional Comments
Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency / Rel. Density (VS Fb VL S F L St M VSt D H VD)	Moisture (D SM M W)	Plasticity
0.25			B			BROWN LOAM - TOPSOIL			
			B			RED SILTY CLAY			
0.50									
			B			YELLOW SANDY CLAY			
0.75									
1.00									
						MOTTLED YELLOW/GREY SANDY CLAY, MANY GRAVEL INCLUSIONS TO 20mm			
1.25			B						
1.50									
1.75						TERMINATED IN ABOVE			
2.00									
2.25									
2.50									
3.00									

Key

Water

seeping

free standing

Plasticity

NP	Non Plastic
T	Trace
VL	Very Low
L	Low
M	Medium
H	High
VH	Very High
EH	Extra High

Moisture

D	dry
SM	slightly moist
M	moist
W	wet

Sampling Data

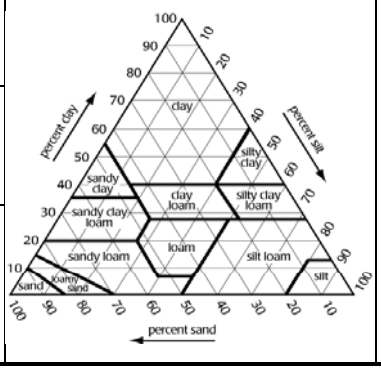
U50	undisturbed sample 50mm diameter
D	disturbed sample
NC	cone penetrometer
B	bulk sample

Consistency

Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP10
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency / Rel. Density (VS Fb VL S F L St M VSt D H VD)	Moisture (D SM M W)	Plasticity	Structure and Additional Comments
0.25			B			BROWN SILTY CLAY LOAM - TOPSOIL				
0.50			B			LIGHT BROWN SILTY CLAY LOAM				
0.75						MOTTLED YELLOW/CREAM SANDY CLAY VERY FEW GRAVEL INCLUSIONS TO 5mm				
1.00			B							
1.25										
1.50						TERMINATED IN ABOVE				
1.75										
2.00										
2.25										
2.50										
3.00										

Key

Water

- seeping
- free standing

Plasticity

NP	Non Plastic
T	Trace
VL	Very Low
L	Low
M	Medium
H	High
VH	Very High
EH	Extra High

Moisture

D	dry
SM	slightly moist
M	moist
W	wet

Sampling Data

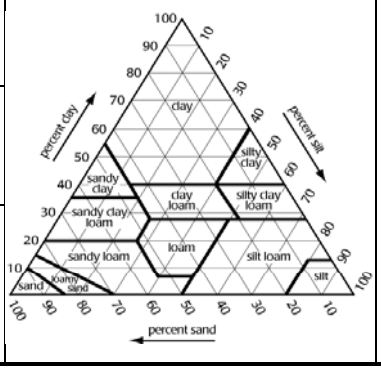
U50	undisturbed sample 50mm diameter
D	disturbed sample
NC	cone penetrometer
B	bulk sample

Consistency

Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP11
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Drilling Information			Sampling Data			Profile Description			Structure and Additional Comments
Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency / Rel. Density (VS Fb VL S F L St M VSt D H VD)	Moisture (D SM M W)	Plasticity
0			B			BROWN LOAM - TOPSOIL			
0.25			B			RED SANDY LOAM			
0.50									
0.75									
1.00			B			MOTTLED YELLOW/GREY FEW GRAVEL INCLUSIONS TO 20mm			
1.25									
1.50						TERMINATED IN ABOVE			
1.75									
2.00									
2.25									
2.50									
3.00									

Key

Water

- seeping
- free standing

Plasticity

NP	Non Plastic
T	Trace
VL	Very Low
L	Low
M	Medium
H	High
VH	Very High
EH	Extra High

Moisture

D	dry
SM	slightly moist
M	moist
W	wet

Sampling Data

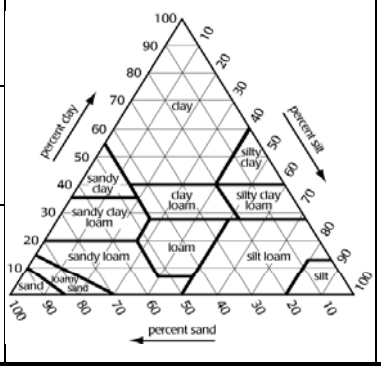
U50	undisturbed sample 50mm diameter
D	disturbed sample
NC	cone penetrometer
B	bulk sample

Consistency

Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP12
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Drilling Information			Sampling Data			Profile Description				Structure and Additional Comments
Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency Rel. Density (VS Fb, S VL, F L, St M, VSt D, H VD)	Moisture (D, SM, M, W)	Plasticity	
			B			BROWN LOAM TOPSOIL				
0.25			B			LIGHT GREY SILTY LOAM				
0.50										
0.75			B			YELLOW SILTY CLAY WITH ORANGE MOTTLE				
1.00										
1.25			B			YELLOW SANDY CLAY WITH ORANGE/WHITE MOTTLE COMMON GRAVEL INCLUSIONS TO 50mm				
1.50						TERMINATED IN ABOVE				
1.75										
2.00										
2.25										
2.50										
3.00										

Key

Water
seeping
free standing

Plasticity
NP Non Plastic
T Trace
VL Very Low
L Low
M Medium
H High
VH Very High
EH Extra High

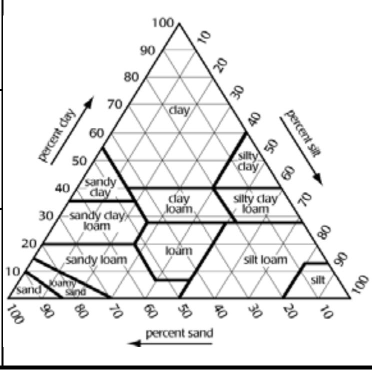
Moisture
D dry
SM slightly moist
M moist
W wet

Sampling Data
U50 undisturbed sample 50mm diameter
D disturbed sample
NC cone penetrometer
B bulk sample

Consistency / Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle
consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP13
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency / Rel. Density (VS Fb, S VL, F L, St M, VSt D, H VD)	Moisture (D, SM, M, W)	Plasticity	Structure and Additional Comments
0.00–0.25			B			DARK BROWN LOAM TOPSOIL	S	M		
0.25–0.50			B			RED SANDY CLAY, VERY FEW COBBLE INCLUSIONS TO 200mm	S	SM		
0.50–1.25			B			YELLOW SILTY CLAY WITH ORANGE/WHITE MOTTLE , MANY COBBLE INCLUSIONS TO 200mm	F	SM (0.50–0.80), D–SM (0.80–1.25)		REFUSAL
1.25						TERMINATED IN ABOVE				

Depth scale: 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25, 2.50, 3.00

Key

Water
seeping
free standing

Moisture
D dry
SM slightly moist
M moist
W wet

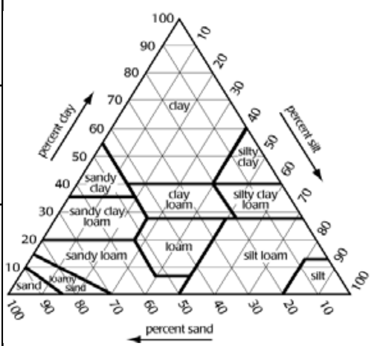
Sampling Data
U50 undisturbed sample 50mm diameter
D disturbed sample
NC cone penetrometer
B bulk sample

Plasticity
NP Non Plastic
T Trace
VL Very Low
L Low
M Medium
H High
VH Very High
EH Extra High

Consistency / Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

ENGINEERING LOG

barker harle consulting engineers

Location:	FAITHFULL STREET, GUNDAROO	**Testpit No:**	TP14
Client:	R & M MEISCHKE	**Equipment:**	BOBCAT E50
Position:	SEE SITE PLAN	**Job No:**	2916
Surface RL:	EXISTING	**Logged By:**	RB
Groundwater:	NIL ENCOUNTERED	**Date:**	13.10.12

Drilling Information			Sampling Data			Profile Description			Structure and Additional Comments
Depth in metres	Progress	Water	Sample type	Graphic Log	USC	Material/Strata	Consistency / Rel. Density (VS Fb, S VL, F L, St M, VSt D, H VD)	Moisture (D, SM, M, W)	Plasticity
			B			LIGHT BROWN LOAM TOPSOIL			
0.25									
0.50						ORANGE SANDY CLAY			
0.75			B						
1.00									
1.25						MOTTLED YELLOW/CREAM SILTY CLAY, MANY GRAVEL INCLUSIONS TO 200mm			
1.50									
1.75						TERMINATED IN ABOVE			
2.00									
2.25									
2.50									
3.00									

Key

Water

- seeping
- free standing

Plasticity

NP	Non Plastic
T	Trace
VL	Very Low
L	Low
M	Medium
H	High
VH	Very High
EH	Extra High

Moisture

D	dry
SM	slightly moist
M	moist
W	wet

Sampling Data

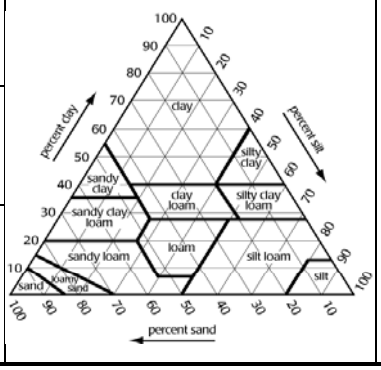
U50	undisturbed sample 50mm diameter
D	disturbed sample
NC	cone penetrometer
B	bulk sample

Consistency

Relative Density

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	M	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

Textural Classification Diagram



Site Plan N.T.S / Comments

Attachments

3 Laboratory Test Results

NSW GOVERNMENT | Soil Conservation Service

SOIL TEST REPORT

Scone Research Centre

REPORT NO:	SCO12/369R1
REPORT TO:	R Barker Barker Harle PO Box 63 Warners Bay NSW 2282
REPORT ON:	Two soil samples Ref: 2916
PRELIMINARY RESULTS ISSUED:	Not issued
REPORT STATUS:	Final
DATE REPORTED:	2 November 2012
METHODS:	Information on test procedures can be obtained from Scone Research Centre

TESTING CARRIED OUT ON SAMPLE AS RECEIVED

SR Young
(Laboratory Manager)

SOIL CONSERVATION SERVICE
Scone Research Centre

Report No: SCO12/369R1
Client Reference: R Barker
Barker Harle
PO Box 63
Warners Bay NSW 2282

Lab No	Method	C1A/4	C2A/3	C2B/3	C5A/4 CEC & exchangeable cations (me/100g)						C8B/1		P9B/2
	Sample Id	EC (dS/m)	pH	pH ($CaCl_2$)	CEC	Na	K	Ca	Mg	Al	P sorp (mg/kg)	P sorp index	EAT
1	TP1 600-1500	0.02	7.7	6.2	12.5	1.0	0.2	4.8	5.7	nt	292	2.4	2(2)
2	TP2 0-450	<0.01	5.2	4.2	4.0	0.2	<0.1	1.4	0.7	<0.1	258	2.2	3(1)
3	TP4 300-500	<0.01	6.9	5.6	16.5	0.6	<0.1	4.9	9.1	<0.1	672	4.5	5
4	TP5 0-200	0.01	5.3	4.5	4.2	0.2	0.1	2.0	1.2	0.3	261	2.3	3(1)
5	TP5 500-900	0.37	9.1	8.2	31.9	4.7	0.3	7.7	18.0	nt	458	3.2	2(3)
6	TP7 100-300	0.01	5.2	4.2	1.9	0.1	0.4	0.8	0.6	<0.1	219	2.0	3(1)
7	TP9 0-250	0.01	5.1	4.0	2.0	<0.1	0.4	0.9	0.6	0.3	243	2.2	3(1)
8	TP12 0-200	0.02	4.8	3.9	4.1	0.1	0.3	0.8	0.6	1.0	329	2.6	3(1)
9	TP12 300-1250	0.08	8.6	7.0	12.9	1.9	0.2	2.5	8.4	nt	471	3.3	2(1)

nt = not tested

END OF TEST REPORT

mgt LabMark
ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Barker Harle
216 Macquarie Rd
Warners Bay
NSW 2282

Attention:Mark Sasaki

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Report	**363751-S**
Client Reference	2916
Received Date	Dec 18, 2012

Client Sample ID			**TP1 (0-250)**	**TP2 (0-450)**	**TP3 (0-250)**	**TP6 (0-250)**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
mgt-LabMark Sample No.			**M12-De15557**	**M12-De15558**	**M12-De15559**	**M12-De15560**
Date Sampled			**Dec 13, 2012**	**Dec 13, 2012**	**Dec 13, 2012**	**Dec 13, 2012**
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
4.4'-DDD	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4'-DDE	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4'-DDT	0.05	mg/kg	-	< 0.05	-	< 0.05
a-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
b-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Chlordane	0.1	mg/kg	-	< 0.1	-	< 0.1
d-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan I	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	< 0.05	-	< 0.05
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	-	< 0.05
Methoxychlor	0.05	mg/kg	-	< 0.05	-	< 0.05
Toxaphene	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	102	-	113
Tetrachloro-m-xylene (surr.)	1	%	-	98	-	103
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	< 0.2
Demeton-O	0.2	mg/kg	-	< 0.2	-	< 0.2
Diazinon	0.2	mg/kg	-	< 0.2	-	< 0.2
Dichlorvos	0.2	mg/kg	-	< 0.2	-	< 0.2
Disulfoton	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethion	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethoprop	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenitrothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fensulfothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenthion	0.2	mg/kg	-	< 0.2	-	< 0.2
Merphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Methyl azinphos	0.2	mg/kg	-	< 0.2	-	< 0.2

mgt LabMark
ENVIRONMENTAL LABORATORIES

Client Sample ID			TP1 (0-250)	TP2 (0-450)	TP3 (0-250)	TP6 (0-250)
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			M12-De15557	M12-De15558	M12-De15559	M12-De15560
Date Sampled			Dec 13, 2012	Dec 13, 2012	Dec 13, 2012	Dec 13, 2012
Test/Reference	LOR	Unit				
Organophosphorous Pesticides						
Methyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
Mevinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Naled	0.5	mg/kg	-	< 0.5	-	< 0.5
Phorate	0.2	mg/kg	-	< 0.2	-	< 0.2
Ronnel	0.2	mg/kg	-	< 0.2	-	< 0.2
Tokuthion	0.2	mg/kg	-	< 0.2	-	< 0.2
Trichloronate	0.2	mg/kg	-	< 0.2	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	112	-	96
Triazines						
Ametryn	0.2	mg/kg	-	-	-	< 0.2
Atraton	0.2	mg/kg	-	-	-	< 0.2
Atrazine	0.2	mg/kg	-	-	-	< 0.2
Prometon	0.2	mg/kg	-	-	-	< 0.2
Prometryn	0.2	mg/kg	-	-	-	< 0.2
Propazine	0.2	mg/kg	-	-	-	< 0.2
Simazine	0.2	mg/kg	-	-	-	< 0.2
Simetryn	0.2	mg/kg	-	-	-	< 0.2
Terbuthylazine	0.2	mg/kg	-	-	-	< 0.2
Terbutryne	0.2	mg/kg	-	-	-	< 0.2
Synthetic Pyrethroids*						
Allethrin	2	mg/kg	-	< 2	< 2	< 2
Cyfluthrin	2	mg/kg	-	< 2	< 2	< 2
Cypermethrin (total)	2	mg/kg	-	< 2	< 2	< 2
Fenvalerate	2	mg/kg	-	< 2	< 2	< 2
Permethrin	2	mg/kg	-	< 2	< 2	< 2
Phenothrin	2	mg/kg	-	< 2	< 2	< 2
Resmethrin	2	mg/kg	-	< 2	< 2	< 2
Tetramethrin	2	mg/kg	-	< 2	< 2	< 2
Acid Herbicides						
2.4-D	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-DB	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-T	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-TP	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Actril (loxynil)	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dicamba	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorprop	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dinitro-o-cresol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dinoseb	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
MCPA	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
MCPB	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Mecoprop	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Warfarin (surr.)	1	%	104	98	97	95
% Moisture	0.1	%	20	13	13	16

Client Sample ID			TP9 (0-250)
Sample Matrix			Soil
mgt-LabMark Sample No.			M12-De15561
Date Sampled			Dec 13, 2012
Test/Reference	LOR	Unit	
Organochlorine Pesticides			
4.4'-DDD	0.05	mg/kg	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05
a-BHC	0.05	mg/kg	< 0.05
Aldrin	0.05	mg/kg	< 0.05
b-BHC	0.05	mg/kg	< 0.05
Chlordane	0.1	mg/kg	< 0.1
d-BHC	0.05	mg/kg	< 0.05
Dieldrin	0.05	mg/kg	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05
Endrin	0.05	mg/kg	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05
Heptachlor	0.05	mg/kg	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05
Toxaphene	0.1	mg/kg	< 0.1
Dibutylchlorendate (surr.)	1	%	145
Tetrachloro-m-xylene (surr.)	1	%	127
Organophosphorous Pesticides			
Bolstar	0.2	mg/kg	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2
Demeton-O	0.2	mg/kg	< 0.2
Diazinon	0.2	mg/kg	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2
Disulfoton	0.2	mg/kg	< 0.2
Ethion	0.2	mg/kg	< 0.2
Ethoprop	0.2	mg/kg	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2
Fenthion	0.2	mg/kg	< 0.2
Merphos	0.2	mg/kg	< 0.2
Methyl azinphos	0.2	mg/kg	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2
Mevinphos	0.2	mg/kg	< 0.2
Naled	0.5	mg/kg	< 0.5
Phorate	0.2	mg/kg	< 0.2
Ronnel	0.2	mg/kg	< 0.2
Tokuthion	0.2	mg/kg	< 0.2
Trichloronate	0.2	mg/kg	< 0.2
Triphenylphosphate (surr.)	1	%	106
Synthetic Pyrethroids*			
Allethrin	2	mg/kg	< 2
Cyfluthrin	2	mg/kg	< 2

Client Sample ID			TP9 (0-250)
Sample Matrix			Soil
mgt-LabMark Sample No.			M12-De15561
Date Sampled			Dec 13, 2012
Test/Reference	LOR	Unit	
Synthetic Pyrethroids*			
Cypermethrin (total)	2	mg/kg	< 2
Fenvalerate	2	mg/kg	< 2
Permethrin	2	mg/kg	< 2
Phenothrin	2	mg/kg	< 2
Resmethrin	2	mg/kg	< 2
Tetramethrin	2	mg/kg	< 2
Acid Herbicides			
2.4-D	0.5	mg/kg	< 0.5
2.4-DB	0.5	mg/kg	< 0.5
2.4.5-T	0.5	mg/kg	< 0.5
2.4.5-TP	0.5	mg/kg	< 0.5
Actril (loxynil)	0.5	mg/kg	< 0.5
Dicamba	0.5	mg/kg	< 0.5
Dichlorprop	0.5	mg/kg	< 0.5
Dinitro-o-cresol	0.5	mg/kg	< 0.5
Dinoseb	0.5	mg/kg	< 0.5
MCPA	0.5	mg/kg	< 0.5
MCPB	0.5	mg/kg	< 0.5
Mecoprop	0.5	mg/kg	< 0.5
Warfarin (surr.)	1	%	95
% Moisture	0.1	%	13

mgt-LabMark Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environment Protection Authority
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC was performed on samples not pertaining to this report, however QC is representative of the sequence or batch that client samples were analysed within

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

Attachments

4 Groundwater Chemical Analysis

Basic Potability Report

Drinking and Household Use

ECOWISE Environmental
PO Box 1834
Fyshwick ACT 2609
Telephone 02 6270 7650
Facsimile 02 6270 7608

ATTN: Roger Meischke
Dr Roger Meischke
Strathallan
Gundaroo NSW 2620
fax

Job Name : XMEISHKE_20738

Customer Reference No. : n/a
This report covers samples collected from Potability tests Skinner & Meischke

Results in this report are a basic assessment for potable water use. This assessment does not declare the water as 'fit for purpose'. Tests performed are as agreed upon sample submission. This report compares results with the Australian Drinking Water Guidelines (ADWG) 1996.

