

3. C THE LOCATION

3.1. C.1 PLANNING INFORMATION

3.1.1. C.1.a Zoning, Permissibility and Land Use Constraints

The subject land for the proposed piggery is described as Lot 1 on DP 1250489, Shire of Lockhart. Figure 23 shows the cadastral details of the property. Additional land surrounding this lot (Munyabla Farm), and farms at Urana and Yerong Creek owned by the owners of KBM Farms have been designated as reuse areas.

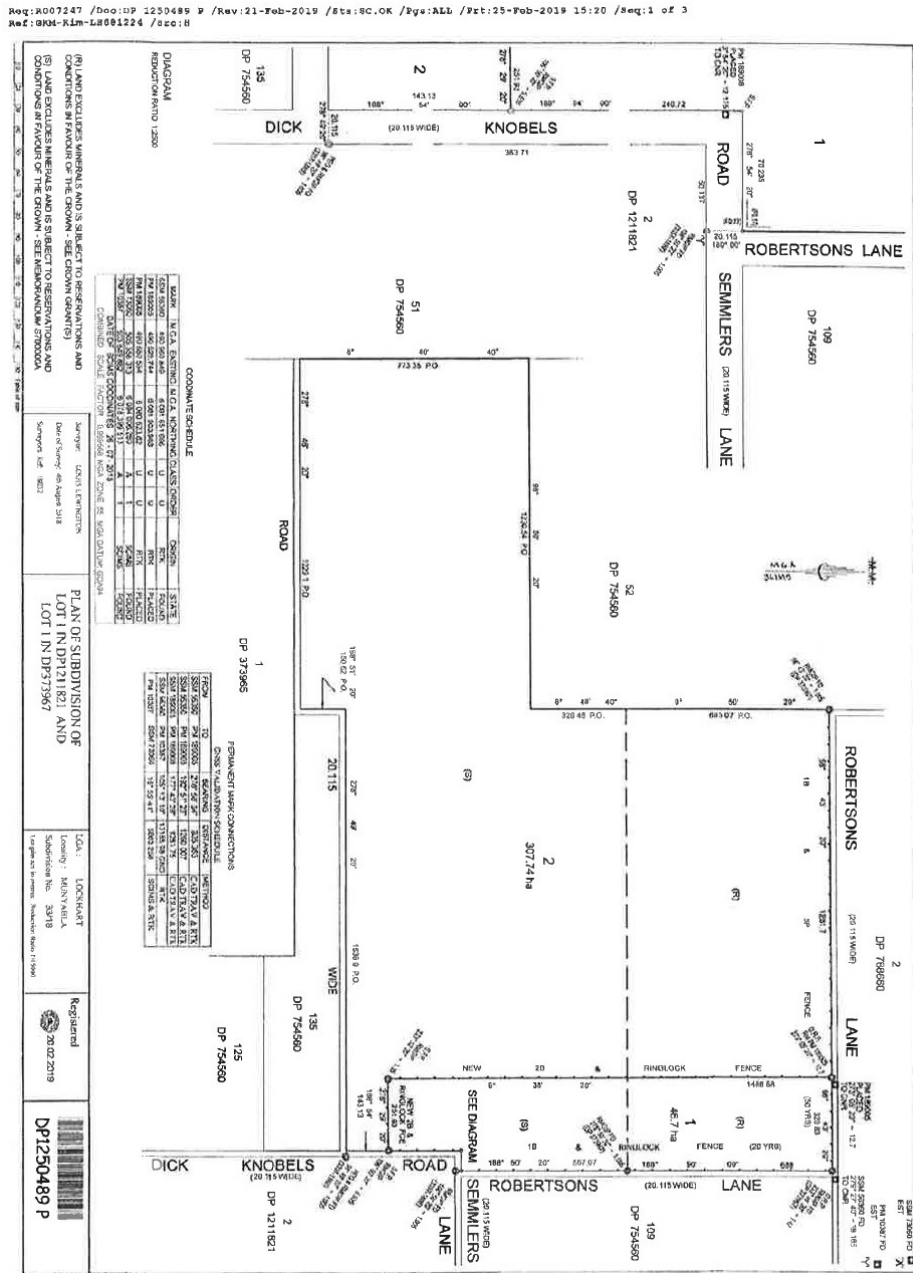


Figure 23 – Plan of Subdivision of Lot 1 in DP121821 and Lot 1 in DP373967

The NSW Planning Portal and the Lockhart Shire Local Environmental Plan (LEP) were used to identify specific planning controls. The subject property, and all surrounding land, is zoned RU1 Primary Production (see Figure 24) (LEP 2011 zoning map LSZ_004). The nearest town zones (pink) are at Pleasant Hills, Henty and The Rock.

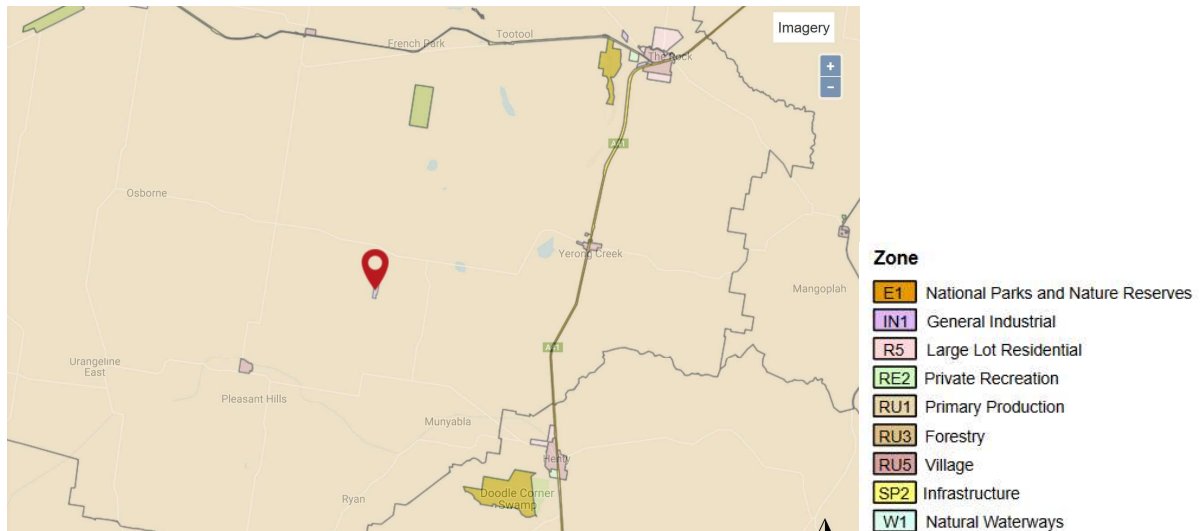


Figure 24 – District Land Use Zoning

The Urana and Yerong Creek properties that are designated for reuse are zoned RU1, as is all surrounding land.

Clause 2.3 of the LEP lists the objectives of RU1 lands as being:

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

Intensive livestock agriculture is permitted with consent.

The proposed use consistent with the objectives of the RU1 zone. The piggery will help to diversify the agricultural land uses in the area. It is suitably sited, being sufficiently separated from sensitive land uses to protect amenity, minimising the risk of conflict with other nearby land uses (see section 3.1.3). It is also well separated from waterways, native vegetation, groundwater and known Aboriginal cultural heritage sites (see sections 2.1.4 and 3.1.5). It has been designed to operate in an environmentally sustainable way: manure and effluent will be carefully managed to ensure there is no pollution of surface water, groundwater, soils, habitats or items, sites or places of Aboriginal cultural heritage significance (see sections 2.1.4 and 2.1.5 for more details). The manure and effluent will be composted and reused to enhance the structure and fertility of the soils of surrounding farmland and to productively grow crops (see sections 2.1.4 and 2.1.5 for more details). While the proposed piggery complex will occupy a small footprint, it is part of a larger system,

drawing inputs of grain and straw from a larger local area and providing compost for enhancement of the soils of nearby land. Hence, it will not alienate or fragment resource lands.