Explanation of ADWG Guideline Value

Arsenic	< 7 ug/L based on health considerations
Colilert E.Coli	0 MPN/100 mL (**main faecal contamination indicator**), sometimes reported as Fa**ecal Coliforms**
Colilert Total	0 MPN/100 mL (bacteria **disinfection** indicator), sometimes reported as Total Coliforms
Copper	< 1000 ug/L based on staining of fittings, < 2000 ug/L based on health (plumbing possible source).
Fluoride	< 1.5 mg/L based on dental fluorosis, > 4 can cause skeletal fluorosis
Nitrates	< 50 mg/L (as N) based on methaemoglobinaemia risk to infants, upto 100 mg/L for adults and chlidren over 3 months.
pH	< 6.5 may be corrosive. > 8.5 may cause scale and taste problems. Values up to 9.2 may be tolerated in new concrete tanks. < 4 or > 11 may effect health but no health guideline set.
Pl Count	<100 cfu/1 mL disinfected supply, <500 undisinfected supply (general bacterial measure)
Sodium	<180 mg/L based on taste
Sulphates	< 250 mg/L based on taste, > 500 mg/L can have purgative effects
T.Diss Salt (c)	< 500 mg/L good taste. 500 - 1000 acceptable taste. >1000 scaling, corrosion, unacceptable taste.
Total Hardness	< 200 mg/L based on scaling, > 500 severe scaling (caused by calcium and magnesium)
Total Iron	< 0.3 mg/L based on taste, high concentrations stain laundry and fittings
Total Lead	< 10 ug/L based on health considerations (plumbing possible source)
Total Manganese	< 100 ug/L based on taste, < 500 based on health considerations
Total Zinc	< 3000 ug/L based on taste (plumbing possible source).
Unit Conversion	1 mg/L = 1000 ug/L

Sample %850508 **Desc.** Meischke **Sample Date 17-Aug-11**

Client Desc. B

LEVEL ID shows if guideline is health or aesthetics based.
FAIL indicates result is outside or near ADWQ guideline value.

TEST	NAME	RESULT	UNITS	LEVEL	PASS / FAIL
Chloride	Chloride	210	mg/L	AESTHETIC	Pass
Coliforms (Colilert)	E.Coli	<1	MPN/100mL	HEALTH	Pass
Coliforms (Colilert)	Total	210	MPN/100mL	HEALTH	-Fail
Diss. Sodium	Diss_Na	210	mg/L	AESTHETIC	-Fail
Fluoride	Fluoride	0.6	mg/L	HEALTH	Pass
Nitrate	Nitrate	0.4	mg/L N	HEALTH	Pass
pH	pH	7.2	pH units	AESTHETIC	Pass
Sulphate	Sulphate	660	mg/L SO4	AESTHETIC	-Fail
Sulphate	Sulphate	660	mg/L SO4	HEALTH	-Fail
T.Diss Salt (c)	TDS	1500.0	mg/L	AESTHETIC	-Fail
Total Arsenic	Total_As	1	ug/L	HEALTH	Pass
Total Hardness	Total	690	mg/L	AESTHETIC	-Fail
Total Iron	Total_Fe	0.37	mg/L	AESTHETIC	-Fail
Total Manganese	Total_Mn	0.11	mg/L	AESTHETIC	-Fail
Total Manganese	Total_Mn	0.11	mg/L	HEALTH	Pass

for Manager Scientific Services
22/10/2012

Environmental Division (Water Resources Group)

Certificate of Analysis

Batch No:	**XMEISHKE_20738**	*Page*	Page 1 of 2
Final Report:	XMEISHKE_20738_KHK6	*Laboratory*	Canberra Laboratory
		Address	PO Box 1834, Fyshwick, Canberra. ACT 2609.
Client:	**Dr Roger Meischke**	*Phone*	02 6202 5409
Contact:	**Roger Meischke**	*Fax*	02 6202 5452
Address:	Strathallan Gundaroo NSW 2620	*Contact:*	Shane Reynolds Supervisor Chemistry shane.reynolds@alsglobal.com
Client Ref:	**Potability tests Skinner & Meischke**	*Date Sampled:*	17-Aug-2011
		Date Issued:	**30-Aug-2011**
Client PO:	n/a	*Date Samples Received:*	17-Aug-2011
		Date Testing Commenced:	17-Aug-2011

The sample(s) referred to in this report were analysed by the following method(s):
- NATA accreditation does not cover the performance of this service

Analysis	*Method*	*Laboratory*	*NATA No.*	*Analysis*	*Method*	*Laboratory*	*NATA No.*	*Analysis*	*Method*	*Laboratory*	*NATA No.*
Chloride	35	CANBERRA	992	**Fluoride**	35	CANBERRA	992	**Nitrate**	35	CANBERRA	992
Sulphate	35	CANBERRA	992	**Coliforms (Colilert)**	640	CANBERRA	992	**Conductivity**	65	CANBERRA	992
T.Diss Salt (c)	261	CANBERRA	992	**pH**	210	CANBERRA	992	**Diss. Calcium**	120	CANBERRA	992
Diss. Magnesium	120	CANBERRA	992	**Diss. Sodium**	120	CANBERRA	992	**Sodium Adsorp.R**	253	CANBERRA	992
Total Arsenic	121	CANBERRA	992	**Total Hardness**	105	CANBERRA	992	**Total Iron**	120	CANBERRA	992
Total Manganese	120	CANBERRA	992								

Temperature on receipt at Lab: 11.5

NATA No. 992

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

These results have been electronically signed by the authorised signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11

Name	*Title*	*Name*	*Title*
Don Sirimanne	Metals	Martin Radic	Supervisor Microbiology
Shane Reynolds	Supervisor Chemistry	Titus Vimalasiri	Supervisor Metals

Batch No: XMEISHKE_20738

Report Number: XMEISHKE_20738_KHK6

Client: Dr Roger Meischke

Client Ref: Potability tests Skinner & Meischke

				Sample No.	850507	850508
				Client Sample ID.	Skinner A	Meischke B
				Sample Point.	BORE	BORE
				Sample Date.	17-Aug-2011 9:00:00AM	17-Aug-2011 9:00:00AM
Analysis	**Analyte**	**LOR**	**Units**			
Chloride	Chloride	<0.1	mg/L		140	210
Coliforms (Colilert)	Total	<1	MPN/100mL		<1	210
	E.Coli	<1	MPN/100mL		<1	<1
Conductivity	SpC	<2	uS/cm		2200	2200
Diss. Calcium	Diss_Ca	<0.05	mg/L		120	82
Diss. Magnesium	Diss_Mg	<0.05	mg/L		120	120
Diss. Sodium	Diss_Na	<0.1	mg/L		200	210
Fluoride	Fluoride	<0.1	mg/L		0.2	0.6
Nitrate	Nitrate	<0.1	mg/L N		2.8	0.4
pH	pH	<0.1	pH units		7.2	7.2
Sodium Adsorp.R	Ratio	N/A			3.090	3.460
Sulphate	Sulphate	<0.4	mg/L SO4		600	660
T.Diss Salt (c)	TDS	<2	mg/L		1500.0	1500.0
Total Arsenic	Total_As	<1	ug/L		2	1
Total Hardness	Total	<0.1	mg/L		800	690
Total Iron	Total_Fe	<0.02	mg/L		0.10	0.37
Total Manganese	Total_Mn	<0.001	mg/L		0.027	0.11

These samples were analysed as received into the Laboratory.
Tests marked # are not NATA accredited.
A blank space indicates no test performed. A 'P' indicates results are pending authorisation
Soil results expressed in mg/kg dry weight unless specified otherwise
LOR = Limit of reporting. When a reported LOR is higher than the standard LOR, this may due to high moisture content, insufficient sample or matrix interference.
The analytical procedures in this report (including house methods) are developed from internationally recognised procedures such as those published by USEPA, APHA and NEPM
Results listed as Total Metals are actually Total Recoverable Metals

LABORATORY TEST REPORT

ECOWISE Environmental
PO Box 1834 Fyshwick,ACT 2609
ABN 68 074 205 780

Telephone 02 6270 7650
Facsimile 02 6270 7608

To: **Dr Roger Meishke Pty Lyd**
Strathallan
Gundaroo NSW
ATTN: Roger Meishke

Job Name: XMEISHKE_07912
File No:

Sample Date: **29-AUG-2004**

Customer Reference No:

This report details results of samples collected from **Bore / Tank**

Method (LOP)	Test	Units	Sample	413028
			Site	BORE
			Desc	Bore Water
			Time	17:00
			Ext.ID	
210.06	pH	pH units		7.0
91.03	Fluoride	mg/L		0.82
35.05	Chloride	mg/L		230
35.05	Sulphate	mg/L SO4		760
35.05	Nitrate	mg/L N		<0.2
65.08	Sp.Conductance	uS/cm		2200
261.02	T.Diss Salt (c)	mg/L		1500.0
120.06	Total Iron	mg/L		0.72
120.06	Total Manganese	mg/L		0.60
120.06	Diss Calcium	mg/L		90
120.06	Diss Magnesium	mg/L		130
120.06	Diss Sodium	mg/L		210
121.03	Total Arsenic	ug/L		2
105.03	Total Hardness	mg/L		760.1
253.02	Sodium Adsorp.R			3.310
640.01	Colilert - TC & EC			
	Total	MPN/100mL		0
	E.Coli	MPN/100mL		0

END OF RESULTS

Comments:

for Manager Ecowise Environmental
3-SEP-2004

AGENJOB

Basic Potability Report

Drinking and Household Use

ECOWISE Environmental
PO Box 1834
Fyshwick ACT 2609
Telephone 02 6270 7650
Facsimile 02 6270 7608

ATTN: Roger Meishke
Dr Roger Meishke Pty Lyd

Gundaroo NSW
fax

Job Name : XMEISHKE_07912

Customer Reference No. :
This report covers samples collected from Bore / Tank

Results in this report are a basic assessment for potable water use. This assessment does not declare the water as 'fit for purpose'. Tests performed are as agreed upon sample submission. This report compares results with the Australian Drinking Water Guidelines (ADWG) 1996.

Explanation of ADWG Guideline Value

Arsenic	< 7 ug/L based on health considerations
Colilert E.Coli	0 MPN/100 mL (**main faecal contamination indicator**), sometimes reported as **Faecal Coliforms**
Colilert Total	0 MPN/100 mL (bacteria **disinfection** indicator), sometimes reported as Total Coliforms
Copper	< 1000 ug/L based on staining of fittings, < 2000 ug/L based on health (plumbing possible source).
Fluoride	< 1.5 mg/L based on dental fluorosis, > 4 can cause skeletal fluorosis
Nitrates	< 10 mg/L (as N) based on methaemoglobinaemia risk to infants
pH	< 6.5 may be corrosive. > 8.5 may cause scale and taste problems. Values up to 9.2 may be tolerated in new concrete tanks. < 4 or > 11 may effect health but no health guideline set.
PI Count	<100 cfu/1 mL disinfected supply, <500 undisinfected supply (general bacterial measure)
Sodium	<180 mg/L based on taste
Sulphates	< 250 mg/L based on taste, > 500 mg/L can have purgative effects
T.Diss Salt (c)	< 500 mg/L good taste. 500 - 1000 acceptable taste. >1000 scaling, corrosion, unacceptable taste.
Total Hardness	< 200 mg/L based on scaling, > 500 severe scaling (caused by calcium and magnesium)
Total Iron	< 0.3 mg/L based on taste, high concentrations stain laundry and fittings
Total Lead	< 10 ug/L based on health considerations (plumbing possible source)
Total Manganese	< 100 ug/L based on taste, < 500 based on health considerations
Total Zinc	< 3000 ug/L based on taste (plumbing possible source).
Unit Conversion	1 mg/L = 1000 ug/L

Sample %413028 **Desc.** Bore Water **Sample Date** 29-Aug-04

Client Desc.

LEVEL ID shows if guideline is health or aesthetics based.
FAIL indicates result is outside or near ADWQ guideline value.

TEST	NAME	RESULT	UNITS	LEVEL	PASS / FAIL
Chloride	Chloride	230	mg/L	AESTHETIC	-Fail
Colilert - TC & EC	E.Coli	0	MPN/100mL	HEALTH	Pass
Colilert - TC & EC	Total	0	MPN/100mL	HEALTH	Pass
Diss Sodium	Diss_Na	210	mg/L	AESTHETIC	-Fail
Fluoride	Fluoride	0.82	mg/L	HEALTH	Pass
Nitrate	Nitrate	<0.2	mg/L N	HEALTH	Pass
pH	pH	7.0	pH units	AESTHETIC	Pass
Sulphate	Sulphate	760	mg/L SO4	AESTHETIC	-Fail
Sulphate	Sulphate	760	mg/L SO4	HEALTH	-Fail
T.Diss Salt (c)	TDS	1500.0	mg/L	AESTHETIC	Fail
Total Arsenic	Total_As	2	ug/L	HEALTH	Pass
Total Hardness	Total	760.1	mg/L	AESTHETIC	-Fail
Total Iron	Total_Fe	0.72	mg/L	AESTHETIC	-Fail
Total Manganese	Total_Mn	0.60	mg/L	AESTHETIC	-Fail
Total Manganese	Total_Mn	0.60	mg/L	HEALTH	-Fail

for Manager Scientific Services
3/9/2004

Basic Irrigation Report

Water use for Irrigation

ECOWISE Environmental
PO Box 1834
Fyshwick ACT 2609
Telephone 02 6270 7650
Facsimile 02 6270 7608

ATTN: Roger Meishke
Dr Roger Meishke Pty Lyd

Gundaroo NSW
fax

Job Name : XMEISHKE_07912

Customer Reference No. :
This report covers samples collected from Bore / Tank

Results in this report are a basic assessment for irrigation water use. This assessment does not declare the water as 'fit for purpose'. Tests performed are as agreed upon sample submission. Guidelines for Fresh and Marine This report compares results with Australian and New Zealand Water Quality (ANZECC) 2000.
Refer to ANZECC guidelines Chapter 4 for more information **www.deh.gov.au/water/quality/nwqms/volume1.html**

Explanation of ANZECC Guideline Value

Arsenic	< 100 ug/L based on long term build up in surface soil and toxicity to standing crops.
Colilert E.Coli	**Faecal contamination indicator, also reported as Faecal Coliforms**
	if 20 % of results exceed 4 times the median levels list below then investigate
	<10 MPN/100 mL for raw human food crops in direct contact
	<1000 MPN/100 mL for raw human food crops not in direct contact
	< 100 MPN/ 100mL for pasture and fodder - see ANZECC guidelines
Chloride	<175 mg/L, sensitive crops may have lower tolerance , possible foliar injury
Copper	< 200 ug/L based on long term build up in surface soil or toxicity to standing crops.
Fluoride	< 1 mg/L based on long term build up in surface soil or toxicity to standing crops.
pH	< 6.5 may be corrosive. > 8.5 may cause fouling of pumping and watering systems
SAR	<2 for sensitive plants - indicator of soil structure degradation
Sodium	<115 mg/L , sensitive crops may have lower tolerance , possible foliar injury
Sp.Conductance	<600 uS/cm for sensitive crops, depends on soil drainage and crop. See ANZECC guideline
Total Hardness	<60 mg/L increased corrosion potential, > 350 increased fouling potential
Total Iron	< 0.2 mg/L based on long term build up in surface soil or toxicity to standing crops.
Total Lead	< 2000 ug/L based on long term build up in surface soil or toxicity to standing crops.
Total Manganese	< 200 ug/L based on long term build up in surface soil or toxicity to standing crops
Total Zinc	< 2000 ug/L based on long term build up in surface soil or toxicity to standing crops.
Unit Conversion	1 mg/L = 1000 ug/L

Sample %413028 **Desc.** Bore Water **Sample Date** 29-Aug-04

Client Desc.