3.1.2. C.1.b Local and State Environmental Plans and Policies

This development is subject to:

- Environmental Planning & Assessment Act NSW (1979) (NSW Government, 1979)
- Environmental Planning & Assessment Regulation NSW (2000) (NSW Government, 2000)
- Protection of the Environment Operations Act (1997) (NSW Government, 1997)
- Protection of the Environment Operations (General) Regulation NSW (2009) (NSW Government, 2009)
- NSW Department of Planning (1996) EIS Guideline Piggeries (NSW Department of Planning, 1996)
- Lockhart Local Environmental Plan (LEP) (2013) (Lockhart Shire Council, 2012)
- Lockhart Shire Development Control Plan (DCP) (2016) (Lockhart Shire Council, 2016).

The objects of the Environmental Planning and Assessment Act 1997 are:

- a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,
- b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,
- c) to promote the orderly and economic use and development of land,
- d) to promote the delivery and maintenance of affordable housing,
- e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,
- f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),
- g) to promote good design and amenity of the built environment,
- h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,
- i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,
- j) to provide increased opportunity for community participation in environmental planning and assessment.

This EIS demonstrates that the proposed piggery satisfies all of these objectives.

Schedule 3 of the Environmental Planning and Assessment Regulation 2000 identifies that piggeries are designated development if they:

- (a) accommodate more than 200 pigs or 20 breeding sows and are located:
 - (i) within 100 metres of a natural waterbody or wetland, or
 - (ii) in an area of high water table, highly permeable soils or acid sulphate, sodic or saline soils, or
 - (iii) on land that slopes at more than 6 degrees to the horizontal, or
 - (iv) within a drinking water catchment, or

- (v) on a floodplain, or
 - (vi) within 5 kilometres of a residential zone and, in the opinion of the consent authority, having regard to topography and local meteorological conditions, are likely to significantly affect the amenity of the neighbourhood by reason of noise, odour, dust, traffic or waste, or
- (b) that accommodate more than 2,000 pigs or 200 breeding sows.

This proposal represents designated development since it will accommodate more than 2000 pigs or 200 breeding sows. An EIS must therefore be submitted with a development application.

The Objects of the Protection of the Environment Operations Act 1997 are as follows:

- a) to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development,
- b) to provide increased opportunities for public involvement and participation in environment protection,
- c) to ensure that the community has access to relevant and meaningful information about pollution,
- d) to reduce risks to human health and prevent the degradation of the environment by the use of mechanisms that promote the following:
 - (i) pollution prevention and cleaner production,
 - (ii) the reduction to harmless levels of the discharge of substances likely to cause harm to the environment,
 - (iii) the elimination of harmful wastes,
 - (iv) the reduction in the use of materials and the re-use, recovery or recycling of materials,
 - (v) the making of progressive environmental improvements, including the reduction of pollution at source,
 - (vi) the monitoring and reporting of environmental quality on a regular basis,
- e) to rationalise, simplify and strengthen the regulatory framework for environment protection,
- f) to improve the efficiency of administration of the environment protection legislation,
- g) to assist in the achievement of the objectives of the [Waste Avoidance and Resource Recovery Act 2001](#).

The purpose of this EIS is to ensure this proposal satisfies the objects of the Act.

Schedule 1, which covers EPA-licensed activities, includes piggeries that are intended to accommodate more than 2,000 pigs or 200 breeding sows. It therefore applies to this proposal.

The Protection of the Environment Operations (General) Regulation NSW (2009) sets out licencing fees and regulatory requirements.

SEPP 30, which is referenced in the SEARS, was repealed on 27th February 2019. SEPP 30 pertained to intensive agriculture. The "Planning Guidelines: Intensive Livestock Agriculture Development" (State of NSW, 2019) includes key information from this, along with the content of the other repealed SEPPs including SEPP (Rural Lands).

The NSW Department of Planning (1996) EIS Guideline Piggeries (NSW Department of Planning, 1996) sets out the format and information for inclusion in an EIS for a piggery. It has been used to structure this EIS.

The Lockhart LEP sets out the local environmental requirements. This section of this EIS addresses the LEP requirements as they pertain to the piggery site and the Munyabla farm.

The Lockhart LEP lot size map (LEP map LSZ_004) shows that a minimum lot size of 250 ha applies to the subject land.

The LEP map BIO_004 shows terrestrial biodiversity mapping. There are no terrestrial biodiversity areas on the piggery property, although there are some nearby, including on parts of the surround farm that will be used for reuse (see Figure 25). Clause 6.2 of the LEP pertains to terrestrial biodiversity.

- (1) The objective of this clause is to maintain terrestrial biodiversity by:
 - (a) protecting native fauna and flora, and
 - (b) protecting the ecological processes necessary for their continued existence, and
 - (c) encouraging the conservation and recovery of native fauna and flora and their habitats.
- (2) This clause applies to land identified as “Biodiversity” on the [Terrestrial Biodiversity Map](#).
- (3) Before determining a development application for development on land to which this clause applies, the consent authority must consider:
 - (a) whether the development is likely to have:
 - (i) any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and
 - (ii) any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and
 - (iii) any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and
 - (iv) any adverse impact on the habitat elements providing connectivity on the land, and
 - (b) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.
- (4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:
 - (a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or
 - (b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or
 - (c) if that impact cannot be minimised—the development will be managed to mitigate that impact.

The proposed piggery will be sited on an area that has been cropped for many years. No clearing of trees or native vegetation will occur. Hence, there will be no direct impacts to habitats nor

fragmenting or disturbance of vegetation. Manure and effluent will be carefully managed and controlled to prevent any harm through unplanned escape of nutrients from the piggery complex. Reuse will only occur on land that has been farmed for many years and suitable buffers will be provided to particularly sensitive vegetation which are shown on the native vegetation regulatory mapping on Figure 60 (Munyabla farm), Figure 65, (Urana Farm) and Figure 67 (Yerong Creek farm). Further details are provided in section 2.1.4.

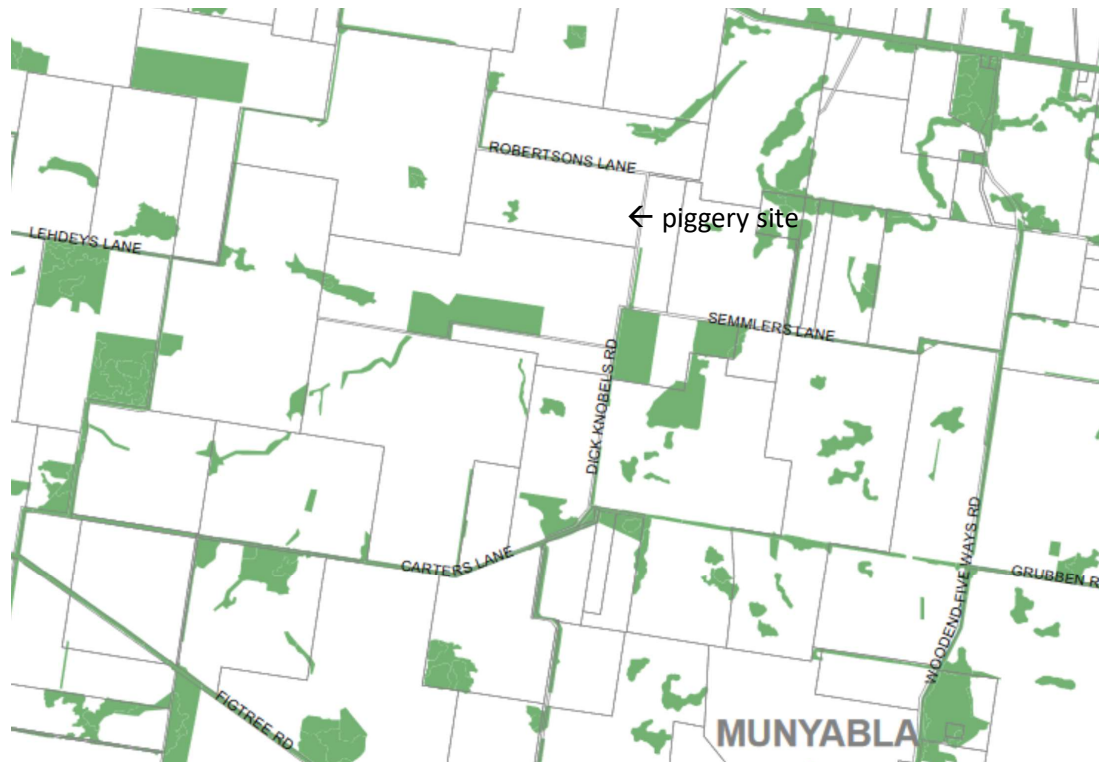


Figure 25 – Munyabla Farm: Terrestrial Biodiversity on Reuse Areas and Surrounds

LEP map WCL_001 identifies the location of watercourses. There are no designated watercourses through the subject property or the Munyabla farm reuse areas. As Figure 26 shows, the closest watercourse (Mundwaddery Creek) lies to the north and east of the site. From LEP map WET_004, there are no wetlands on or near the subject property (see Figure 27).



Figure 26 – Munyabla Farm: Watercourses

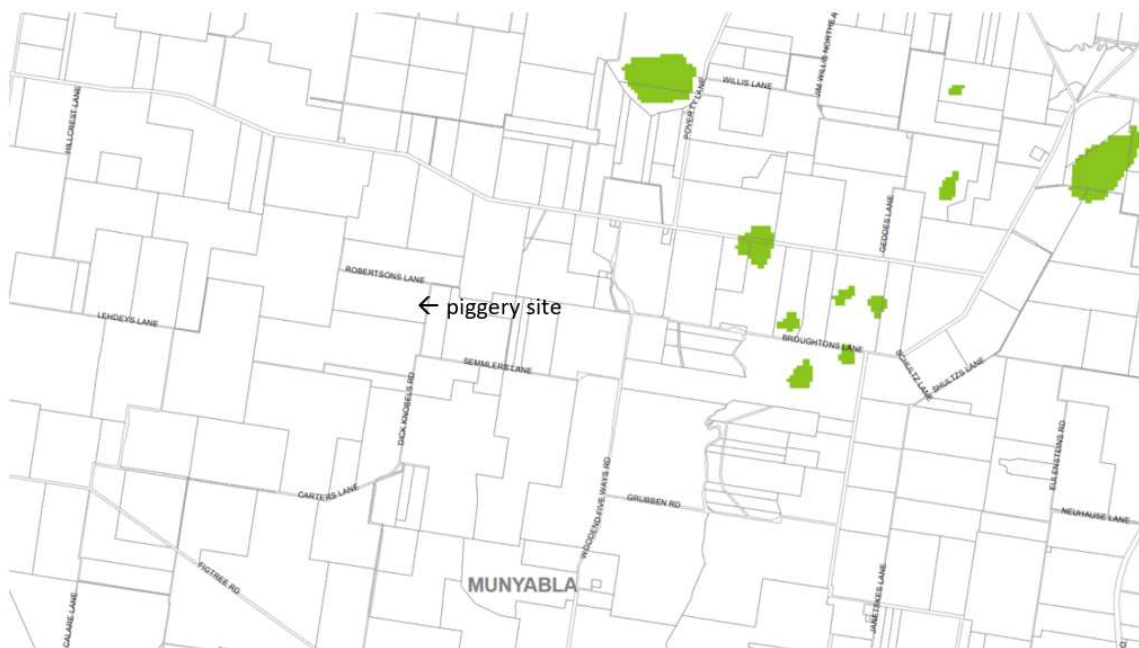


Figure 27 – Munyabla Farm Wetlands

The subject land is not subject to:

- Hazards – flooding, bushfire, mining subsistence
- Protection – including (but not limited to) acid sulfate soils, drinking water catchment, environmental conservation area, groundwater vulnerability, native vegetation protection, riparian lands and watercourse, salinity or wetlands.

There are no land acquisition reservation (LEP map LRA_001), heritage areas (LEP Map HER_004A, HER_004B and HER_004C) or defence communication buffers (LEP Map DCB_001) on the subject property, reuse areas or immediate surrounds.

The objectives of the Lockhart Shire DCP, as specified in section A, are to:

- help achieve the aims and objectives of the Lockhart Local Environmental Plan 2012 by providing more detailed controls for development;
- outline Council policies, standards and indicate the preferred future direction for development within Lockhart Shire; and
- assist in the preparation of development proposals by providing applicants and owners the relevant details of Council requirements.

Section C of the DCP gives the following objectives in relation to Rural Development:

1. Objectives

The objectives of these controls are to:

- identify Council standards for certain rural developments including rural dwellings, intensive agriculture, rural industries and extractive industries;
- ensure agriculture, intensive livestock agriculture and intensive plant agriculture are conducted in a sustainable manner;
- provide for business activities including the processing of primary products produced in the area or the servicing of agricultural equipment;
- ensure that extractive industries occur where the benefits of resource extraction are not overridden by potential impacts on the character and amenity of Lockhart Shire or on identified environmental values;
- provide guidance for the development and siting of dwellings on land zoned RU1 Primary Production within Lockhart Shire; and
- ensure that development of dwellings in rural areas of the Shire are adequately serviced.

2. Development Controls Council requires the following general standards for agricultural developments that require approval from Council.

The DCP states that applications for intensive livestock agriculture or intensive plant agriculture are to be accompanied by a Plan of Management which addresses the principles of sustainable agriculture. Sustainable agriculture is defined as the use of farming practices and systems which maintain or enhance:

- agricultural production as an economic activity;
- the natural resource base; and
- other ecosystems which are influenced by agricultural activities.

Property owners will need to address the requirements and standards for the storage and use of chemicals. To reduce environmental impact of certain agricultural activities, an assessment of the capability of the land may need to be undertaken.

Consideration should be given to the sustainability of different soil landscapes across the Shire and the suitability of steep slopes for proposed agricultural activities. Dwellings should be sited to maintain the continuity, and minimise the disturbance, of agriculturally productive land.

In relation to rural industries, measures that protect the amenity of surrounding residents should be incorporated into the design and development of rural industries. These include landscaping, sound attenuation and buffers.

The following should be considered in selecting a site for a rural industry:

- less exposure to neighbouring dwellings and noise sensitive areas;
- good vehicular access;
- suitable area to accommodate landscaping to screen the rural industry;
- suitable land capability; and
- sufficient area for expansion.

In relation to rural dwelling houses, the DCP notes that buffers between rural activities and new rural dwellings are important to ensure that there are no adverse impacts on the amenity of the dwelling as well as minimising the impacts on operating farms.

Buffer and separation distances are to consider the potential for environment harm having regard to:

- noise;
- odour or other air emission;
- water quality;
- visual impact
- traffic generation; and
- spray drift.

Buffers and separation distances that apply to RU1 Primary Production land are identified in Table 3. Where it is demonstrated that a reduced buffer or distance will achieve the desired separation of potential conflicting land uses an alternative solution may be considered at the discretion of Council. The alternative solution will need to give detailed consideration to landform, land uses, prevailing winds, etc.

For piggeries (same land), the minimum buffer around a new rural house is 500 m, extending to 1,000 m for off-site land.