LEVEL ID indicates comparison made with irrigation guidelines.
FAIL indicates result is outside or near ANZECC guideline value.

TEST	NAME	RESULT	UNITS	LEVEL	PASS / FAIL
Chloride	Chloride	230	mg/L	IRRIGATION	-Fail
Colilert - TC & EC	E.Coli	0	MPN/100mL	IRRIGATION	Pass
Diss Sodium	Diss_Na	210	mg/L	IRRIGATION	-Fail
Fluoride	Fluoride	0.82	mg/L	IRRIGATION	Pass
pH	pH	7.0	pH units	IRRIGATION	Pass
Sodium Adsorp.R	Ratio	3.310		IRRIGATION	-Fail
Sp.Conductance	SpC	2200	uS/cm	IRRIGATION	-Fail
Total Arsenic	Total_As	2	ug/L	IRRIGATION	Pass
Total Hardness	Total	760.1	mg/L	IRRIGATION	-Fail
Total Iron	Total_Fe	0.72	mg/L	IRRIGATION	-Fail
Total Manganese	Total_Mn	0.60	mg/L	IRRIGATION	-Fail

for Manager Scientific Services
3/9/2004

Basic Stock Report

Water use for Stock

ECOWISE Environmental
PO Box 1834
Fyshwick ACT 2609
Telephone 02 6270 7650
Facsimile 02 6270 7608

ATTN: Roger Meishke
Dr Roger Meishke Pty Lyd

Gundaroo NSW
fax

Job Name : XMEISHKE_07912

Customer Reference No. :
This report covers samples collected from Bore / Tank

Results in this report are a basic assessment for stock water use. This assessment does not declare the water as 'fit for purpose'. Tests performed are as agreed upon sample submission. Guidelines for Fresh and Marine This report compares results with Australian and New Zealand Water Quality (ANZECC) 2000.
Refer to ANZECC guidelines Chapter 4 for more information **www.deh.gov.au/water/quality/nwqms/volume1.html**

Explanation of ANZECC Guideline Value

Arsenic	< 500 ug/L chronic or toxic effects
Colilert E.Coli	**Faecal contamination indicator**, sometimes reported as **Faecal Coliforms** **if 20 % of results exceed 4 times the median shown below then investigate** <100 MPN/100 mL median
Copper	< 400 ug/L (sheep), <1000 (cattle), <5000 (pigs and Poultry) based on chronic or toxic effects
Diss Calcium	<1000 mg/L based on chronic or acute health problems
Fluoride	< 2 mg/L based on chronic or toxic effects
Nitrates	< 90 mg/L (as N) based on toxicity
Sulphate	<1000 mg/L based on chronic or acute health problems
T.Diss Salt (c)	<2000 mg/L (poultry), <2500 (cattle), <4000(pigs and horses), <5000 (sheep)
Total Lead	< 100 ug/L based on chronic or toxic effects
Total Zinc	< 20000 ug/L based on chronic or toxic effects.

Unit Conversion 1 mg/L = 1000 ug/L

Sample %413028 **Desc.** Bore Water **Sample Date** 29-Aug-04

Client Desc.

LEVEL ID indicates comparison made with stock guidelines.
FAIL indicates result is outside or near ANZECC guideline value.

TEST	NAME	RESULT	UNITS	LEVEL	PASS / FAIL
Colilert - TC & EC	E.Coli	0	MPN/100mL	STOCK	Pass
Diss Calcium	Diss_Ca	90	mg/L	STOCK	Pass
Fluoride	Fluoride	0.82	mg/L	STOCK	Pass
Nitrate	Nitrate	<0.2	mg/L N	STOCK	Pass
Sulphate	Sulphate	760	mg/L SO4	STOCK	Pass
T.Diss Salt (c)	TDS	1500.0	mg/L	STOCK	Pass
Total Arsenic	Total_As	2	ug/L	STOCK	Pass

for Manager Scientific Services
3/9/2004

Basic Potability Report

Drinking and Household Use

ECOWISE Environmental
PO Box 1834
Fyshwick ACT 2609
Telephone 02 6270 7650
Facsimile 02 6270 7608

Results in this report are a basic assessment for potable water use. This assessment does not declare the water is 'fit for purpose'. Tests performed are as agreed upon sample submission. This report compares results with Australian Drinking Water (ADWG) Guidelines 1996.

Explanation of ADWG Guideline Value - Extended testing

True Colour	<15 Pt-Co aesthetics, 15 just noticeable in glass, 25 acceptable if low turbidity
Turbidity	<5 NTU aesthetics, 5 just notieable in glass. (<1 desirable for dinfection)
Cyanide	<80 ug/L health related (source industrial wastes and some plats and bacteria)
Total THM	<250 ug/L, health related (chlorine disinfection byproduct)
Total Aluminium	<200 ug/L aesthetic related. Based on post flocculation probelems. Lower for rēnal dialysis
Total Mercury	< 1 ug/L based on health (possible source industrial, very low naturally)
Total Cadmium	< 2 ug/L based on health. (possible source industry, agriculture, galv. fittings, solder ,brass)
Total Chromium	< 50 ug/L based on health. (possible source industrial, agricultural, plumbing)
Total Nickel	< 20 ug/L based on health. (possible source nickel plated fittings)
Total Selenium	<10 ug/L based on health

Unit Conversion 1 mg/L = 1000 ug/L

Basic Potability Report

Drinking and Household Use

ECOWISE Environmental
PO Box 1834
Fyshwick ACT 2609
Telephone 02 6270 7650
Facsimile 02 6270 7608

Results in this report are a basic assessment for potable water use. This assessment does not declare the water as 'fit for purpose'. Tests performed are as agreed upon sample submission. This report compares results with the Australian Drinking Water Guidelines (ADWG) 1996.

Explanation of ADWG Guideline Value

Arsenic	< 7 ug/L based on health considerations
Colilert E.Coli	0 MPN/100 mL **(main faecal contamination indicator)**, sometimes reported as **Faecal Coliforms**
Colilert Total	0 MPN/100 mL (bacteria **disinfection** indicator), sometimes reported as Total Coliforms
Copper	< 1000 ug/L based on staining of fittings, < 2000 ug/L based on health (plumbing possible source).
Fluoride	< 1.5 mg/L based on dental fluorosis, > 4 can cause skeletal fluorosis
Nitrates	< 10 mg/L (as N) based on methaemoglobinaemia risk to infants
pH	< 6.5 may be corrosive. > 8.5 may cause scale and taste problems. Values up to 9.2 may be tolerated in new concrete tanks. < 4 or > 11 may effect health but no health guideline set.
Pl Count	<100 cfu/1 mL disinfected supply, <500 undisinfected supply (general bacterial measure)
Sodium	<180 mg/L based on taste
Sulphates	< 250 mg/L based on taste, > 500 mg/L can have purgative effects
T.Diss Salt (c)	< 500 mg/L good taste. 500 - 1000 acceptable taste. >1000 scaling, corrosion, unacceptable taste.
Total Hardness	< 200 mg/L based on scaling, > 500 severe scaling (caused by calcium and magnesium)
Total Iron	< 0.3 mg/L based on taste, high concentrations stain laundry and fittings
Total Lead	< 10 ug/L based on health considerations (plumbing possible source)
Total Manganese	< 100 ug/L based on taste, < 500 based on health considerations
Total Zinc	< 3000 ug/L based on taste (plumbing possible source).

Unit Conversion 1 mg/L = 1000 ug/L

Sample %364012 **Desc.** Main Admin **Sample Date** 04-Sep-03

LEVEL ID shows if guideline is health or aesthetics based.
FAIL indicates result is outside or near ADWQ guideline value.

TEST	NAME	RESULT	UNITS	LEVEL	PASS / FAIL
Chloride	Chloride	33	mg/L	AESTHETIC	Pass
Colilert - TC & EC	E.Coli	0	MPN/100mL	HEALTH	Pass
Colilert - TC & EC	Total	4	MPN/100mL	HEALTH	-Fail
Cyanide	Cyanide	<2	ug/L	HEALTH	Pass
Diss Sodium	Diss_Na	20	mg/L	AESTHETIC	Pass
Fluoride	Fluoride	0.54	mg/L	HEALTH	Pass
Nitrate	Nitrate	0.4	mg N/L	HEALTH	Pass
pH	pH	8.2	pH units	AESTHETIC	Pass
Pl Count 35C48h	Avg_Count	3700	CFU/mL	HEALTH	-Fail
Sulphate	Sulphate	5.1	mg/L SO4	AESTHETIC	Pass
Sulphate	Sulphate	5.1	mg/L SO4	HEALTH	Pass
Tot. Manganese	Total_Mn	5.9	ug/L	AESTHETIC	Pass
Tot. Manganese	Total_Mn	5.9	ug/L	HEALTH	Pass
Tot.Aluminium	Total_Al	13	ug/L	AESTHETIC	Pass
Total Arsenic	Total_As	<1	ug/L	HEALTH	Pass
Total Cadmium	Total_Cd	0.14	ug/L	HEALTH	Pass
Total Chromium	Total_Cr	<2	ug/L	HEALTH	Pass
Total Copper	Total_Cu	9	ug/L	AESTHETIC	Pass
Total Copper	Total_Cu	9	ug/L	HEALTH	Pass
Total Hardness	Total	60.9	mg/L	AESTHETIC	Pass
Total Iron	Total_Fe	0.02	mg/L	AESTHETIC	Pass
Total Lead	Total_Pb	1.2	ug/L	HEALTH	Pass

for Manager Scientific Services
3/08/2011

Total Mercury	Total_Hg	<0.1	ug/L	HEALTH	Pass
Total Nickel	Total_Ni	<1	ug/L	HEALTH	Pass
Total Selenium	Total_Se	<2	ug/L	HEALTH	Pass
Total Zinc	Total_Zn	180	ug/L	AESTHETIC	Pass
Trihalomethanes	Total_THM	4.9	ug/L	HEALTH	Pass
True Colour	True	2	CU	AESTHETIC	Pass
Turbidity	Turbidity	0.7	NTU	AESTHETIC	Pass

for Manager Scientific Services
3/08/2011

Basic Irrigation Report

Water use for Irrigation

ECOWISE Environmental
PO Box 1834
Fyshwick ACT 2609
Telephone 02 6270 7650
Facsimile 02 6270 7608

Results in this report are a basic assessment for irrigation water use. This assessment does not declare the water as 'fit for purpose'. Tests performed are as agreed upon sample submission. Guidelines for Fresh and Marine This report compares results with Australian and New Zealand Water Quality (ANZECC) 2000.
Refer to ANZECC guidelines for more information **www.affa.gov.au/nwqms**

Explanation of ANZECC Guideline Value

Arsenic	< 100 ug/L based on long term build up in surface soil and toxicity to standing crops.
Coliiert E.Coli	**Faecal contamination indicator, also reported as Faecal Coliforms** **if 20 % of results exceed 4 times the median levels list below then investigate** <10 MPN/100 mL for raw human food crops in direct contact <1000 MPN/100 mL for raw human food crops not in direct contact < 100 MPN/ 100mL for pasture and fodder - see ANZECC guidelines
Chloride	<175 mg/L, sensitive crops may have lower tolerance , possible foliar injury
Copper	< 200 ug/L based on long term build up in surface soil or toxicity to standing crops.
Fluoride	< 1 mg/L based on long term build up in surface soil or toxicity to standing crops.
pH	< 6.5 may be corrosive. > 8.5 may cause fouling of pumping and watering systems
SAR	<2 for sensitive plants - indicator of soil structure degradation
Sodium	<115 mg/L , sensitive crops may have lower tolerance , possible foliar injury
Sp.Conductance	<600 uS/cm for sensitive crops, depends on soil drainage and crop. See ANZECC guideline
Total Hardness	<60 mg/L increased corrosion potential, > 350 increased fouling potential
Total Iron	< 0.2 mg/L based on long term build up in surface soil or toxicity to standing crops.
Total Lead	< 2000 ug/L based on long term build up in surface soil or toxicity to standing crops.
Total Manganese	< 200 ug/L based on long term build up in surface soil or toxicity to standing crops.
Total Zinc	< 2000 ug/L based on long term build up in surface soil or toxicity to standing crops.

Unit Conversion 1 mg/L = 1000 ug/L

Sample %364012 **Desc.** Main Admin **Sample Date** 04-Sep-03

LEVEL ID indicates comparison made with irrigation guidelines.
FAIL indicates result is outside or near ANZECC guideline value.

TEST	NAME	RESULT	UNITS	LEVEL	PASS / FAIL
Chloride	Chloride	33	mg/L	IRRIGATION	Pass
Colilert - TC & EC	E.Coli	0	MPN/100mL	IRRIGATION	Pass
Diss Sodium	Diss_Na	20	mg/L	IRRIGATION	Pass
Fluoride	Fluoride	0.54	mg/L	IRRIGATION	Pass
pH	pH	8.2	pH units	IRRIGATION	Pass
Sp.Conductance	SpC	220	uS/cm	IRRIGATION	Pass
Tot. Manganese	Total_Mn	5.9	ug/L	IRRIGATION	Pass
Total Arsenic	Total_As	<1	ug/L	IRRIGATION	Pass
Total Copper	Total_Cu	9	ug/L	IRRIGATION	Pass
Total Hardness	Total	60.9	mg/L	IRRIGATION	Pass
Total Iron	Total_Fe	0.02	mg/L	IRRIGATION	Pass
Total Lead	Total_Pb	1.2	ug/L	IRRIGATION	Pass
Total Zinc	Total_Zn	180	ug/L	IRRIGATION	Pass

for Manager Scientific Services
3/08/2011

Basic Stock Report

Water use for Stock

ECOWISE Environmental
PO Box 1834
Fyshwick ACT 2609
Telephone 02 6270 7650
Facsimile 02 6270 7608

Results in this report are a basic assessment for stock water use. This assessment does not declare the water as 'fit for purpose'. Tests performed are as agreed upon sample submission. Guidelines for Fresh and Marine This report compares results with Australian and New Zealand Water Quality (ANZECC) 2000. Refer to ANZECC guidelines for more information **www.affa.gov.au/nwqms**

Explanation of ANZECC Guideline Value

Arsenic	< 500 ug/L chronic or toxic effects
Colilert E.Coli	**Faecal contamination indicator**, sometimes reported as **Faecal Coliforms** **if 20 % of results exceed 4 times the median shown below then investigate** <100 MPN/100 mL median
Copper	< 400 ug/L (sheep), <1000 (cattle), <5000 (pigs and Poultry) based on chronic or toxic effects
Diss Calcium	<1000 mg/L based on chronic or acute health problems
Fluoride	< 2 mg/L based on chronic or toxic effects
Nitrates	< 90 mg/L (as N) based on toxicity
Sulphate	<1000 mg/L based on chronic or acute health problems
T.Diss Salt (c)	<2000 mg/L (poultry), <2500 (cattle), <4000(pigs and horses), <5000 (sheep)
Total Lead	< 100 ug/L based on chronic or toxic effects
Total Zinc	< 20000 ug/L based on chronic or toxic effects.

Unit Conversion 1 mg/L = 1000 ug/L

Sample %364012 **Desc.** Main Admin **Sample Date** 04-Sep-03

LEVEL ID indicates comparison made with stock guidelines.
FAIL indicates result is outside or near ANZECC guideline value.

TEST	NAME	RESULT	UNITS	LEVEL	PASS / FAIL
Colilert - TC & EC	E.Coli	0	MPN/100mL	STOCK	Pass
Diss Calcium	Diss_Ca	13	mg/L	STOCK	Pass
Fluoride	Fluoride	0.54	mg/L	STOCK	Pass
Nitrate	Nitrate	0.4	mg N/L	STOCK	Pass
Sulphate	Sulphate	5.1	mg/L SO4	STOCK	Pass
Total Arsenic	Total_As	<1	ug/L	STOCK	Pass
Total Copper	Total_Cu	9	ug/L	STOCK	Pass
Total Lead	Total_Pb	1.2	ug/L	STOCK	Pass
Total Zinc	Total_Zn	180	ug/L	STOCK	Pass

for Manager Scientific Services
3/08/2011

Basic Potability Report

Drinking and Household Use

ECOWISE Environmental
PO Box 1834
Fyshwick ACT 2609
Telephone 02 6270 7650
Facsimile 02 6270 7608

Results in this report are a basic assessment for potable water use. This assessment does not declare the water is 'fit for purpose'. Tests performed are as agreed upon sample submission. This report compares results with Australian Drinking Water (ADWG) Guidelines 1996.

Explanation of ADWG Guideline Value - Extended testing

True Colour	<15 Pt-Co aesthetics, 15 just noticeable in glass, 25 acceptable if low turbidity
Turbidity	<5 NTU aesthetics, 5 just notieable in glass. (<1 desirable for dinfection)
Cyanide	<80 ug/L health related (source industrial wastes and some plats and bacteria)
Total THM	<250 ug/L, health related (chlorine disinfection byproduct)
Total Aluminium	<200 ug/L aesthetic related. Based on post flocculation probelems. Lower for renal dialysis
Total Mercury	< 1 ug/L based on health (possible source industrial, very low naturally)
Total Cadmium	< 2 ug/L based on health. (possible source industry, agriculture, galv. fittings, solder ,brass)
Total Chromium	< 50 ug/L based on health. (possible source industrial, agricultural, plumbing)
Total Nickel	< 20 ug/L based on health. (possible source nickel plated fittings)
Total Selenium	<10 ug/L based on health

Unit Conversion 1 mg/L = 1000 ug/L

Attachments

5 General Notes

General Notes

Introduction

These notes are supplied with all geotechnical reports from **Barker Harle** and therefore may contain information not necessarily relevant to this report.

The purpose of the report is set out in the introduction section of this report. It should not be used by any other party, or for any other purpose, as it may not contain adequate or appropriate information in these events.