Requirements in relation to roads and access for commercial and industrial purposes are specified in Table 3 of the DCP. All internal driveways will be sealed and constructed to a width suitable for the vehicles anticipated to use the site. All internal driveways are to be suitably drained. All vehicles are to be able to enter and leave the site in a forward direction. Internal driveway width of 6 metres is to be provided for two way traffic and 4.5 metres for one way traffic. Consideration is to be given to pedestrian movement in and around the development. All car parking located within Council's road

reserve will be sealed. All car parking spaces shall be line-marked using 100 mm wide lines, with a minimum width of three (3) metres. Disabled parking shall be provided in accordance with AS 1428.1 and will be suitably marked. Signs indicating the location of car parking are to be erected. The dimensions of off-street car parking spaces will comply with the design standards contained within the NSW Roads and Traffic Authority's Guide to Traffic Generating Developments.

This EIS demonstrates that the requirements of the DCP will be satisfied.

3.1.3. C.1.c Compatibility with Existing and Potential Land Uses

Appraisal of the proposal suggests that the site is suitable for the proposed purpose. All of the land surrounding the piggery and reuse areas is zoned RU1 and used for cropping and grazing. The proposed development is an allowable use in the zone and will not restrict the use of surrounding land for agricultural purposes, except perhaps if someone wanted to operate their own intensive livestock facility close to the proposed development. It is intended that grain and straw will be sourced from surrounding land owners and others in the district, and there will be opportunities for nearby farmers to access compost or sludge for use as cropping system inputs. Separation distances need to be provided between piggeries and nearby houses and other sensitive land uses to minimise the risk of odour, dust and noise nuisance. The adequacy of the available separation distance to nearby houses is dealt with in section 5.2.2. However, consultation with nearby neighbours has raised some concerns about possible impacts to amenity and land values (see section 4.1.2).

Land use conflicts can arise when one land user is thought to impinge on the rights, values and amenity of another. Most rural land use conflicts pertain to amenity (e.g. odour, dust, noise, visual amenity), but environmental concerns also arise. A land use conflict risk assessment (LUCRA) can help to identify and address potential land use conflicts before a new land use proceeds, objectively assess the effects of a proposed land use on neighbours, increase understanding of potential land use conflicts and recommend strategies to help minimise the potential for land use conflicts and contribute to the development and implementation of separation strategies. NSW Department of Primary Industries has developed a "Land Use Conflict Risk Assessment Guide" (NSW Department of Primary Industries, 2011) that has been used to inform the following LUCRA.

The four key steps in a LUCRA are:

1. gather information about proposed land use change and associated activities
2. evaluate the risk level of each activity
3. identify risk reduction management strategies
4. record LUCRA results.

This EIS provides detailed information about the proposed land use change and the associated reuse activities. The amenity and environmental risks are assessed in section 4. Risk reduction strategies are incorporated throughout section 2, but particularly in the mitigation strategies included throughout section 5. It effectively includes all elements of a LUCRA.

3.1.4. C.1 d Urban Expansion, Rural Residential Development, Recreation, Tourism or Community Facilities

Urban expansion and rural residential development are most unlikely to ever become an issue since the subject property and surrounding land is all zoned RU1 and is productive cropping and grazing country. The zoning, particularly the minimum sub-division lot size, would be a barrier to rural

residential development. The proponents are not aware of any plans for diversification of any land close to the proposed piggery for recreational or tourism uses.

3.1.5. C.1.e Heritage Items for Environmental Protection

The Lockhart LEP does not identify any heritage areas on or near the pig farm or designated reuse areas on the Munyabla farm. The site selected for the piggery complex is cropping country that has experienced high levels of ground surface disturbance from cropping and farming practices for many decades. Nevertheless, it is important to identify and protect items of Aboriginal cultural heritage significance. To that end, investigation and consultation has been undertaken to ascertain whether there may be items, sites or places of significance to Aboriginal people or communities or others. The Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (Department of Environment, Climate Change & Water, 2010), the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (NSW Office of Environment and Heritage, 2011) and the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (Department of Environment, Climate Change and Water, 2010) were all used to inform this investigation.

As a starting point, a preliminary AHIMS search was conducted for the land making up the property, plus a 1 km buffer around it. No Aboriginal sites were recorded in or near the location and no Aboriginal places have been declared at or near the location.

Consultation with Reena Goyal of the Office of Environment and Heritage confirmed that the subject property is not listed on the State Heritage Register (pers. comm. Reena Goyal, Office of Environment and Heritage, 9th July 2018).

Jodie Rikiti of the Aboriginal Land Rights Act (ALRA) undertook a search of the Register of Aboriginal Owners (pers. comm. 20th June 2018). The project area described does not have Registered Aboriginal Owners pursuant to Division 3 of the *Aboriginal Land Rights Act 1983* (NSW Government, 1983).

A representative of the National Native Title Tribunal (NNTT) identified that they are not aware of any native title claimants, native title holders or registered indigenous land use agreements within a 10 km radius of the site (15th June 2018, pers. comm. email).

Consultation with Aboriginal stakeholders was undertaken in accordance with clause 80C of the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010* (NSW Government, 2010) following the consultation steps outlined in the Aboriginal Cultural Heritage Consultation Requirements for Proponents (Office of Environment and Heritage, 2010). The guide outlines a four-stage process of consultation as follows:

- Stage 1 – Notification of project proposal and registration of interest.
- Stage 2 – Presentation of information about the proposed project.
- Stage 3 – Gathering information about cultural significance.
- Stage 4 – Review of draft cultural heritage assessment report.

A summary of actions carried out in following these stages are as follows.

Stage 1.

Broad consultation was undertaken to ensure all groups or individuals that might have an interest in the project were identified (see Appendix F). This process identified that the following parties might have an interest in the project:

- Wagga Wagga Local Aboriginal Land Council
- Albury Local Aboriginal Land Council
- Narrandera Local Aboriginal Land Council
- Yalmambirra
- Bangerang Aboriginal Corporation (Freddy (Doogalook) Dowling)
- Bundiyi Aboriginal Cultural Knowledge (Mark Saddler)

Because the Lockhart Shire Council (pers. comm. 26th April 2018) and the Office of Environment and Heritage (Dan Clegg, pers. comm. 13th June 2018) had both recommended engaging with the Wagga Wagga Local Aboriginal Land Council, this group was invited to undertake a preliminary site survey. A report describing their findings was provided on 9th August 2018. It is provided as Appendix G. This survey is included as part of the consultation with Aboriginal stakeholders detailed below.

Stage 2. Each of the six parties identified as possibly having an interest in the project were provided with information about the proposed project. This included a description and maps of the site and an overview of the proposed development. The parties other than the Wagga Wagga Local Aboriginal Land Council were also provided with a copy of their site survey report that was completed before this stage. Each party was invited to contribute any information regarding known Aboriginal cultural significance values associated with the subject area and/or any Aboriginal objects contained therein. A minimum of 28 days was allowed for a response to the document.

Wagga Wagga Local Aboriginal Land Council were interested in further consultation and in undertaking a site survey. (Note: this is the site survey mentioned in stage 1).

Albury Aboriginal Land Council advised that their border ends near Culcairn and Holbrook and that they wouldn't need to be involved (pers. comm. Sam Kirby, 21st June 2018).

Narrandera Local Aboriginal Land Council did not respond.

A representative of Yalmambirra emailed to say: "Many thanks for the information. I am satisfied that all has been covered at this point in time. The reps from Wagga Wagga Local Aboriginal Land Council appear to have things covered also. I thank you, on behalf of the Wiradjuri Council of Elders, for engaging in an appropriate manner in consulting with local First Nations peoples and for contacting me." (pers. comm. 11th November 2018).

Bangerang Aboriginal Corporation did not respond.

Mark Saddler of Bundiyi Aboriginal Cultural Knowledge expressed particular interest (various communications, November 2018).

Stage 3. To gather information about site sensitivity, the groups that expressed an interest in the project (Wagga Wagga Aboriginal Land Council and Bundiyi Aboriginal Cultural Knowledge) were invited to undertake a site inspection.

Mr Leonard Lyons and Mr Darryl Charles of the Wagga Wagga Aboriginal Land Council undertook their site survey on 9th August 2018. They provided a written report following their site survey, a copy of which is provided as Appendix G. The purpose of the survey was to assess whether there were likely to be cultural heritage impacts from the proposed piggery development. The survey was undertaken on foot. It was observed that weather conditions were dry and that ground visibility was limited, with ~70% vegetation coverage of the ground.

In their report, it was noted that the Aboriginal Heritage Information Management System (AHIMS) has no recorded sites, items or objects on the property. However, further investigations were recommended once work commences.

Mr Mark Saddler of Bundyi Aboriginal Cultural Knowledge was familiar with the area. He commenced his study by undertaking an AHIMS search covering a larger area (GDA zone 55, Eastings 494000-495000, Northings 6082000-608,3000 plus a 1 km buffer) than the original search. This picked up two Aboriginal sites but no declared Aboriginal places. He undertook his site visit on 14th February 2019. A detailed report was prepared and this is provided as Appendix H.

In his report, Mr Saddler observed that Yerong and Kengal (The Rock) are areas that have been inhabited by his Wiradjuri people for over 60,000 years. The Wiradjuri people still use these places today to connect to their culture. Figure 28, taken directly from Mr Saddler's report, shows the location of places (red lines) and items (pins) of cultural heritage significance to Wiradjuri people.

Mr Saddler noted that existing and old creek lines are also extremely important to the area and to the Wiradjuri people. Figure 29, also taken directly from Mr Saddler's report, shows old and existing creek lines (red lines) as well as the special Munyabla area (green shading). Munyabla and the surrounding area include many Wiradjuri scar trees, sources of bush tucker and wildlife refuges for native animals.

Mr Saddler was particularly interested in:

- the potential for contaminants in wash-out or run-off from general cleaning or flooding entering the old or existing waterways and causing issues with native vegetation, animals and Wiradjuri special places and items. He would like to see the piggery avoid the possibility of this occurring through careful shed siting or extra holding dams.
- protecting any recorded Aboriginal items. These must remain at the property and can only be moved in the presence of an Elder or Wiradjuri community member. Where items cannot be moved (e.g. scar trees, if any), exclusion zones must be placed around them.
- requiring workers involved in the construction and running of the piggery to have cultural awareness training and education provided by local Elders or Wiradjuri community members.
- ensuring that all Aboriginal sites and items are treated with respect and that any work in this area takes into consideration any impacts.

Stage 4 No known Aboriginal objects or declared Aboriginal places have been located within the area of the proposed activity. However, the sensitivity of the landscape is acknowledged. In particular,

consultation with interested parties (see above) has identified that there are places and items of cultural heritage significance to the Wiradjuri people within the surrounding area (see Figure 28).

To minimise the risk of damage to artefacts, the piggery complex will be sited away from old and current waterways. Additionally, KBM Farms will commit to the Piggery Manager undertaking cultural awareness training and education provided by local Elders or Wiradjuri community members. The contractors involved in excavations for the site will also be expected to undertake this training. This is to help with the identification of Aboriginal items during construction, and to ensure all Aboriginal sites and items will be treated with respect, with any work considering the potential for impacts. In the event that an Aboriginal object is found during construction, work will immediately stop and the Office of Environment and Heritage will be notified as soon as practical. If human remains were found, work will stop, the site will be secured and the NSW Police and the Office of Environment and Heritage will be notified as soon as practical.

Any Aboriginal items recorded in the future on land used for the piggery or its reuse areas will be protected. These will remain at the property and will only be moved in the presence of an Elder or Wiradjuri community member. Where items cannot be moved (e.g. scar trees, if any), suitable buffers will be placed around them.