Engineering Reports

Barker Harle engineering reports are prepared by qualified personnel and are based on information obtained, and on modern engineering standards of interpretation and analysis of that information. Where the report has been prepared for a specific design proposal the information and interpretation may not be relevant if the design proposal is changed. If the design proposal or construction methods do change, **Barker Harle** request that it be notified and will be pleased to review the report and the sufficiency of the investigation work.

Geotechnical reports are based on information gained from limited subsurface test boring and sampling, supplemented by knowledge of local geology and experience. For this reason, the report must be regarded as interpretative, rather than a factual document, limited, to some extent, by the scope of information on which it relies.

Barker Harle *cannot accept responsibility for problems which may develop if it is not consulted after factors considered in the report's development have changed.*

Every care is taken with the report as it relates to interpretation of subsurface condition, discussion of geotechnical aspects and recommendations or suggestions for design and construction. However, **Barker Harle** cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions – the potential for this will depend partly on bore spacing and sampling frequency.
- The actions of contractors responding to commercial pressures.

If these occur, **Barker Harle** will be pleased to assist with investigation or advice to resolve the matter.

A Geotechnical Engineering Report May Be Subject To Misinterpretation

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid these problems, **Barker Harle** should be retained to review the adequacy of plans and specifications relative to geotechnical issues.

Engineering Logs Should Not Be Separated From The Engineering Report.

Final engineering logs are developed by the Geotechnical Engineer based upon interpretation of field logs and laboratory evaluation of field samples. Only final engineering logs are included in geotechnical engineering reports. To minimize the likelihood of engineering log misinterpretation, *give contractors ready access to the complete geotechnical engineering report*.

Site Inspection

Barker Harle will always be pleased to provide inspection services for geotechnical aspects of work to which this report is related. This could range from a site visit, to full time engineering presence on site.

Change In Conditions

Subsurface conditions may be modified by constantly changing natural forces. Because a geotechnical engineering report is based on conditions, which existed at the time of subsurface exploration, *construction decisions should not be based on a geotechnical engineering report whose adequacy may have been affected by time*.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations may also affect subsurface conditions and thus, the continuing adequacy of a geotechnical report. **Barker Harle** should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, **Barker Harle** requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed during construction, than at some later stage, well after the event.

Ground Water

Unless otherwise indicated the water levels given on the engineering logs are levels of free water or seepage in the test hole recorded at the given time of measuring. This may not accurately represent actual ground water levels, due to one or more of the following:

- In low permeability soils, ground water although present may enter the hole slowly, or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent prior weather changes. They may not be the same at the time of construction as indicated at the time of investigation.

Accurate confirmation of levels can only be made by appropriate instrumentation techniques and monitoring programs.

General Notes – Continued

Foundation Depth

Where referred to in the report, the recommended depth of any foundation, (piles, caissons, footings etc) is an engineering estimate of the depth to which they should be constructed. The estimate is influenced and perhaps limited by the fieldwork method and testing carried out in connection with the site investigation, and other pertinent information as has been made available. The depth remains, however, an estimate and therefore liable to variation. Foundation drawings, designs and specifications based upon this report should provide for variations in the final depth depending upon the ground conditions at each point of support.

Engineering Logs

Engineering logs presented in the report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable, or possible to justify economically. In any case, the boreholes or test pits represent only a very small sample of the subsurface profile.

Interpretation of information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling and the possibility of other than straight line variations between the test locations.

Drilling Methods

The following is a summary of drilling methods currently used by **Barker Harle**, and some comments on their use and application.

Continuous Sample Drilling: The soil sample is obtained by screwing a 75 or 100mm auger into the ground and withdrawing it periodically to remove the soil. This is the most reliable method of drilling in soils as the moisture content is unchanged and soil structure, strength, appearance etc. is only partially affected.

Test Pits: These are excavated using a backhoe or tracked excavator, allowing close examination of insitu soil if it is safe to descend into the pit. The depth of digging is limited to about 3 metres for a backhoe, and about 5 metres for an excavator. A potential disadvantage is the disturbance of the site caused by the excavation.

Hand Auger: The soil sample is obtained by screwing a 75mm Auger into the ground. This method is usually restricted to approximately 1.5 to 2 metres in depth, and the soil structure and strength is significantly disturbed.

Continuous Spiral Flight Augers: The soil sample is obtained by using a 90 – 115mm diameter continuous spiral flight auger which is withdrawn at intervals to allow sampling or insitu testing. This is a relatively economical means of drilling in clays, and in sands above the water table. Samples, returned to the surface, are very disturbed and may be contaminated. Information from the drilling is of relatively lower reliability. SPT's or undisturbed sampling may be combined with this method of drilling for reasonably satisfactory sampling.

Hand Penetrometers

Hand Penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and recording the number of blows for successive 50mm increments of penetration.

Two, relatively similar tests are used:

1. Perth Sand Penetrometer (AS 1289.5.3.3) – A 16mm flat ended rod is driven with a 9kg hammer, dropping 600mm. This test was developed for testing the density of sands and is mainly used in granular soils and loose fill.

2. Cone Penetrometer/Scala Penetrometer (AS 1289.5.3.2) – A 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm. The test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio (CBR) have been published by various road authorities.

Sampling

Sampling is carried out during drilling to allow engineering examination, and laboratory testing of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending on the amount of disturbance during drilling, some information on strength and structure.

Undisturbed samples are taken by pushing a think walled sample tube into the soils and withdrawing this with a sample of soil in a relatively undisturbed state contained inside. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils. Details of the type and method of sampling are given in the report.

Laboratory Testing

Laboratory testing is carried out in accordance with Australian Standard 1289 series, Methods of Testing Soils for Engineering Purposes. Details of the test procedure used are given on the individual report forms.

Attachments

6 Useful Background Information

Useful Background Information

Introduction

Historically the poor performance or failure of up to 82% of on-site effluent disposal systems and a number of recent serious public health threats, has been a major cause for concern. In an attempt to address these problems the Australian Standards AS-1547 “Disposal systems for effluent from domestic premises” and the NSW Governments “On-site sewage management for single households” guidelines set out the requirements for testing soil characteristics and disposal area size calculation methods to ensure that the on-site disposal of effluent will be safe and effective. The capacity of the soil to receive and absorb the quantities of the effluent and the quality of the soil for plant growth play a major role in the determination of the size of the disposal area. Plants remove nutrients and help to transpire excess water, therefore optimum plant growth is essential for the successful operation of a disposal area. Set out below is a brief explanation of the key soil characteristics and nutrients that are assessed as part of the effluent disposal investigation process.

Soil Tests

pH

This test determines whether the soils is acid, neutral or alkaline. pH is measured on a scale from 0 to 14 with 7 being neutral. Below 7 is acid and above 7 is alkaline. The further away from 7 in either direction, the stronger the pH. For land application of effluent a pH between 6 and 8 should pose no constraints. Soil pH affects the solubility and fixation of some nutrients in soils. This in turn reduces plant growth. By correcting the pH, plant growth can be increased, which aids the absorption of the nutrients and transpiration of the effluent. Most soils are acidic. Excessive acidity may be reduced by applying an annual dose of line, reducing the pH towards neutral.

Emerson Aggregate Test

The Emerson aggregate test, assesses the dispersiveness of the soil. If the soil is prone to dispersiveness, it poses a limitation to on-site disposal of effluent because of the potential loss of soil structure when effluent is applied. If soil structure is degraded, soil permeability will reduce, and hence reduce the rate of absorption of effluent into the soil. This will lead to failure of the disposal system. The test produces a value from 1 to 8 and any reading above 3 is considered adequate. If a soil is dispersive, there is no remedy, other than to move the disposal area or greatly increase its size.

Electrical Conductivity

The measure of electrical conductivity indicates the level of salts in the soil. A high electrical conductivity is undesirable for vegetation growth. Any reading below 4 ds/m is considered acceptable. If a site has a high EC, two strategies can be taken. The first will help to reduce the EC. This involves drenching the site with fresh water to wash out the salts. This is only effective for permeability soils. The second strategy involves working with the salts by planting salt tolerant plants.

Cation Exchange Capacity

The cation exchange capacity (CEC) of a soil, is a measure of the soils ability to readily absorb cations (positively charged molecules). Because some soils have a negative charge, they can absorb cations. Soils bind cations such as calcium, magnesium, potassium, and sodium, preventing them from being leached out of the soil by water, but keeps them available in the soil as plant nutrients. It is recommended that for land application, the soil should have a CEC greater than 15 cmol+/kg. If the CEC is below 15 cmol+/kg, organic matter (humus/compost) can be applied to increase the CEC.

Exchangeable Sodium Percentage

Exchangeable sodium percentage is a measure of the exchangeable sodium cations in the soil. If this figure is too high it can lead to the degradation of the soil structure and increase the potential for soil erosion. The exchangeable sodium percentage is considered too high when it exceeds 5%. The exchangeable sodium percentage can be reduced by applying an annual dose of gypsum, which is a calcium based mineral.

Nutrients

Phosphorus Sorption Capacity

Phosphorus sorption capacity, is a measure of the ability of the soil to absorb phosphorus. Phosphorus is a nutrient, and is one of the limiting factors when it comes to land application of effluent. For a site to operate properly, it must be able to absorb all phosphorus within the effluent. Phosphorus is immobilized by being bound to the soil particles. A very small percentage of the bound phosphorus is taken up by vegetation.

Nitrogen Loading

Nitrogen is a nutrient, and frequently the limiting factor in the land application of effluent. Nitrogen is absorbed by plants. Therefore it is the capability of the plants to remove nitrogen from effluent that governs the disposal area size and rate of application. To facilitate the process of nitrogen removal, it is critical that the effluent be kept in the root zone of the soil, where the nitrogen is accessible to the plants. This is allowed for in the increased area required for effluent disposal.

Attachments

7 Land Application Areas

Land Application Areas

Irrigation Areas

Siting of surface irrigation areas

Surface irrigation areas shall be in a location away from regular pedestrian traffic and recreation areas, so that there is no risk of direct spray or wind-driven spray onto such areas. Effluent shall not be used for irrigation of fruit or vegetables.

Preparation of irrigation area

When a proposed irrigation area has low permeability, it is particularly important to ensure that the permeability of the soils in the irrigation area is improved and maintained and that there is adequate cover of porous and fertile topsoil (see AS 2223) to act as immediate storage for effluent applied to it, and to support the rapid growth of vegetation on the area to maximize evapotranspiration.

It may be necessary to import topsoil, but the possibility of improvement of the natural topsoil layer should not be overlooked. A vigorous plant root system will also lead to an improvement in soil structure and consequently to an increase in permeability. However reliance upon a vigorous plant root system to provide an improvement in permeability is a long term achievement and therefore soil improvement by other means is essential.

Requirements for irrigation systems

All irrigation pipework and fittings shall comply with all parts of AS1477 or AS2698.2. The distribution irrigation lines shall have a minimum depth of cover of 100mm.

There shall be no cross-connection between any irrigation pipework and a potable water supply.

Standard household hose taps and garden fittings shall not be used.

Along the boundary of the surface irrigation area there shall be at least two warning signs clearly visible to inform the occupants of the premises that recycled water is used for irrigation. Each sign shall comply with AS 1319 and have:

Lettering visible at 3m, and wording:

- Recycled water
- Avoid contact
- Do not drink

At the time of commencing to use the system, the warning sign and the landscaping or that surface preparation, or both, of the system must be completed.

Vegetation Suitable for Wet Soils

This section sets out suitable vegetation for growing in wet soils, eg. on evapotranspiration beds and areas.

Types of Vegetation

Climbers	
Bougainvilea	Kennedia
Hardenbergia	Lonicera japonica
Hibbertia scandens	Pandorea jasminoides

Grasses	
Buffalo	Kikuyu

Ground Cover	
Acanthus mollis	Liriope muscari
Coprosmo x kirki	Ophiopogon
Grevillea poorinda	Royal Mantle

Perennials	
Agapanthus preacox	Gazania x hybrida
Astor novi-belgii	Salvia x superba
Canna x generalis	Stokesia laevis
Chrysanthemum maximum	Viola hederacea

Shrubs	
Abelia x grandiflora	Correa alba
Euphorbia pulcherrima	Hebe speciosa
Cotoneaster glaucophyllus	Jasminum mesnyi
Cassia bicapsularis	Ceratostigma
Jasminum polyanthum	Callistemon citrinus
Chaenomiles lagenaria	Cotoneaster lacteus
Acacia longifolia	Nerium oleander
Lantana montevidensis	Westringia fruticosa
Leptospermum flavescens	Cuphea ignea
Plumbago auriculata	Thumbergia alata
Euonymus japonicus	Euphorbia milii
Pyracantha fortuneana	Cotoneaster pannosus
Jasminum officinale 'Grandiflorum'	Lantana camara(cultivars only)

Trees	
Leptospermum laevigatum	Banksia integrifolia
Leptospermum petersonii	Angophora costata
Eucalyptus botryoides	Callistermon salignus
Eucalyptus robusta	Callistermon viminalis
Photinea x fraseri 'Robusta'	Casuarina glauca
	Casuarina stricta
Tristaniopsis laurina	Nyssa sylvatica
Hakea saligna	Hakea salicifolia
Melaleuca quinquenervia – Sandy soil	Melaleuca styphelioides – Clay soil
Melaleuca armilaris – Sandy soil	Melaleuca linariifolia – Clay soil

Attachments

8 Vegetation Suitable For Land Application Areas

Vegetation Suitable For Land Application Areas

Grasses

Botanical Name	Approximate Height	Common Name or Variety
Carex spp.		
Lomandra longifolia		
Microlaena stipoides		
Oplismenus imbecillis	40 – 80 cm	Available as lawn turf
Pennisetum alopecuroides		
Poa lab		
Stipa spp.		

Sedges/Grasses/Small Plants

Botanical Name	Approximate Height	Common Name or Variety
Anigozanthus flavidus	2m	Kangaroo Paw
Baumea acuta		
Baumea articulate	Sedge	
Baumea juncea	Sedge	
Baumea nuda	Sedge	
Baumea rubiginosa	Sedge	
Baumea teretifolia	Sedge	
Blandfordia grandiflora	30-90cm	Christmas bell
Blandfordia nobilis	30-90cm	Christmas bell
Brachyscome diversifolia	Clump	Native daisy
Carex appressa	Sedge	
Cotula coronopitolia	10-20cm	Waterbutton
Crinum pedunculatum	< 2m	Swamp Lily
Cyperus polystachyos	Sedge	
Dianella caerulea	Low plant	Blue Flax Lily
Epacris microphylla	50cm – 1m	
Ferns		
Gahnia spp.	Tall grass	
Juncus spp.	0.5m	
Lobelia trigoncaulis	Rush	
Lomandra spp.	5-10cm	
Patersonia fragilis	Grass	Native Iris
Patersonia glabrata		Native Iris
Patersonia occidentalis		Native Iris
Ranunculus graniticola		
Restio australis	5cm	
Restio teraphyllys	Reed	
Sowerbaca juncea	1m	Rush Lily
Tetratheca juncea	Sedge	
Xyris ioercykata	<30cm	Tall Yellow Eye

Ground Cover/Climbers

Botanical Name	Approximate Height	Common Name or Variety
Hibbertia scandens		Snake vine
Hibbertia stellaris		
Isotoma fluviatalis	Prostate	
Kennedia rubicunda	Climber	Dusky coral pea
Scaevola albida		
Scaevola ramosissima		
Veronica plebeian		
Viola hederacea		Native violet

Shrubs

Botanical Name	Approximate Height	Common Name or Variety
Agonis flexuosa nana		
Baekea linifolia	1 – 2.5m	
Baekea utilis	1 – 2.5m	
Baekea virgata	< 4m	
Banksia aemula	1 – 7m	
Banksia robur	0.5 – 2m	
Bauera ruboides	0.5 – 1.5m	
Callistemon	2 – 3m	Burgundy
Callistemon	2 – 4m	Eureka
Callistemon	3 – 4m	Harkness
Callistemon	3 – 4.5m	Kings Park Special
Callistemon	2 – 3m	Mauve Mist
Callistemon	1 – 2.5m	Red Clusters
Callistemon	2 – 3m	Reeves Pink
Callistemon citrinus	50 – 80m	Austraflora Firebrand
Callistemon citrinus	2 – 4m	Splendens
Callistemon citrinus	60cm – 1m	White Ice
Callistemon linearis	1 – 3m	
Callistemon macropunctatas	2 – 4m	
Callistemon pachphyllus	2 – 3m	
Callistemon pallidus	1.5 – 4m	
Callistemon paludosus	3 – 7m	
Callistemon pinifolius	1 – 3m	
Callistemon rigidus	1.5 – 2.5m	
Callistemon salignus	3 – 10m	
Callistemon shiresii	4 – 8m	
Callistemon sieberi	1.5 – 2m	
Callistemon sieberi	50 – 80m	Austraflora Little

Vegetation Suitable For Land Application Areas

Shrubs Cont'

Botanical Name	Approximate Height	Common Name or Variety
Callistemon subulatus	1 – 2m	Cobber
Callistemon viminalis	1 – 2m	
Callistemon viminalis	5 – 10m	Captain Cook
Callistemon viminalis	3 – 5m	Dawson River
Callistemon viminalis	50cm – 1m	Hannah Ray
Callistemon viminalis	1.5 – 2m	Little John
Callistemon viminalis	2 – 3m	Rose Opal
Goodenia ovata	1 – 1.5m	Western Glory
Hibiscus diversifolius	1 – 2m	
Kunzea capitata	1 – 2m	Swamp hibiscus
Leptospermum flavescens	< 2m	
Leptospermum juniperinum	1m	Tea-tree
Leptospermum lanigerum	1 – 2m	Tea-tree
Leptospermum squarrosum	< 2m	Woolley Tea-tree
Melaleuca alterifolia	4 – 7m	Tea-tree
Melaleuca decussate	1 – 2m	
Melaleuca lanceolata	4 – 6m	Cross-leaved Honey
Melaleuca squamea	1 – 2m	Myrtle
Melaleuca thymifolia		