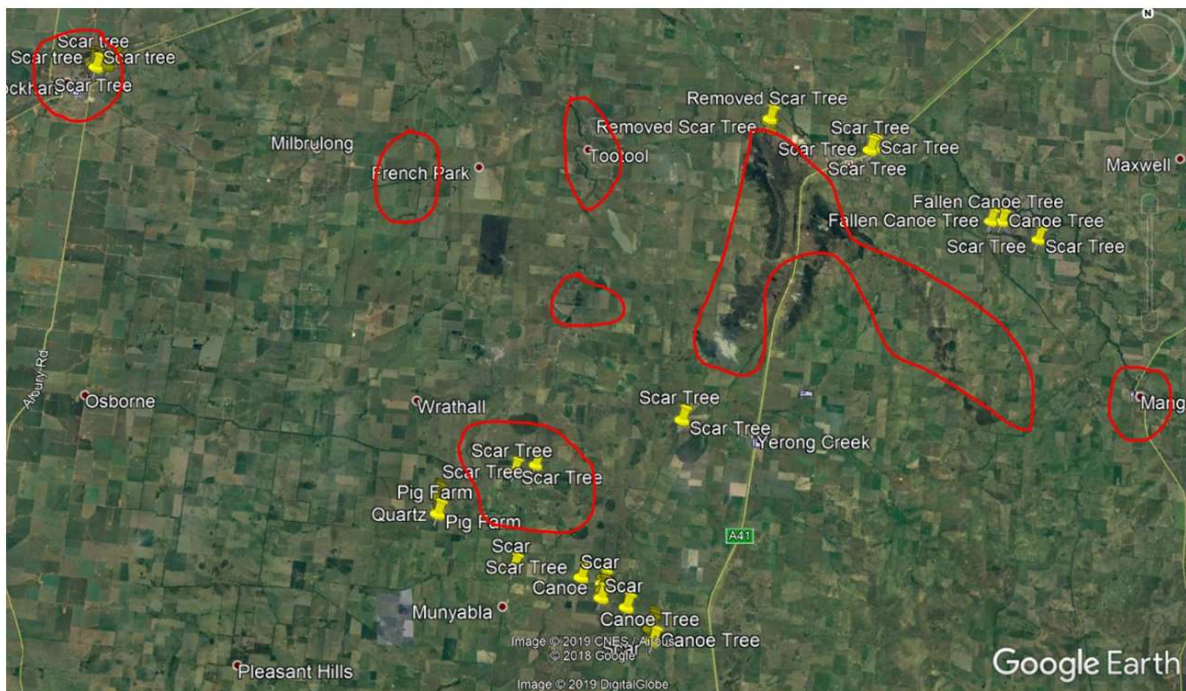


Figure 28 – Wiradjuri Special Places and Items

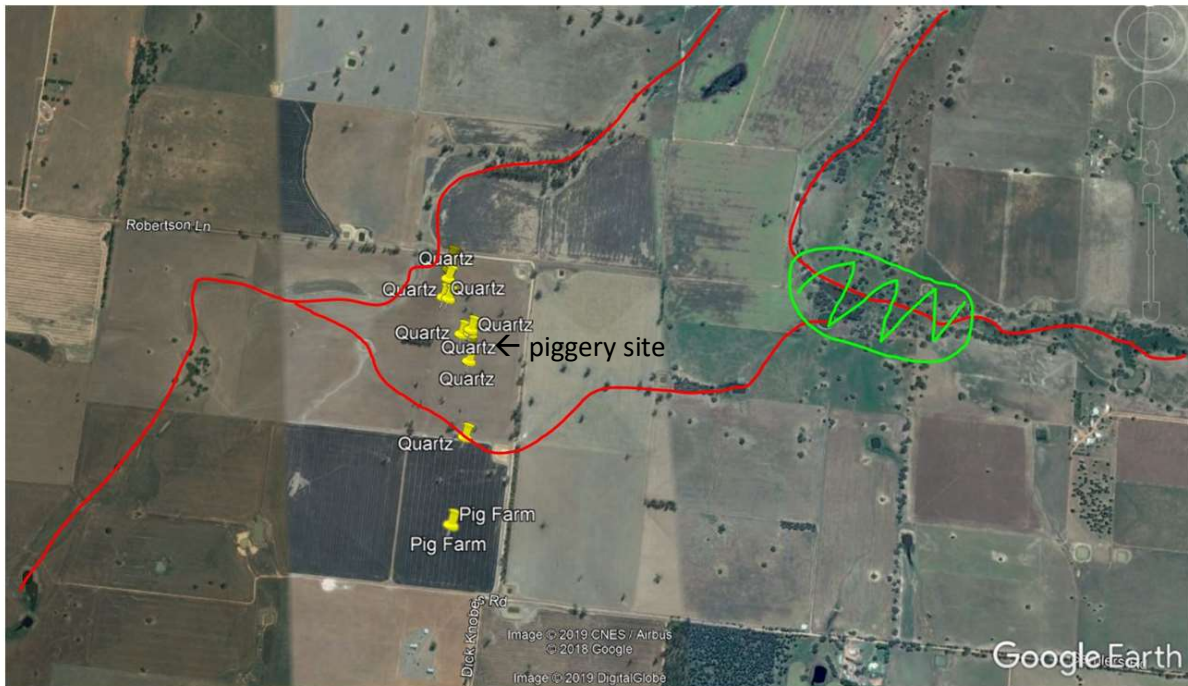


Figure 29 – Creeklines and Wildlife Refuge

A range of measures will be put into place to protect waterways, native vegetation, animals and Wiradjuri special places and items from effluent and manure from the operating piggery. These are detailed in sections 2.1.4, 2.2.3, 2.3.4 and 2.3.6 of this report. They include:

- ensuring the piggery buildings, effluent ponds and composting area are suitably designed and bunded to prevent the escape of manure and effluent in the event of a spill
- constructing and managing piggery buildings to prevent ingress of stormwater and uncontrolled exit of effluent and manure
- ensuring the settling tank, ponds and manure composting area are constructed with bunds or walls that prevent ingress of stormwater and uncontrolled exit of effluent and manure.
- sizing the effluent ponds for a 1 in 10-year spill frequency
- maintaining suitable buffers to waterways, vulnerable native vegetation, known items of Aboriginal cultural heritage significance and sensitive land uses.

A draft version of this section of this EIS was forwarded to the Wagga Wagga Local Aboriginal Land Council and to Mr Mark Saddler of Bundyi inviting feedback. Mark Sadler advised that he had read the emailed information and was happy with the findings and the report (pers. comm. 16th April 2019). No feedback was received from the Wagga Wagga Local Aboriginal Land Council.

3.2. C.2. SITE AND LOCALITY DESCRIPTION

3.2.1. C.2.a Title Details and Land Tenure

The title deeds are freehold and the piggery site is owned by KBM Farms. Title deeds, title searches and plans will accompany the development application.

3.2.2. C.2.b Location of the Proposal

The subject property is situated at 553 Dick Knobels Road, Munyabla (35° 24' 31" S, 146° 53' 59" E). Figure 30 shows the location of the property in relation to nearby towns. Figure 31 and Figure 32 show the location of the subject land on a local scale. Figure 33 shows a close-up of the property.

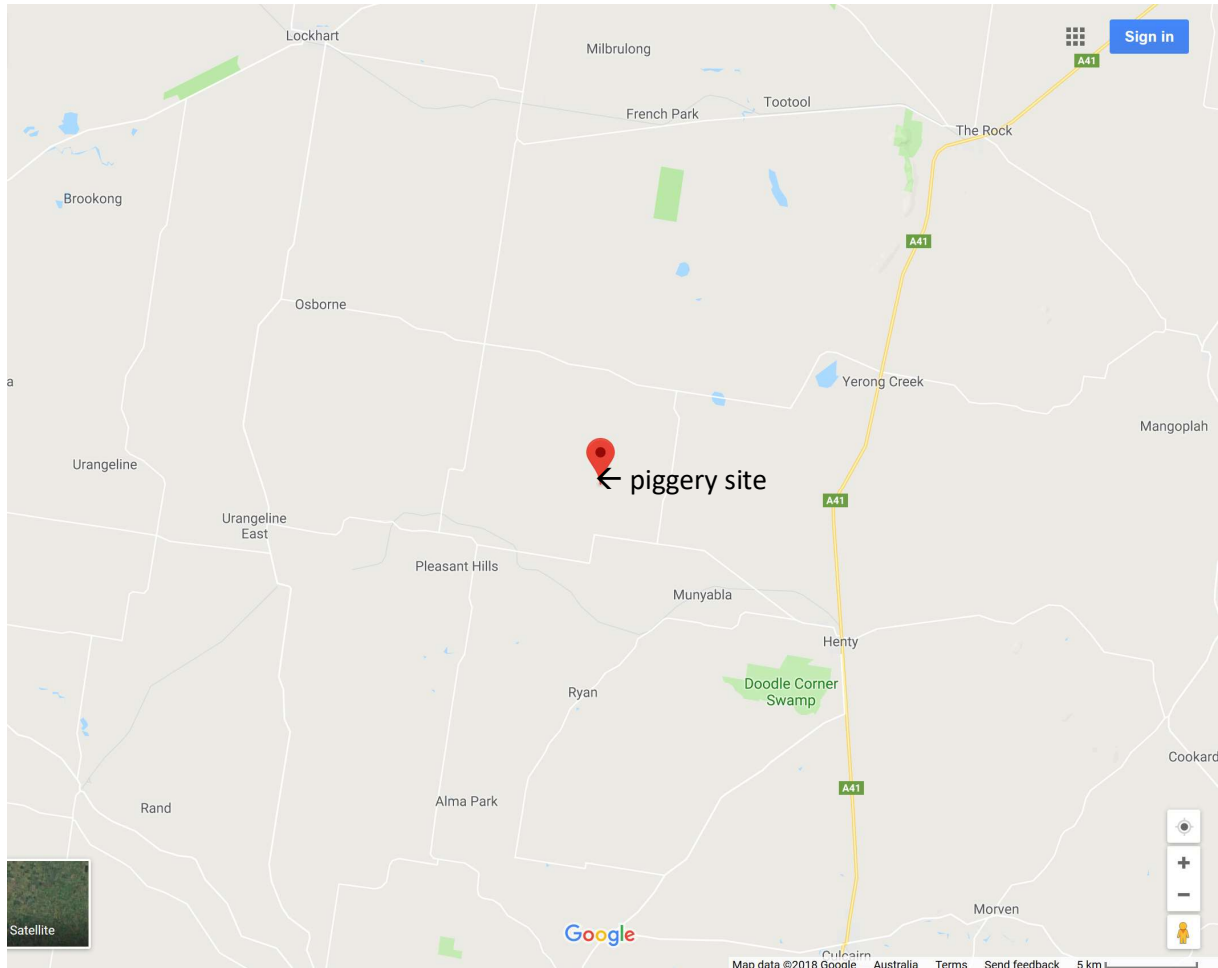


Figure 30 – Location of Property – District Scale (source: Google Maps)



Figure 31 – Location of Property – Local Scale



Figure 32 – Location of Property Local Scale (Google Earth, accessed 6th February 2018)



Figure 33 – Site Aerial Photo (Google Earth, accessed 6th February 2018)

3.2.3. C.2.c Surrounding Roads

Local access to the site will mostly be via Dick Knobels Road which forms part of the eastern boundary of the property. This is an unsealed road in good condition. Semlers Lane is a gravel road in reasonable condition. Robertson’s Lane forms most of the eastern boundary and also the northern boundary of the property. However, this will not be used at all by piggery traffic or for site access; this includes the disused crown road to the north of the site (part of Robertsons Lane).

3.2.4. C.2 d Drainage Lines, Waterways, Natural and Artificial Waterbodies

The topographic features of the Munyabla Farm and surrounds are shown on Figure 34 which is taken from the Mt Pleasant topography map from <https://maps.six.nsw.gov.au/etopo.html>. Local waterways and drainage lines are shown on Figure 35.

The Munyabla property is located within the Bullenbong Creek catchment. No watercourses run through the lot designated for the piggery. The closest waterways are the ephemeral Mittagong Creek which is situated to the north and north-west of the site and runs through the Munyabla Farm, and Mundwaddery Creek which is an ephemeral stream with irregular waterholes which is located to the north-east of the subject property. Mundawaddery Creek is identified as a Riparian Lands Watercourse in the Lockhart Environmental Plan 2012. These creeks drain via Bullenbong Creek to the Murrumbidgee River which itself drains to the Murray River.

The Lockhart Shire State of the Environment Report (Lockhart Shire Council, 2017) identifies that all of the creeks within the shire are intermittent, with little information on stream flow. When the

creeks run, water clarity is very poor due to the amount of soil entering with runoff and from the moving sediment load of the creeks.

About 1 km to the north-east of the subject property, there is an area of seasonal inundation. It is likely that local surface water drains to this area before being removed through infiltration and evaporation. The property is about 6 km to the south-west of ephemeral wetlands identified in the Lockhart Local Environmental Plan 2012. Doodle Corner Swamp (near Henty) is about 14 km to the south-east of the subject land. It is identified in the Greater Hume Local Environmental Plan 2012 and is a nationally important wetland. The latter two wetlands also appear to be ephemeral. They are possibly the result of local surface runoff with drainage restricted by low-permeability subsoils, rather than regional shallow water tables.