Trees

Botanical Name	Approximate Height	Common Name or Variety
Acacia elongate	> 2m	
Acacia floribunda	2 – 4m	Gossamer Wattle
Agonis flexuosa	5 – 6m	Willow Myrtle
Allocasuarina diminuta	1.5m	
Allocasuarina paludosa	0.5m – 2m	
Angophera floribunda	Large Tree	
Angophera subvelutina	Large Tree	
Callicoma serratifolia	10 – 30m	River She-Oak
Casuarina cunninghamiana	6 – 12m	Swamp Oak
Casuarina glauca	Large Tree	Blueberry Ash
Elaeocarpus reticulates	Large Tree	
Eucalyptus amplifolia	10 – 30m	

Trees Cont'

Botanical Name	Approximate Height	Common Name or Variety
Eucalyptus botryoides	15 – 20m	River Red Gum
Eucalyptus camaldulensis	Large Tree	Blue Mountains Blue Gum
Eucalyptus deanei	Large Tree	River Peppermint
Eucalyptus elata	10 – 20m	Flooded Gum
Eucalyptus grandis	20m	Woollybutt
Eucalyptus longifolio	30 – 40m	Blackbutt
Eucalyptus pilularis	< 35m	Greygum
Eucalyptus punctata	20 – 30m	Swamp Mahogony
Eucalyptus robusta	30 – 50m	Sydney Blue Gum
Eucalyptus saligna	30 – 40m	Forest Red Gum
Eucalyptus tereticornis	20 – 40m	Ribbon Gum
Eucalyptus viminalis	10 – 20m	Lilli Pilli
Acmana smithii	< 40m	Native Teak
Flindersia australis	3 – 6m	Native Frangipani
Hymenosporum flavuum	3 – 4m	Bracelet Honey Myrtle
Melaleuca armillaris	4 – 7m	
Melaleuca decora	6m	
Melaleuca ericifolia	4 – 6m	
Melaleuca halmaturorum	2 – 3m	
Melaleuca hypericifolia	4 – 8m	Snow in Summer
Melaleuca hypericifolia	5 – 7m	Vroad Paperback
Melaleuca halmaturorum	6m	
Melaleuca hypericifolia	4 – 6m	
Melaleuca linarifolia	2 – 3m	
Melaleuca linarifolia	4 – 8m	
Melaleuca quinquenervia	5 – 7m	
Melaleuca squarrosa	6m	
Melaleuca stypheloides	6 – 15m	
Melia azedarach	15 – 20m	
Pittosporum spp.		
Syzgium paniculatum		
Tristania Laurina	8 – 10m	Bush Cherry
Viminaria juncea	5 – 15m	Kanuaka

ATTACHMENT 2: REPORT ON STORMWATER MANAGEMENT FOR REZONING

Report on Stormwater Management for Proposed Rezoning

At

Lot 7 & Part Lot 8 DP1025196 and Lot 4 DP881346

Sutton Road and Faithfull Street Gundaroo

For

Dr R & Mrs M Meischke

30 January 2013
BH Ref: 2916

barker harle
consulting engineers

30 January 2013
BH Ref: 2916

Dr R & Mrs M Meischke
C/- Salvestro Planning
PO Box 783
WAGGA WAGGA NSW 2650

Attention: Ms Lizzie Olesen-Jensen

Dear Dr & Mrs Meischke,

Re: Report on Stormwater Management for Proposed Rezoning; Lot 7 & part Lot 8 DP1025196 & Lot 4 DP881346 Sutton Road and Faithfull Street, Gundaroo

The following report presents the results of a review of stormwater management issues in relation to the above proposed rezoning. In particular the report addresses:-

- On-site rainwater storage for domestic consumption;
- Stormwater detention on individual lots, and
- Stormwater management on access roads.

If you have any further enquiries please do not hesitate to contact the undersigned.

Yours faithfully
Barker Harle

Rob Barker
Principal
FIE Aust, CPEng, NPER

Table of Contents

History Of This Document

Document status and review

Revision	Author	Reviewer	Date Issued
0	Rob Barker	Manish Pindoria	30 January 2013

Distribution of copies of this document

Revision	Digital	Printed	Issued to
0	1	3	Salvestro Planning
	1	1	Dr R & Mrs M Meischke
	1	1	Barker Harle file/archives

Report on Stormwater Management for Proposed Rezoning

Lot 7 & part Lot 8 DP1025196 & Lot 4 DP881346 Sutton Road and Faithfull Street, Gundaroo

1 Introduction

This report presents the results of an assessment of:-

- On-site rainwater storage requirements for domestic consumption;
- Stormwater detention on individual lots, and
- Stormwater management on access roads.

2 Reference Data

Where appropriate reference has been made to the flowing references and data:-

- Yass Valley Council "Stormwater Drainage Design Specification", V1.3, June 2007;
- Bureau of Meteorology, historical rainfall records for the Gundaroo region of NSW.

3 On-site Rainwater Storage Requirements

Reticulated water supply is not expected to be available to the Gundaroo township. Therefore, residential development undertaken as a result of the proposed rezoning will need to be reliant on collected rainwater for domestic purposes. Although bore water is utilised by many of the existing residences in the village of Gundaroo, it has not been considered as a source of water for domestic use in the proposed subdivision.

A number of Bureau of Meteorology weather stations are within close proximity (up to 30km) of the site. The weather stations have records of varying from 10 to 40 years. Each weather station has a highly variable minimum and maximum monthly rainfall record. Examples of the available data is summarised in Table 1 below:-

Table 1 – BOM Rainfall Records

Station	Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total (mm)
Gundaroo Store [1]	Lowest	6.2	1.6	1.2	0.0	0.2	20.5	19.0	5.7	8.4	4.0	11.2	10.2	437.0
	Mean	47.7	50.5	45.9	34.4	38.2	54.0	56.0	49.6	54.4	50.9	75.3	60.8	639.6
	Highest	132.4	151.4	254.0	128.2	149.0	130.2	126.0	105.0	115.8	119.6	158.4	144.6	889.6
Sutton, Goolabri Dr[2]	Lowest	11.9	5.6	12.4	7.2	0.6	12.9	24.5	17.9	10.7	4.6	8.0	15.8	410.7
	Mean	40.9	64.2	46.5	21.8	24.4	46.6	43.8	44.4	44.2	44.8	78.0	75.2	608.1
	Highest	75.1	155.3	192.5	56.2	77.1	109.9	97.3	80.0	109.2	75.4	144.0	167.9	922.1
Sutton (Uba)[3]	Lowest	0.0	0.8	1.4	0.4	0.0	5.6	6.2	5.6	4.6	4.2	0.0	0.2	316.4
	Mean	57.4	62.9	51.5	42.6	42.7	47.2	50.7	53.3	60.4	61.5	71.2	55.2	653.7
	Highest	175.0	214.2	239.6	188.2	148.2	142.2	149.2	177.6	147.4	190.6	155.0	184.8	999.6
Murrumbateman McIntosh Cct[4]	Lowest	4.1	1.7	0.0	0.0	0.8	20.5	23.6	11.0	7.0	4.8	7.8	7.7	335.4
	Mean	50.6	49.4	53.5	41.5	45.4	58.9	69.9	66.8	64.4	61.9	75.2	65.9	725.7
	Highest	164.5	163.5	245.0	206.5	160.5	145.2	178.5	152.2	147.1	159.9	168.0	153.7	1011
All Stations	Mean	49.2	56.8	49.4	35.1	37.7	51.7	55.1	53.5	55.9	54.8	74.9	64.3	656.8

1 Record from 1987 to 2012
2 Record from 2002 to 2012
3 Record from 1970 to 2012
4 Record from 1985 to 2012

As can be seen in Table 1, there are considerable variations between Lowest, Highest and Mean records at each station. Therefore, calculations based on mean values will not adequately reflect the impact of extended dry periods or unusually wet periods or events and can be considered to only provide general guidance.

A water balance for a range of residence roof areas has been prepared, based on the following assumptions/inputs:-

- 4 bedroom residence with 6 occupants using 120L/person/day (720L/day)
- 720L/day does not include water usage external to the residence.
- 720L/day is the minimum water usage in July.

- Water usage varies throughout the year as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
11%	9.75%	8.5%	7.75%	7.5%	7.25%	7.0%	7.25%	7.75%	8.0%	8.5%	9.75%	100%

- The roof areas able to collect water varies from 250m^2 to 500m^2
- The annual rainfall is the Mean of All Stations in Table 1 above.
- 90% of the rainfall is collected.
- The tank is empty on 1 April.

The results of the above water balance calculations is presented in Figures 1 and 2 below and indicates that rainwater yield is dependent on roof area and not tank volume. Tanks larger than 25,000L capacity provide little increase in available yield under assumed normal operating conditions. However, larger tanks provide the ability to collect water in heavier than normal storm events and provide onsite storage capacity of water dedicated for fire fighting purposes.

It should be noted that a 100mm storm event would provide the following rainwater volumes:

Roof Area (m^2)	250	350	500	700
Collected runoff (L)	22,500	31,500	45,000	63,000

Therefore, rainwater tanks between 50,000L and 100,000L capacity would provide the ability to collect extreme storm events, however, they are unlikely to be filled on a regular basis and would provide adequate capacity for normal operations.

Figure 1

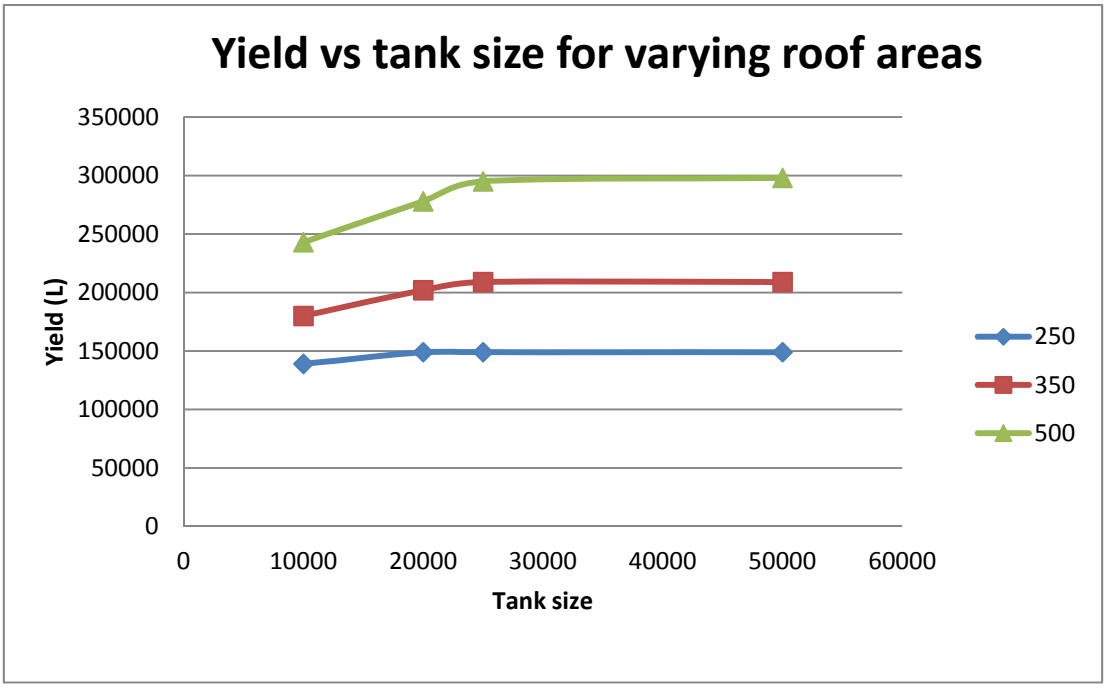
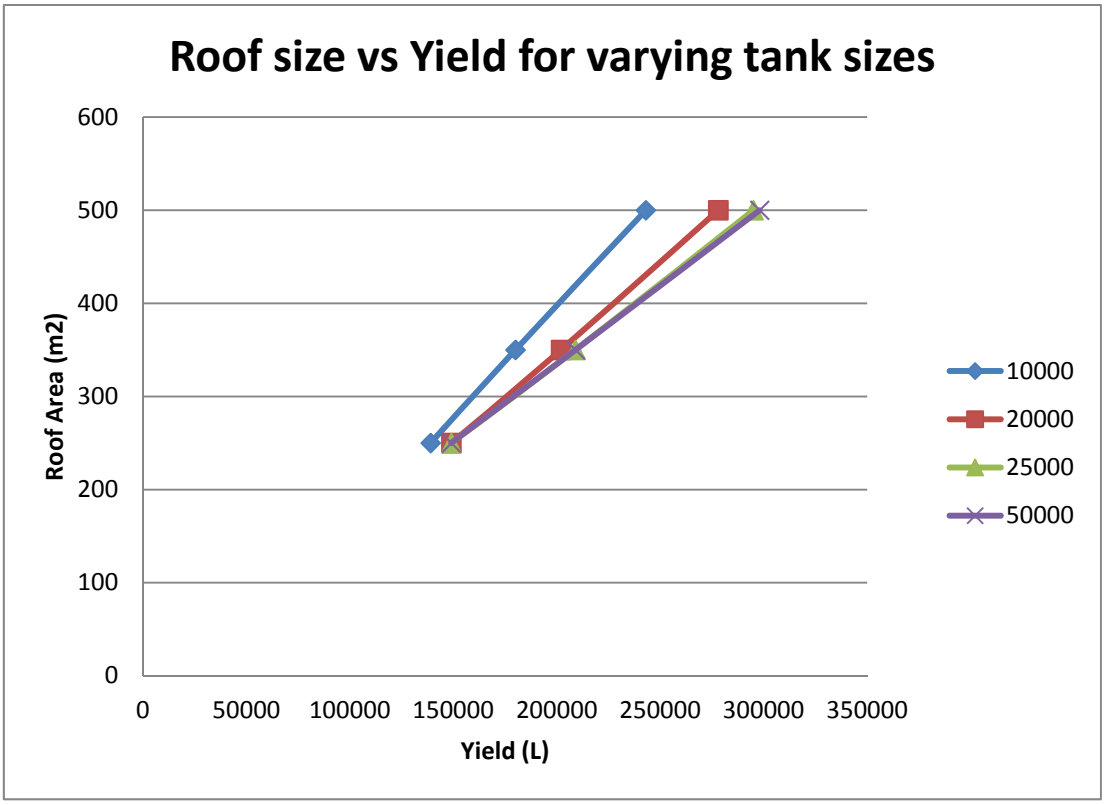


Figure 2



Rainwater tanks between 50,00L and 100,000L would also provide sufficient available capacity, under normal operator conditions, to be able to incorporate detention storage for the difference between the undeveloped and developed site stormwater runoff. The detained volume would become harvested water available for domestic use and would not need to be released.

4 On-site Stormwater Detention

Development of the site will result in increased runoff from each storm event. This increased runoff will occur as a result of the reduction in the permeability of the site with the introduction of roofs and paved surfaces.

Section 5 and 6 of Yass Valley Council's "Stormwater Drainage Design Specification", V1.3, June 2007, provides the following guidance for assessing the increase in runoff as a result of development of the site with lots >1000m^2 in size.

Undeveloped site – Fraction impervious:	0.1			
Undeveloped site – Coefficient of runoff:	C_2	C_{10}	C_{20}	C_{100}
	0.24	0.28	0.29	0.33
Developed site – Fraction impervious:	0.4			
Developed site – Coefficient of runoff:	C_2	C_{10}	C_{20}	C_{100}
	0.41	0.49	0.51	0.58

It is proposed to develop the site with lot sizes of 2,000m^2, 5,000m^2 and up to 10,000m$^{2.}$ It is unlikely the larger lots will have the same proportion of impermeable surface area as the 2,000m$^{2.}$ Assuming the additional lot area is undeveloped, the fraction impervious for the 5,000m^2 and 10,000m^2 lots could be taken to be 0.22 and 0.15 respectively. The increase in runoff from each lot that could need to be detained could be assessed using the Rational Formula for a 5 minute storm event.

$$Q_{Det} = Q_{Dev} - Q_{Undev} = CIA_{(Dev - Undev)} \times t_c$$

C = Coefficient of runoff
I = Intensity (mm/hr)
A = Area (m^2)
t_c = time of concentration of stormwater runoff

The required detention volume for a 100yr, 5 minute storm event (t_c) using the Yass Valley Council's Intensity – Frequency - Duration values in Section 4 of the Stormwater Drainage Design Specification and interpolated coefficients of runoff, would therefore be:-

Lot size	2,000m^2	5,000m^2	10,000m^2
Coefficient of Runoff (Undev)	0.33	0.33	0.33
Coefficient of Runoff (Dev)	0.58	0.44	0.38
Detention Volume	32,500L	29,250L	32,500L

Adequate stormwater detention could be provided on residential lots by providing rainwater tanks that are 30,000L larger than the volume required for normal usage. The detained water would become harvested water and would be available for domestic use.

It is considered that there would be sufficient storage volume available in a 100,000L tank under normal operating conditions to accommodate/detain the runoff that is likely to be generated by storms up to a 100yr, 5 minute event or a lower intensity event of up to 100mm rainfall.

5 Stormwater Management on Public Roads

Stormwater runoff from the public roads within the road reserves constructed to service the proposed lots will be at an increased rate as a result of the reduction in permeability (pervious fraction) of the of the surface arising from the construction of a sealed pavement. The increased runoff could be directed to a detention basin servicing all or most of the development or the additional stormwater could be managed at its source by the use of infiltration swales beside the roads.

The use of detention basins will require land to be dedicated for the purpose of stormwater management. The basin(s) will require outlet flow controls, as well as sediment and nutrient management and gross pollution/trash collection. These structures/components will require ongoing maintenance.

Alternately, the use of infiltration swales will not require additional land to be dedicated to stormwater management. The stormwater will be infiltrated at its source, resulting in increased groundwater recharge, reduction in nutrients and sediment in stormwater runoff discharged from the site. Smaller scale gross pollution control measures may still need to be provided.

The access roads would need to be designed for the conveyance of surface runoff flows in swales beside the roads in lieu of kerbs and gutters. Underground infiltration storage units would be required to be provided. Specific details will be resolved in conjunction with the detailed engineering design of the roads.

It is recommended that at source stormwater infiltration be adopted for the management of stormwater runoff from the internal access roads.

Yours faithfully
Barker Harle

Rob Barker

FIE Aust,
CPEng
NPER 322333
RPEQ 1963,
RBP EC24316

barker harle
consulting engineers

www.barkerharle.com.au

Yass | Sydney | Gosford | Newcastle

t: (02) 6226 1222 e: admin@barkerharle.com.au p: PO Box 645 Yass NSW 2582

Barker Harle is a division of Water Agents Pty Ltd ABN 76 126 306 689

civil structural geotechnical environmental

ATTACHMENT 3: PROPERTY INFORMATION

INSTRUMENT SETTING OUT TERMS OF EASEMENTS INTENDED TO BE CREATED PURSUANT TO SECTION 88B, CONVEYANCING ACT 1919

Lengths are in metres

DP1002259

Subdivision covered by Council's Certificate No. DA9868 of 1st March 1999

PART 1

Full name and address of proprietor of the land	HEIKO ROGIER CHRISTIAAN MEISCHKE and MARION RUTH MEISCHKE of "Strathallan" GUNDAROO NSW 2620
Full name and address of of Mortgagee of the land	National Australia Bank Limited of Auburn Street, Goulburn NSW 2580
1 Identity of easement firstly referred to in abovementioned plan.	Easement for water supply 2 wide

Schedule of Lots Affected

Lots Burdened	Lots or Authority Benefited
Lot 5	Lot 3 6

PART 2

1 Terms of Easement for Water Supply 2 wide firstly referred in the abovementioned plan

Full and free right for the body in whose favour this easement is created, and every person authorised by it, from time to time and at all times to drain water (whether rain, storm, spring, soakage, or seepage water) in any quantities across and through the land herein indicated as the servient tenement, together with the right to use, for the purposes of the easement, any line of pipes already laid within the

Marion R Meischke

D. Leach

INSTRUMENT SETTING OUT TERMS OF EASEMENTS INTENDED TO BE CREATED PURSUANT TO SECTION 88B, CONVEYANCING ACT 1919

Lengths are in metres

Plan: DP 1002259

Subdivision covered by Council's Certificate No. DA9868 of 1st March 1999

---

servient tenement for the purpose of draining water or any pipe or pipes in replacement or in substitution therefor and where no such line of pipes exists, to lay, place and maintain a line of pipes of sufficient internal diameter beneath or upon the surface of the servient tenement and together with the right for the body in whose favour this easement is created and every person authorised by it, with any tools, implements, or machinery, necessary for the purpose, to enter upon the servient tenement and to remain there for any reasonable time for the purpose of laying, inspecting, cleansing, repairing, maintaining, or renewing such pipe line or any part thereof and for any of the aforesaid purposes to open the soil of the servient tenement to such extent as may be necessary provided that the body in whose favour this easement is created and the persons authorised by it will take all reasonable precautions to ensure as little disturbance as possible to the surface of the servient tenement and will restore that surface as nearly as practicable to its original condition.

The name of the person empowered to release, vary or modify the easement firstly referred to in the abovementioned plan shall be the owner for the time being of the dominant tenement.

SIGNED by HEIKO ROGIER CHRISTIAAN)
MEISCHKE and MARION RUTH MEISCHKE)
in the presence of:-)

H R Meischke

Marion R Meischke

D. C. LEACH

Mortgagee under Mortgage No. 2021758
Signed at Sydney this 31st day of MARCH 1999 for National Australia Bank Limited ACN 004 044 937 by [illegible] its duly appointed Attorney under Power of Attorney No. 515 Book 3394

Manager

Witness/Bank Officer Kylie BARNETT

255 George Street, Sydney NSW

REGISTERED 4.6.1999

PLAN FORM 1

Plan Drawing only to appear in this space

*OFFICE USE ONLY

SIGNATURES, SEALS AND STATEMENTS of intention to dedicate public roads or to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants.

As Mortgagee under Mortgages Numbered - R520103 and Y758612 Westpac Banking Corporation hereby consents to the within plan of subdivision.

Signed sealed and delivered for and on behalf of Westpac Banking Corporation by its duly constituted Attorney who is personally known to me

Westpac Banking Corporation ARBN 007 457 141 By its Attorney who hereby states that at the time of executing this instrument no notice of revocation has been received of the Power of Attorney in the office of the Register General No 538 Book 4005 under the Authority of which this instrument has been executed.

Peter Alexander

GEOFFREY LUTHANT, 36 DUNBAR STREET FRASER ACT, BANK OFFICER

Officer in charge Regional Securities Centre (ACT) New South Wales Division

Crown Lands Office Approval

PLAN APPROVED ....
Authorised Officer

Land District ....

Paper No. ....

Field Book .... pages ....

Council's Certificate

I hereby certify that —

(a) the requirements of the Local Government Act, 1993 *(other than the requirements for the registration of plans), and*

~~*(b) the requirements of Part 3 Division 2 of the † Water Board Act 1987 and † Water Supply Authorities Act 1987~~

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

Subdivision No 8/94

Date 28-4-94

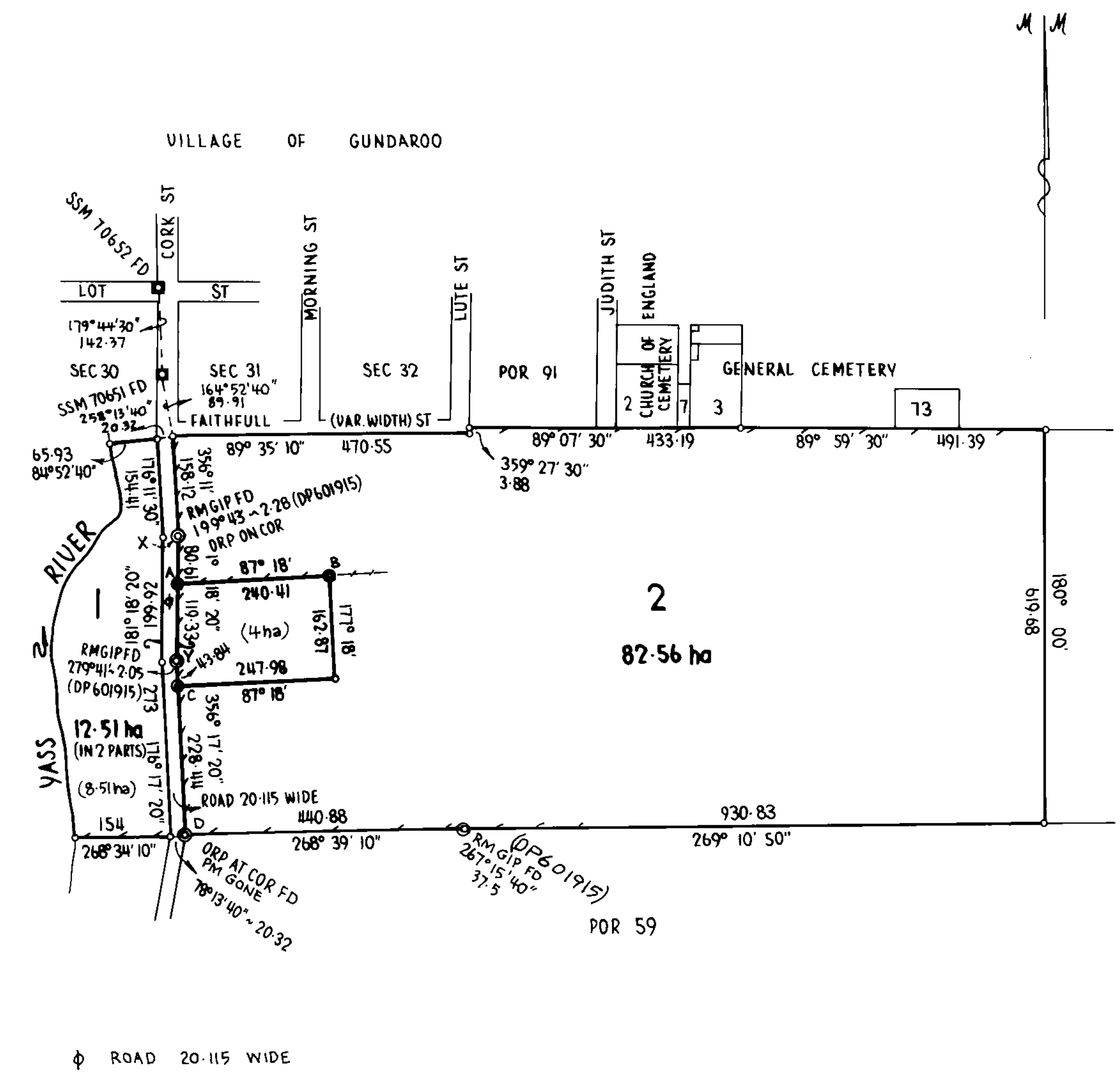
(Signature)

General Manager / ~~Authorised Person~~

Council File No. 15.1.1 D/A 94/8

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

† Delete if inapplicable



REFERENCE MARKS

COR	BEARING	FROM	DISTANCE
A	88° 09'	G I PIPE	2.16
B	89° 16'	G I PIPE	37.74
C	87° 18'	G I PIPE	5.94
D	198° 50'	CONC BLK	2.5

10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	Table of mm

DP 840631

A / 2 A O O N

Registered: 4.7.1994

C.A. No 8/94 OF 28.4.1994

Title System: TORRENS

Purpose: SUBDIVISION

Ref. Map: 8727-1-N* CO: MURRAY (19)

Last Plan: D.P. 601915

PLAN OF SUBDIVISION OF LOTS 2 AND 3 DP 601915

Lengths are in metres. Reduction Ratio 1: 8000

LGA GUNNING

Locality: GUNDAROO

Parish: GUNDAROO

County: MURRAY

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

DP 601915
DP 634057

S.S.M.'S 70651 & 70652 ARE NOT EST'D BY DATA FROM SCIMS DATED 5.7.94

I, PETER WILDEN
of RJ KELL & CO. PTY LTD P.O. BOX 528 QUEANBEYAN NSW 2620
a surveyor registered under the Surveyors Act, 1929, as amended, hereby certify that the survey represented in this plan AS REGARDS 4HA PART OF LOT 1 *is accurate and has been made in accordance with the Survey Practice Regulation 1990 and was completed on*

\# 7TH APRIL 1994

Signature ....

Surveyor registered under Surveyors Act, 1929, as amended.
Datum Line of Azimuth. X-Y
#Insert date of survey.

SURVEYOR'S REFERENCE: 13044

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

PLAN FORM 2

Plan Drawing only to appear in this space

*OFFICE USE ONLY

SIGNATURE AND SEALS ONLY.

Marion R. [illegible]

As Mortgagee under Mortgages Numbered R321013 and 4758612 Westpac Banking Corporation hereby Consents to the within Plan of Subdivision

A.R.B.N. 007 457 141

Crown Lands Office Approval

PLAN APPROVED ....
Authorised Officer

Land District ....

Paper No. ....

Field Book .... pages

Council's Certificate

I hereby certify that –

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

~~†(b) the requirements of † Part 9 Division 2 of the Water Board Act 1987, or † Part 5 Division 7 of the Hunter Water Board (Corporatisation) Act 1991~~

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

Subdivision No. 8/95-6

Date 19th December, 1995

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

Council File No. 15.1.P DA 95-6/26

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

†Delete if inapplicable

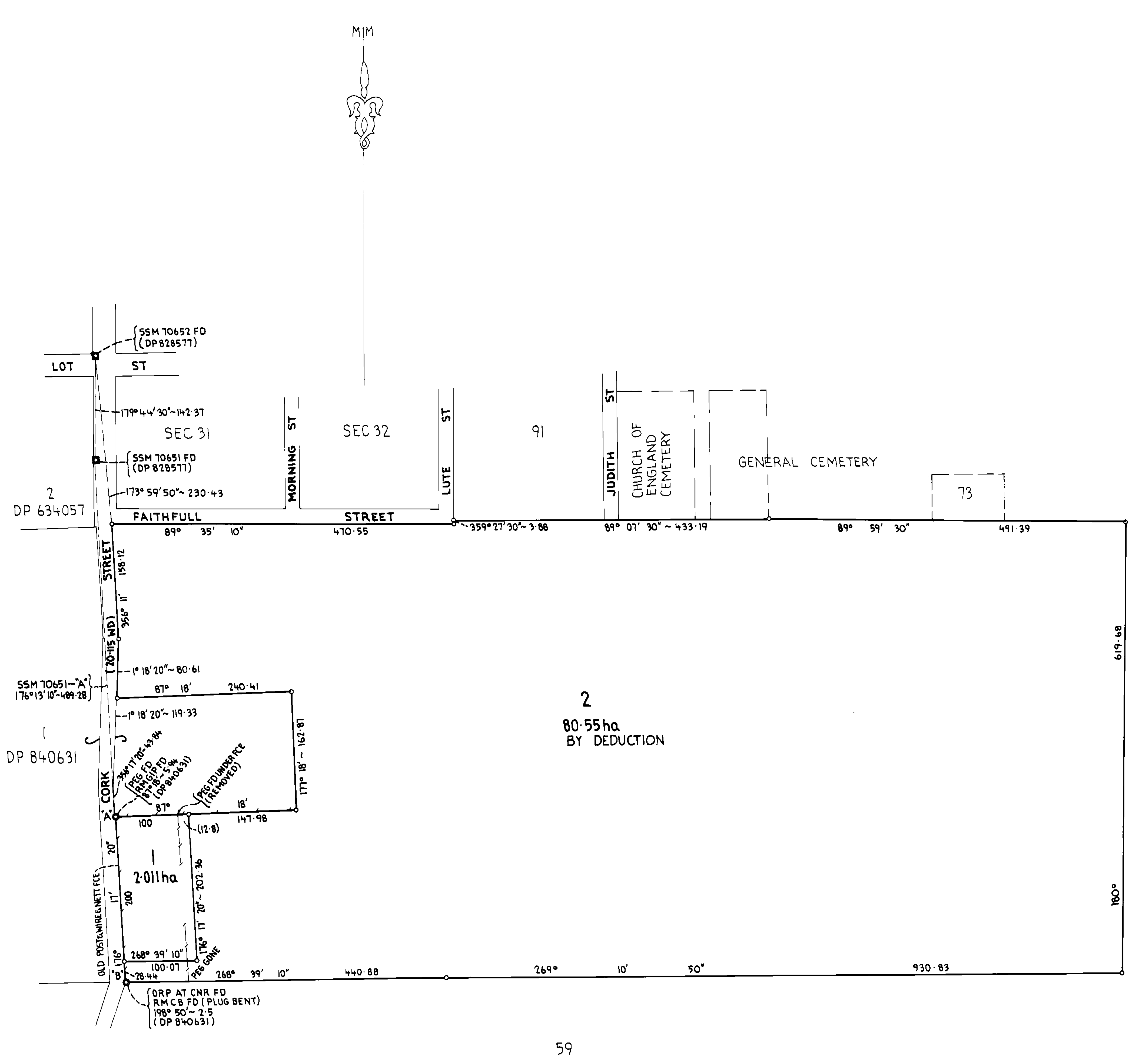


Table of mm: 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

SURVEYOR'S REFERENCE: 13655

DP 857918

Registered 27·3·1996

C.A. No. 8/95-6 OF 19·12·1995

Title System TORRENS

Purpose SUBDIVISION

Ref. Map. 8727-1-N#

Last Plan: DP 854976

PLAN OF SUBDIVISION OF LOTS 1 & 2 DP 854976

Lengths are in metres. Reduction Ratio 1: 4000

LGA GUNNING

Locality: GUNDAROO

Parish: GUNDAROO

County: MURRAY

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

I, FRANCIS ANDREW SEARSON of RJ KELL & Co P/L 36 MONTAGUE ST GOULBURN 2580 PH (048) 211033 FAX (048) 217238 a surveyor registered under the Surveyors Act 1929, hereby certify that the survey represented in this plan is accurate* has been made in accordance with the Survey Practice Regulation 1990 and was completed on 21st NOV. 1995

* AS REGARDS LOT 1

(Signature) ....
Surveyor registered under the surveyors Act 1929

Datum Line of Azimuth "A" ~ "B"

Plans used in preparation of survey/compilation.

DP 601915
DP 828577
DP 840631
DP 854976

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

LGEO - IN

PLAN FORM 2

Plan Drawing only to appear in this space

*OFFICE USE ONLY

SIGNATURES AND SEALS ONLY.

Marion R Maiscake

MORTGAGEE UNDER MORTGAGE No. 2021758
SIGNED AT SYDNEY THIS 13TH DAY OF OCTOBER 1998 FOR NATIONAL AUSTRALIA BANK LIMITED A.C.N. 004 044 937
BY Fiona Mary FERGUSON IF DULY APPOINTED ATTORNEY UNDER POWER OF ATTORNEY No. 541 BOOK 3834

A MANAGER

George St, Sydney

WITNESS: Kylie BARNETT

AZIMUTH A–B 179°44'30" 142·37 P·O & BY ME

M|M

SSM 70652 FD (DP 828577)

SSM 70651 FD (DP 828577)

SEC 31

SEC 32

MORNING ST

LUTE ST

JUDITH ST

CHURCH OF ENGLAND CEMETERY

GENERAL CEMETERY

PEG FD

PEG GONE RM GIP FD 83°28'–7·58 (DP 601915)

PM 82206

PM 85939 170°20'50" 15·105 TO COR

(VAR WIDTH)

FAITHFULL ST

PEGS GONE

RM GIP FD (1·3 OCC) 199°43'–2·28 (DP 601915)

(·9 OCC) 2B,5P&NETT

4
4000m²

3
80·15 ha

1
DP 840631

1
DP 857918

CORK (20·115 WIDE) ST

I DP 601915

REFERENCE MARKS			
COR	BEARING	FROM	DIST
C	176°21'	G.I PIPE	2·58
C	256°08'50"	PM 82206	14·005
D	178°01'	G.I PIPE	2·78

59

Crown Lands Office Approval

PLAN APPROVED.....
Authorised Officer

Land District.....
Paper No.....
Field Book.....pages.....

Council's Certificate

I hereby certify that -

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

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

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

Subdivision No. 98/53

Date.....8/10/1998.....

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

Council File No. 98/53

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

† Delete if inapplicable.

DP 881346

Registered: 3-11-1998

C.A: NO 98/53 OF 8-10-1998

Title System: TORRENS

Purpose: SUBDIVISION

Ref. Map: 8727–I–N #

Last Plan: DP 857918

PLAN OF SUBDIVISION OF LOT 2 DP 857918

Lengths are in metres. Reduction ratio 1:4000

L G A GUNNING

Locality: GUNDAROO

Parish: GUNDAROO

County: MURRAY

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

I, R.U.SCHNEIDER
of PO BOX 201 SUTTON 2620
PH (02) 62303577
a surveyor registered under the Surveyors Act, 1929, as amended, hereby certify that the survey represented in this plan AS REGARDS LOT4
is accurate and has been made in accordance with the Survey Practice Regulation 1990 and any special requirements of the Department of Lands, and was completed on
18 TH SEPTEMBER 1998

Signature .....
Surveyor registered under Surveyors Act, 1929, as amended.
Datum Line of Azimuth. A–B
Insert date of survey.

Plans used in preparation of survey/compilation.
DP 857918
DP 854976
DP 601915
DP 584518
DP 840631

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

SURVEYOR'S REFERENCE: 0111/CHECKLIST

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 Table of mm 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

DP 881346

PLAN FORM 2 — Plan Drawing only to appear in this space

SIGNATURES AND SEALS ONLY.

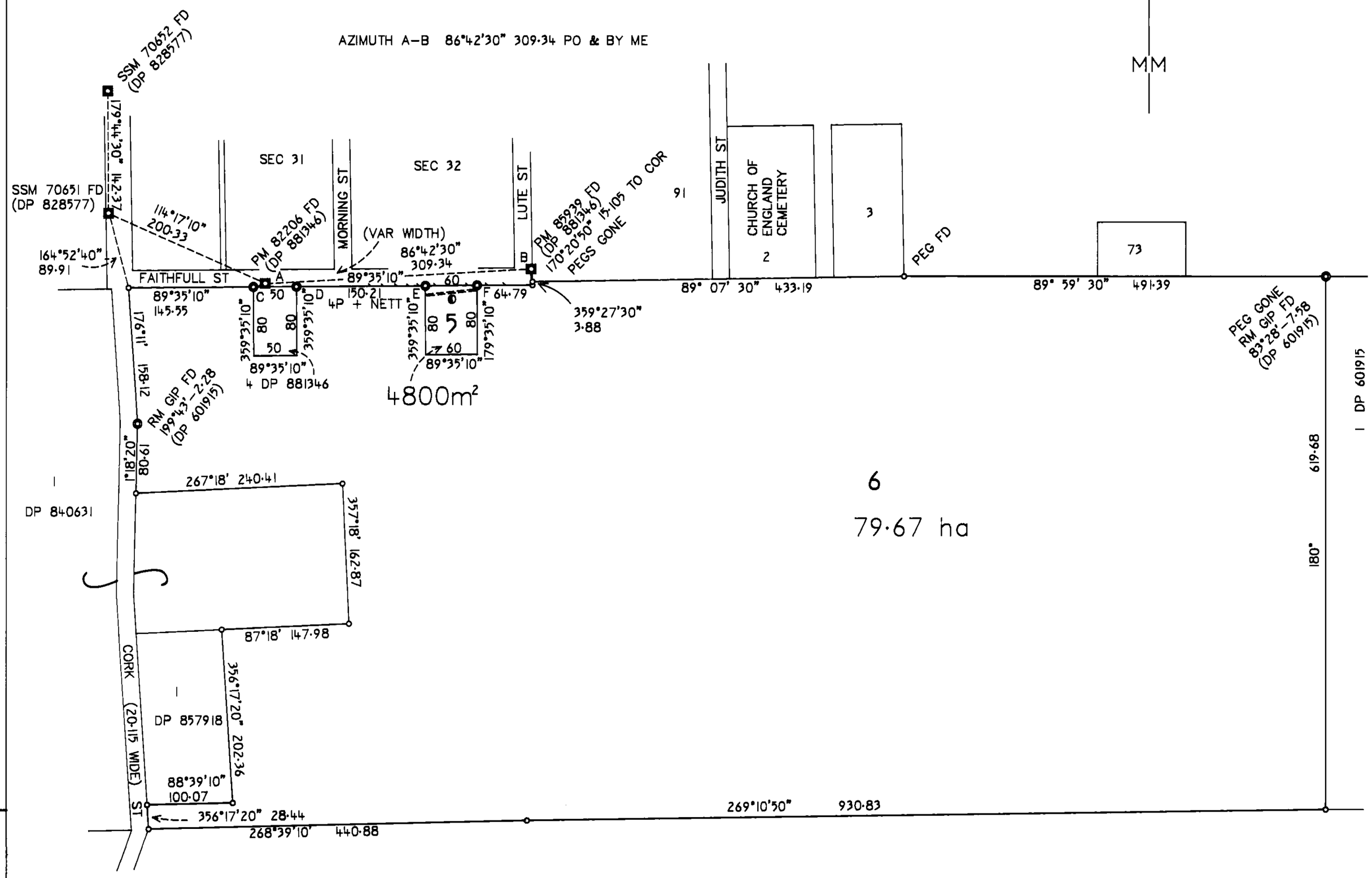
Marion R. Meischke

Mortgagee under Mortgage No. 2021758
Signed at Sydney this 31st day of MARCH 1999 for National Australia Bank Limited ACN 004 044 937
by LYNETTE IRENE DARBY duly appointed Attorney under Power of Attorney No. 549 Book 3934

Manager

Witness/Bank Officer Kylie BARNETT

255 George Street, Sydney NSW



◐ EASEMENT FOR WATER SUPPLY 2 WIDE
COR "E" TO CENTRE EASEMENT 11.42
COR "F" TO CENTRE EASEMENT 5.28

REFERENCE MARKS			
COR	BEARING	FROM	DIST
C	176°21'	G.I PIPE FD (DP881346)	2.58
C	256°08'50"	PM 82206 FD (DP 881346)	14.005
D	178°01'	G.I PIPE FD (DP 881346)	2.78
E	171°56'	G.I PIPE	3.995
F	186°30'	G.I PIPE	2.54

Crown Lands Office Approval

PLAN APPROVED.....
Authorised Officer
Land District.....
Paper No.....
Field Book.....pages.....

Council's Certificate

I hereby certify that -
(a) the requirements of the Local Government Act, 1919 (other than the requirements for the registration of plans), and
*(b) the requirements of † Part 3 Division 2 of the Water Board Act 1987, or † Part 5 Division 7 of the Hunter Water Board (Corporatisation) Act 1991,
have been complied with by the applicant in relation to the proposed SUBDIVISION
(Insert "new road", "subdivision" or "consolidated lot") set out herein

Subdivision No.....
Date 1 March 1999
(Signature).....
General Manager/Authorised Person
Council File No. DA 98/68

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

† Delete if inapplicable.

SURVEYOR'S REFERENCE: 0112/CHECKLIST

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 Table of mm 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

DP1002259

Registered: 4.6.1999
C.A: No. DA98/68 OF 1.3.1999
Title System: TORRENS
Purpose: SUBDIVISION
Ref. Map: 8727-I-N *
Last Plan: DP881346

PLAN OF SUBDIVISION OF LOT 3 DP 881346

Lengths are in metres. Reduction ratio 1:4000

L G A GUNNING
Locality: GUNDAROO
Parish: GUNDAROO
County: MURRAY

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

I R.U.SCHNEIDER
of PO BOX 201 SUTTON 2620
PH (02) 62303577
a surveyor registered under the Surveyors Act, 1929, as amended, hereby certify that the survey represented in this plan AS REGARDS LOT 5
is accurate and has been made in accordance with the Survey Practice Regulation 1990 and any special requirements of the Department of Lands, and was completed on
2 ND FEBRUARY 1999

Signature.....
Surveyor registered under Surveyors Act, 1929, as amended.
Datum Line of Azimuth A–B
Insert date of survey.

Plans used in preparation of survey/compilation.
DP 881346 DP 857918
DP 854976
DP 601915
DP 584518
DP 840631

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

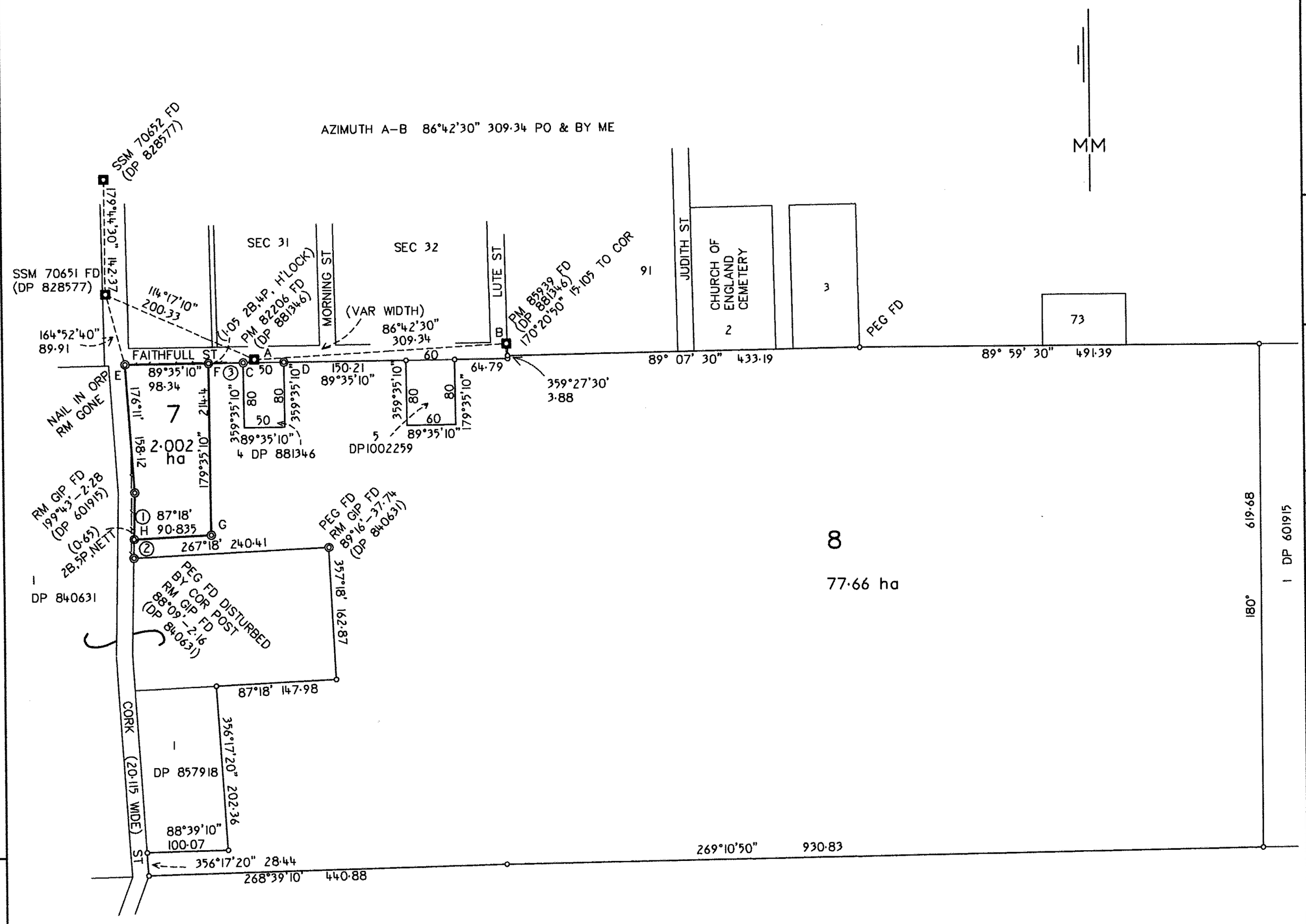
PURSUANT TO SEC 88B
OF THE CONVEYANCING ACT
1919 (AS AMENDED)
IT IS INTENDED TO CREATE
1) EASEMENT FOR WATER SUPPLY
2 WIDE.

PLAN FORM 2

Plan Drawing only to appear in this space

SIGNATURES AND SEALS ONLY.

Marion R Mercuric



SHORT LINES		
LINE	BEARING	DIST
1	1°18'20"	60.22
2	1°18'20"	20.395
3	89°35'10"	47.21

REFERENCE MARKS			
COR	BEARING	FROM	DIST
C	176°21'	G.I PIPE FD (DP881346)	2.58
C	256°08'50"	PM 82206 FD (DP 881346)	14.005
D	178°01'	G.I PIPE FD (DP 881346)	2.78
E	154°30'10"	G.I PIPE	3.89
F	219°53'	G.I PIPE	3.55
G	283°40'30"	G.I PIPE	14.75
H	88°02'	G.I PIPE	1.04

59

DP1025196

Registered: SB 20.3.2001

CA: SEE CERTIFICATE

Title System: TORRENS

Purpose: SUBDIVISION

Ref Map: 8727-1-N

Last Plan: DP1002259

PLAN OF SUBDIVISION OF LOT 6 DP 1002259

Lengths are in metres. Reduction ratio 1:4000

L G A: GUNNING

Locality: GUNDARRO

Parish: GUNDAROO

County: MURRAY

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

Surveyors (Practice) Regulation 1996

I, RICHARD ULRICH SCHNEIDER
of RU SCHNEIDER PTY LTD
PO BOX 201 SUTTON NSW TEL: (02) 62303577
a surveyor registered under the Surveyor's Act 1929, hereby certify that the survey represented in this plan is accurate, has been made in accordance with the Surveyors (Practice) Regulation 1996 and was completed on 1 ST APRIL 2000
The survey relates to AS REGARDS LOT 7

(here specify the land actually surveyed, or specify any land shown in the plan that is not the subject of the survey)

Datum Line: 'A'–'B'
Zone: Suburban

(Signature) .....
Surveyor registered under the Surveyors Act, 1929

Plans used in preparation of survey/compilation.
DP 1002259
DP 881346
DP 840631
DP 857918

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

Crown Lands Office Approval

PLAN APPROVED .....
Authorised Officer

Land District .....
Paper No. .....
Field Book ..... pages .....

Subdivision Certificate

I certify that the provisions of s.109J of the Environmental Planning and Assessment Act 1979 have been satisfied in relation to the proposed

SUBDIVISION .....set out herin
(insert 'subdivision' or 'new road')

.....
* Authorised Person/General Manager/Accredited Certifier

Consent Authority : GUNNING SHIRE COUNCIL
Date of endorsment : 21 FEBRUARY 2001
Accreditation no :
Subdivision Certificate no : 9/2001
File No : DA 99-0/14

Note:

When this plan is to be lodged electronically in the Land Titles office, it should include a signature in an electronic or digital format approved by the Registrar-General.

* Delete whichever is inapplicable.

SURVEYOR'S REFERENCE: 0145 CHECKLIST URBAN

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 Table of mm 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

Land and Property Information Division
ABN: 84 104 377 806
GPO Box 15
Sydney NSW 2001
DX 17 SYDNEY Telephone: 1300 052 637

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 1/840631

SEARCH DATE	TIME	EDITION NO	DATE
27/11/2012	12:33 PM	7	20/10/2006

LAND

LOT 1 IN DEPOSITED PLAN 840631
AT GUNDAROO
LOCAL GOVERNMENT AREA YASS VALLEY
PARISH OF GUNDAROO COUNTY OF MURRAY
TITLE DIAGRAM DP840631

FIRST SCHEDULE

OMAR JABAL
HALIME JABAL
AS JOINT TENANTS (CN 6445407)

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 AC682809 MORTGAGE TO COMMONWEALTH BANK OF AUSTRALIA

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PRINTED ON 27/11/2012

Land and Property Information Division
ABN: 84 104 377 806
GPO Box 15
Sydney NSW 2001
DX 17 SYDNEY Telephone: 1300 052 637

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 1/857918

SEARCH DATE	TIME	EDITION NO	DATE
27/11/2012	12:33 PM	3	7/9/2011

LAND

LOT 1 IN DEPOSITED PLAN 857918
AT GUNDAROO
LOCAL GOVERNMENT AREA YASS VALLEY
PARISH OF GUNDAROO COUNTY OF MURRAY
TITLE DIAGRAM DP857918

FIRST SCHEDULE

STEPHEN ROBERT MYERS
ANNEKE RUTH MYERS
AS JOINT TENANTS (T 5795593)

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 AG479323 MORTGAGE TO BENDIGO AND ADELAIDE BANK LIMITED

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PRINTED ON 27/11/2012

Land and Property Information Division
ABN: 84 104 377 806
GPO Box 15
Sydney NSW 2001
DX 17 SYDNEY Telephone: 1300 052 637

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 4/881346

SEARCH DATE	TIME	EDITION NO	DATE
27/11/2012	12:33 PM	3	20/3/2001

LAND

LOT 4 IN DEPOSITED PLAN 881346
AT GUNDAROO
LOCAL GOVERNMENT AREA YASS VALLEY
PARISH OF GUNDAROO COUNTY OF MURRAY
TITLE DIAGRAM DP881346

FIRST SCHEDULE

HEIKO ROGIER CHRISTIAAN MEISCHKE
MARION RUTH MEISCHKE
AS JOINT TENANTS

SECOND SCHEDULE (1 NOTIFICATION)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)

NOTATIONS

NOTE: THE CERTIFICATE OF TITLE FOR THIS FOLIO OF THE REGISTER DOES NOT INCLUDE SECURITY FEATURES INCLUDED ON COMPUTERISED CERTIFICATES OF TITLE ISSUED FROM 4TH JANUARY, 2004. IT IS RECOMMENDED THAT STRINGENT PROCESSES ARE ADOPTED IN VERIFYING THE IDENTITY OF THE PERSON(S) CLAIMING A RIGHT TO DEAL WITH THE LAND COMPRISED IN THIS FOLIO.
UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PRINTED ON 27/11/2012

Land and Property Information Division
ABN: 84 104 377 806
GPO Box 15
Sydney NSW 2001
DX 17 SYDNEY Telephone: 1300 052 637

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 5/1002259

SEARCH DATE	TIME	EDITION NO	DATE
27/11/2012	12:33 PM	3	28/9/2000

LAND

LOT 5 IN DEPOSITED PLAN 1002259
AT GUNDAROO
LOCAL GOVERNMENT AREA YASS VALLEY
PARISH OF GUNDAROO COUNTY OF MURRAY
TITLE DIAGRAM DP1002259

FIRST SCHEDULE

JOZEF NOWAK
HANNA NOWAK
AS JOINT TENANTS (T 7113192)

SECOND SCHEDULE (3 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 DP1002259 EASEMENT FOR WATER SUPPLY 2 METRES WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
7079794 VARIATION OF RESTRICTION DP1002259
3 7113193 MORTGAGE TO STATE BANK OF NEW SOUTH WALES LIMITED

NOTATIONS

NOTE: THE CERTIFICATE OF TITLE FOR THIS FOLIO OF THE REGISTER DOES NOT INCLUDE SECURITY FEATURES INCLUDED ON COMPUTERISED CERTIFICATES OF TITLE ISSUED FROM 4TH JANUARY, 2004. IT IS RECOMMENDED THAT STRINGENT PROCESSES ARE ADOPTED IN VERIFYING THE IDENTITY OF THE PERSON(S) CLAIMING A RIGHT TO DEAL WITH THE LAND COMPRISED IN THIS FOLIO.
UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PRINTED ON 27/11/2012

Land and Property Information Division
ABN: 84 104 377 806
GPO Box 15
Sydney NSW 2001
DX 17 SYDNEY Telephone: 1300 052 637

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 7/1025196

SEARCH DATE	TIME	EDITION NO	DATE
27/11/2012	12:33 PM	3	20/7/2012

LAND

LOT 7 IN DEPOSITED PLAN 1025196
AT GUNDAROO
LOCAL GOVERNMENT AREA YASS VALLEY
PARISH OF GUNDAROO COUNTY OF MURRAY
TITLE DIAGRAM DP1025196

FIRST SCHEDULE

HEIKO ROGIER CHRISTIAAN MEISCHKE
MARION RUTH MEISCHKE
AS JOINT TENANTS

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 DP1002259 EASEMENT FOR WATER SUPPLY 2 METRES WIDE APPURTENANT TO THE LAND ABOVE DESCRIBED
7079794 VARIATION OF RESTRICTION DP1002259

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PRINTED ON 27/11/2012

Land and Property Information Division
ABN: 84 104 377 806
GPO Box 15
Sydney NSW 2001
DX 17 SYDNEY Telephone: 1300 052 637

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 8/1025196

SEARCH DATE	TIME	EDITION NO	DATE
27/11/2012	12:33 PM	1	20/3/2001

LAND

LOT 8 IN DEPOSITED PLAN 1025196
AT GUNDAROO
LOCAL GOVERNMENT AREA YASS VALLEY
PARISH OF GUNDAROO COUNTY OF MURRAY
TITLE DIAGRAM DP1025196

FIRST SCHEDULE

HEIKO ROGIER CHRISTIAAN MEISCHKE
MARION RUTH MEISCHKE
AS JOINT TENANTS

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 DP1002259 EASEMENT FOR WATER SUPPLY 2 METRES WIDE APPURTENANT TO THE LAND ABOVE DESCRIBED
7079794 VARIATION OF RESTRICTION DP1002259

NOTATIONS

NOTE: THE CERTIFICATE OF TITLE FOR THIS FOLIO OF THE REGISTER DOES NOT INCLUDE SECURITY FEATURES INCLUDED ON COMPUTERISED CERTIFICATES OF TITLE ISSUED FROM 4TH JANUARY, 2004. IT IS RECOMMENDED THAT STRINGENT PROCESSES ARE ADOPTED IN VERIFYING THE IDENTITY OF THE PERSON(S) CLAIMING A RIGHT TO DEAL WITH THE LAND COMPRISED IN THIS FOLIO.
UNREGISTERED DEALINGS: NIL

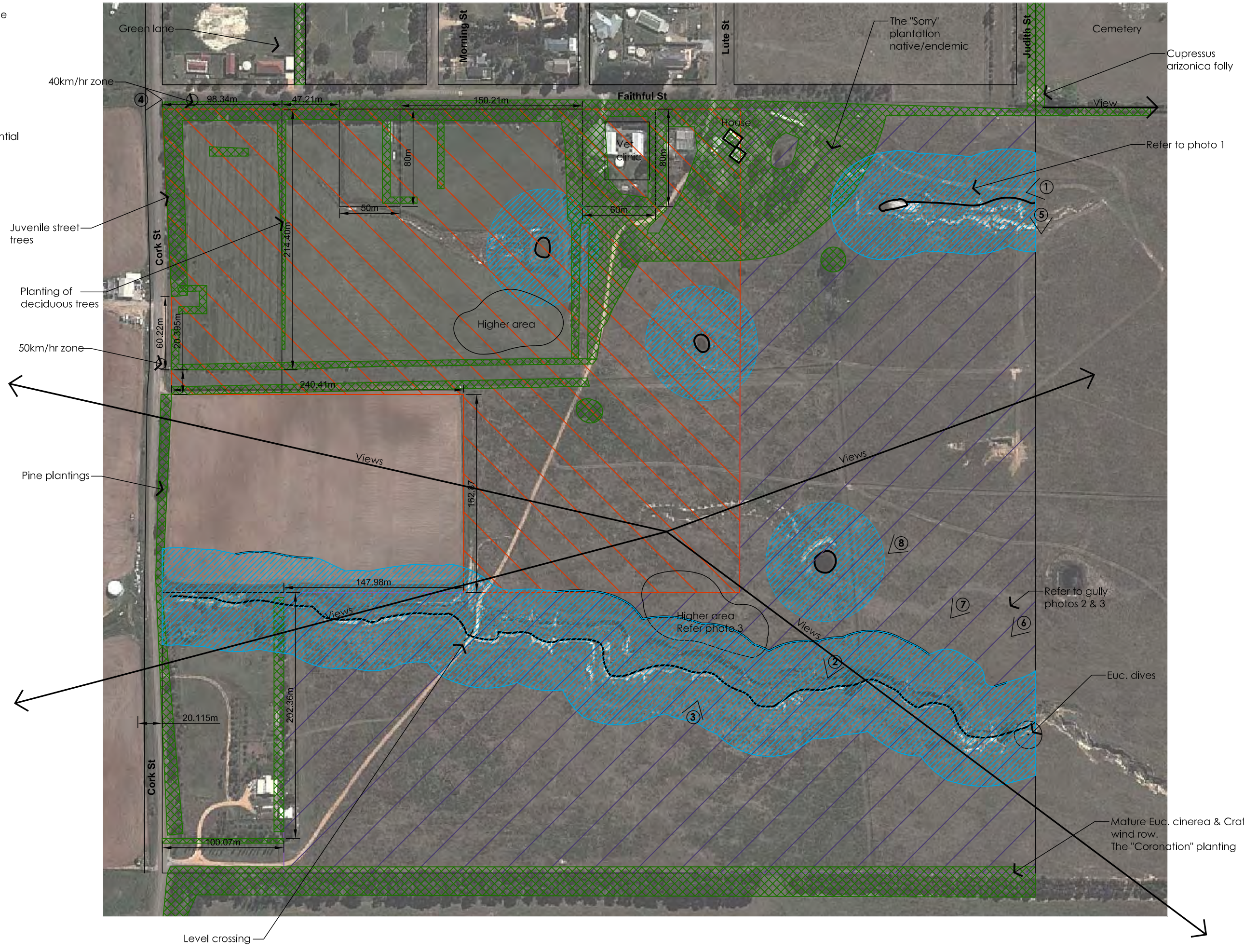
*** END OF SEARCH ***

PRINTED ON 27/11/2012

ATTACHMENT 4: SITE ANALYSIS PLAN

Legend

- Gullies & Dams with 40m exclusion zone
- Tree plantings
- Level crossing
- RU5 Village 2000 m2
- RU2 Low density residential 5000 m2
- ① Refer to photo on LO2



Rev	Date	Notes
A	03.10.2012	For comment
B	04.02.2013	For comment

Project North: N

All work to comply with the provisions of the BCA, Australian Standards and Local Authority Requirements. Report inconsistencies to Superintendent Immediately.

Landscape Architect:
Somewhere. LANDSCAPE ARCHITECTS, DESIGNERS AND DREAMERS
Olde Milong YOUNG NSW 2594
phone: 0263847333
email: alex@somewhere.net.au

Client: H.R.C & M.R Melschke

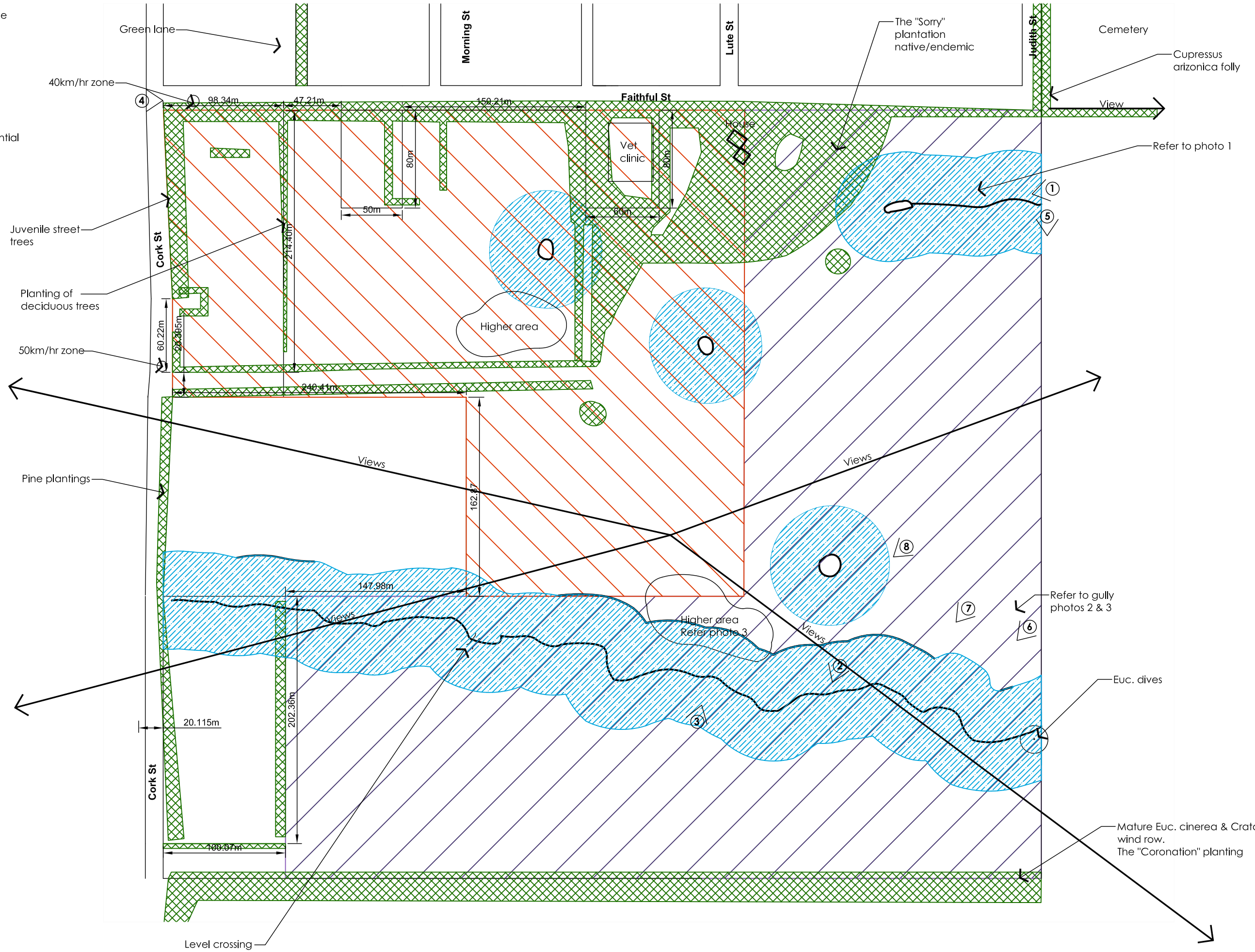
Project Name: Gundaroo Subdivision

Drawing Title: Site Analysis

Scale: 1:3000 @ A3 | Date:04.02.2013
Status: For Comment | Checked By: AD
Project No: 192 | Drawing No: L01 | Rev: B

Legend

- Gullies & Dams with 40m exclusion zone
- Tree plantings
- Level crossing
- RU5 Village 2000 m2
- RU2 Low density residential 5000 m2
- ① Refer to photo on LO2



Rev	Date	Notes
A	03.10.2012	For comment
B	04.02.2013	For comment

Project North:

All work to comply with the provisions of the BCA, Australian Standards and Local Authority Requirements. Report inconsistencies to Superintendent Immediately.

Landscape Architect:

somewhere. LANDSCAPE ARCHITECTS, DESIGNERS AND DREAMERS

Olde Millaroy YOUNG NSW 2594
phone: 0263847333
email: alex@somewhere.net.au

Client: H.R.C & M.R Melschke

Project Name: Gundaroo Subdivision

Drawing Title: Site Analysis

Scale: 1:3000 @ A3 | Date:04.02.2013
Status: For Comment | Checked By: AD
Project No: 192 | Drawing No: L01 | Rev: B

ATTACHMENT 5: AHIMS SEARCH RESULTS

AHIMS Web Services (AWS)
Search Result

Your Ref Number : 12095 - Gundaroo Rezoning

Client Service ID : 82041

Lizzie Olesen-Jensen
Po Box 783
Wagga Wagga New South Wales 2650
Attention: Lizzie Olesen-Jensen
Email: lizzie@salvestroplanning.com.au

Date: 05 October 2012

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : 149.26388, -35.03793 - Lat, Long To : -35.03019, 149.27681 with a Buffer of 1000 meters. conducted by Lizzie Olesen-Jensen on 05 October 2012

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

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

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

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

Important information about your AHIMS search

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

ATTACHMENT 6: CONCEPT LAYOUT PLAN

Legend

- Gullies & Dams with 40m exclusion zone
- Existing tree plantings
- Level crossing
- RU5 Village 2000 m2
- RU2 Low density residential 5000 m2
- Green lane
- Pedestrian links

Lane
Green lane
Lane
Green lane
Morning St
Lute St
Grazing lease
Judith St
Cemetery
Faithful St
2000m2
2400m2
Vet clinic
Cork St
Higher area
Existing avenue
Green lane
Larger lots
5200m2
3000m2
One sided road overlooking gully
Existing low level crossing
Higher area
Fire trail if required
Cork St
10000m2
6500m2
Future connection
Proposed dirt road
Alternative Road Access
Larger lots

Rev	Date	Notes
A	04.02.2013	For comment

Project North:

All work to comply with the provisions of the BCA, Australian Standards and Local Authority Requirements. Report inconsistencies to Superintendent Immediately.

Landscape Architect:

somewhere.
LANDSCAPE ARCHITECTS, DESIGNERS AND DREAMERS

Olde Milong YOUNG NSW 2594
phone: 0263847333
email: alex@somewhere.net.au

Client: H.R.C & M.R Meischke

Project Name: Gundaroo Subdivision

Drawing Title: Concept Masterplan

Scale: 1:3000 @ A3 | Date:04.02.2013
Status: For Comment | Checked By: AD
Project No: 200 | Drawing No: SP01 | Rev: A

ATTACHMENT 7: GUNDAROO LAND ZONING MAP – DRAFT YASS LEP 2012

Yass Valley Local Environmental Plan 2012

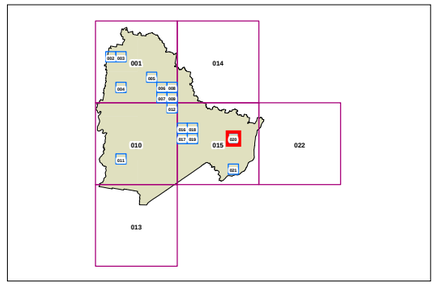
Land Zoning Map - Sheet LZN_020

Legend

B1	Neighbourhood Centre
B2	Local Centre
B5	Business Development
B6	Enterprise Corridor
E1	National Parks & Nature Reserves
E2	Environmental Conservation
E3	Environmental Management
E4	Environmental Living
IN1	General Industrial
IN2	Light Industrial
R1	General Residential
R2	Low Density Residential
R3	Medium Density Residential
R5	Large Lot Residential
RE1	Public Recreation
RE2	Private Recreation
RU1	Primary Production
RU2	Rural Landscape
RU3	Forestry
RU4	Rural Small Holdings
RU5	Village
SP1	Special Activities
SP2	Infrastructure
W1	Natural Waterways

Cadastre

Cadastre 1/02/12 © Dept of Lands



N
W E
S

0 250 500
METRES

Projection: GDA 1994
Zone 55

Scale 1: 20000 @ A3

Map Identification Number:
8710_COM_LZN_020_020_20120416