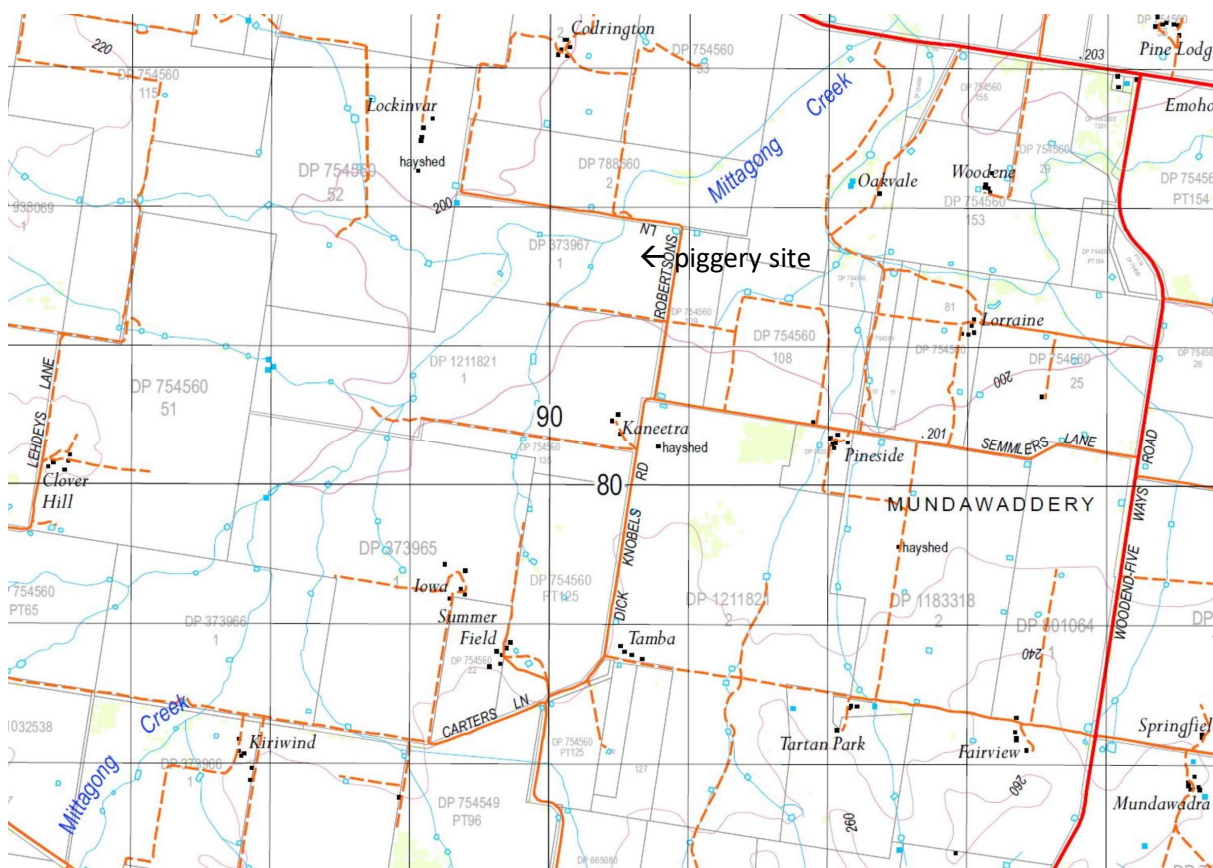


Figure 34 – Munyabla Farm: District Topographic Details

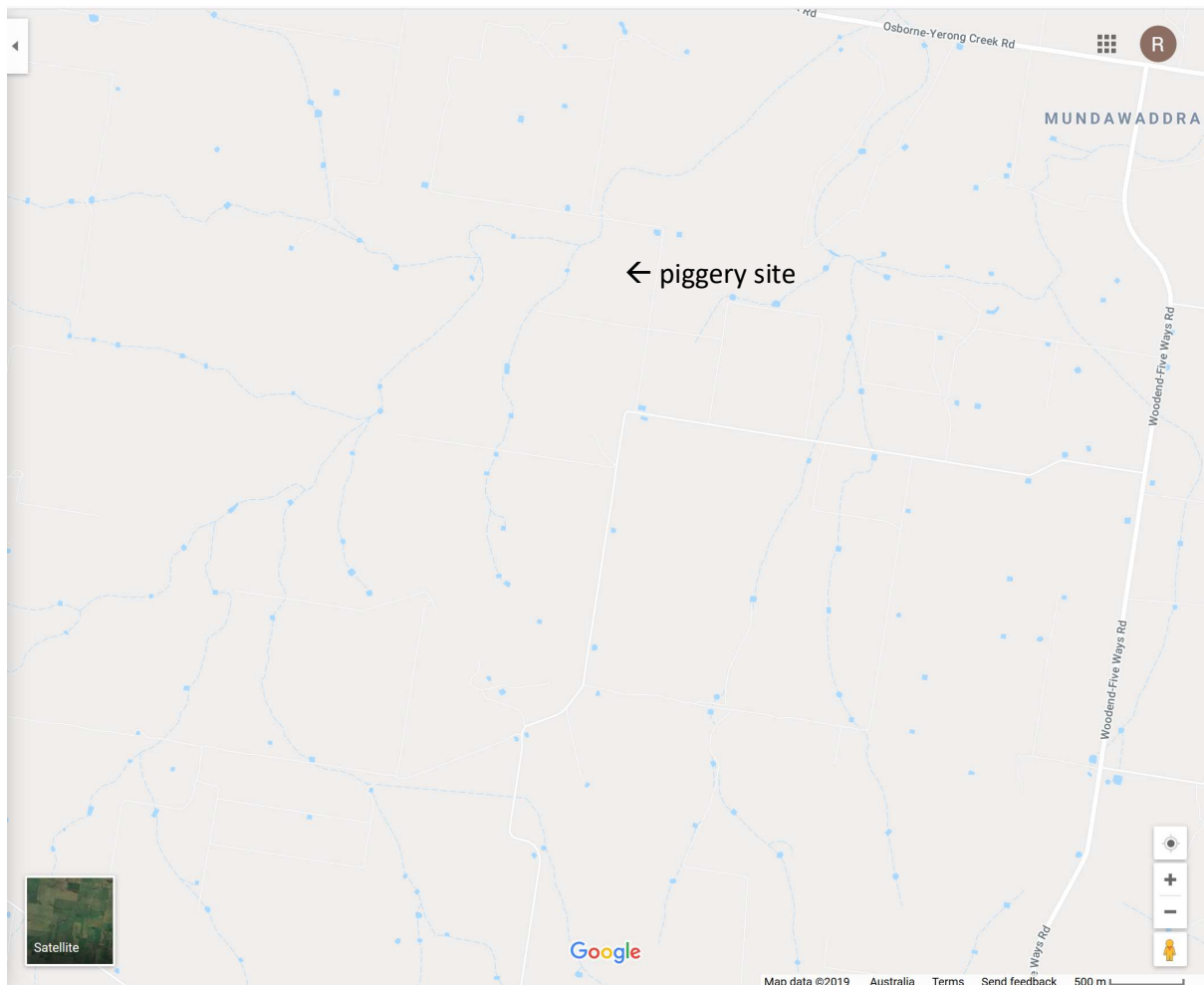


Figure 35 – Local Waterways Near Munyabla Farm & Piggery Site

Figure 36, Figure 37, Figure 38 and Figure 39 show topography, flooding, wetlands, and waterways and riparian land for the Urana farm as taken from the Urana LEP (Urana Shire Council, 2011). (Note: Urana Shire is now part of Federation Shire). Billabong Creek, on the western margin of the property, is the closest waterway and associated drainage lines pass through parts of the property. There is a low-lying area on the northern boundary of the farm. The other important feature is Lake Urana which is to the north near the town of Urana. Lake Urana is fed by Urangeline Creek.

The property is flat with a low elevation. Figure 37 shows that most of the farm is subject to flooding, which could affect suitability for reuse. A flood study prepared for the nearby town of Urana identified that the town has experienced major floods in June 1889, July 1891, June 1931, January 1934, October 1934, July 1936, January 1974, October 2010, February 2011 and March 2012. The 2012 flood is likely to be the largest flood event at Urana since 1889 and was similar to the 1% AEP event, while the October 2010 event was similar to the 2% AEP event (Reeves M and Hossain A, 2017). According to Greg Male (pers. comm. 18th June 2019), the property has flooded only twice in the 12 years he and James have managed it (2010 and 2012). As these were very big floods, and there has been no other flooding in 12 years, the flood frequency of the land is likely to be well less than 1 in 5 years.

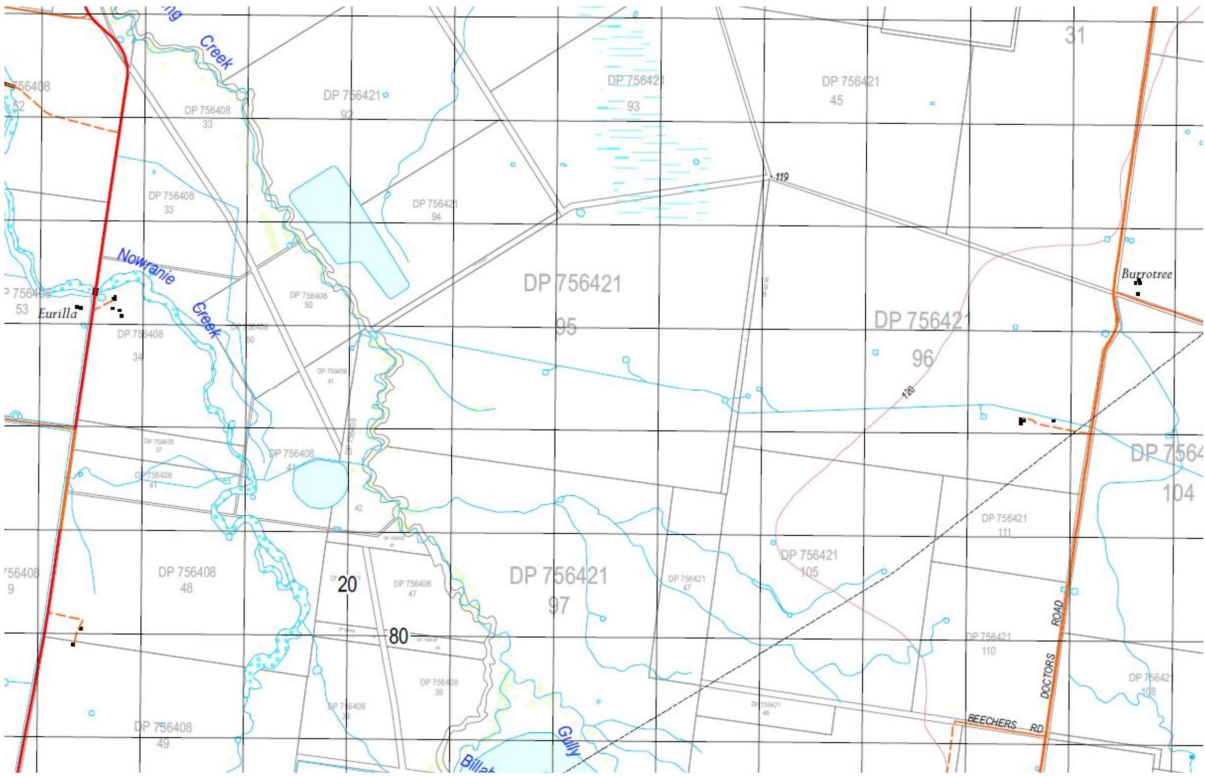


Figure 36 – Topography of Urana Farm (Reuse)

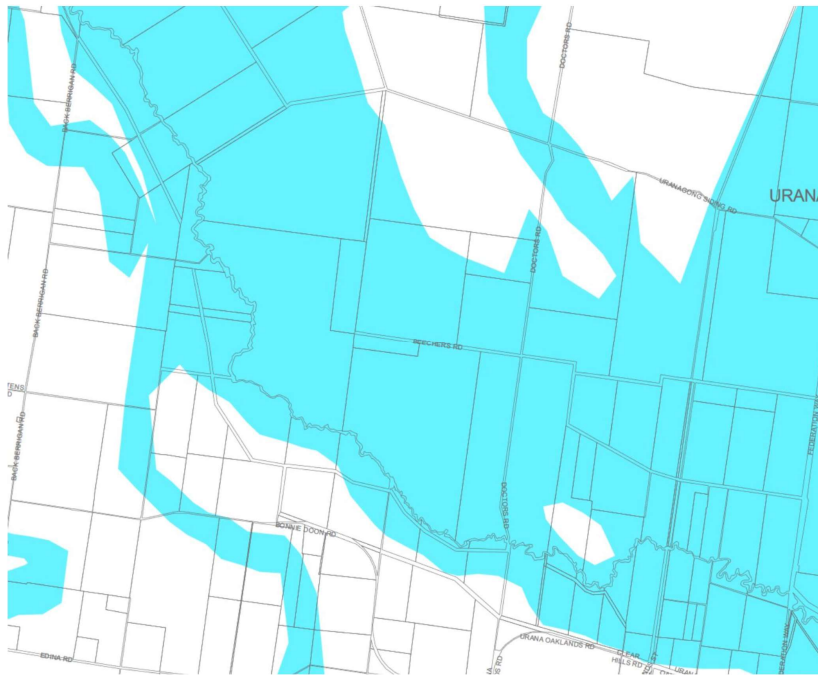


Figure 37 – Urana Farm: Flood Mapping from Urana LEP

Figure 40 shows the topography of the Yerong Creek farm. The topography varied from relatively flat to gently undulating. The main watercourse through the property is Wattle Creek which runs in a south-westerly direction.

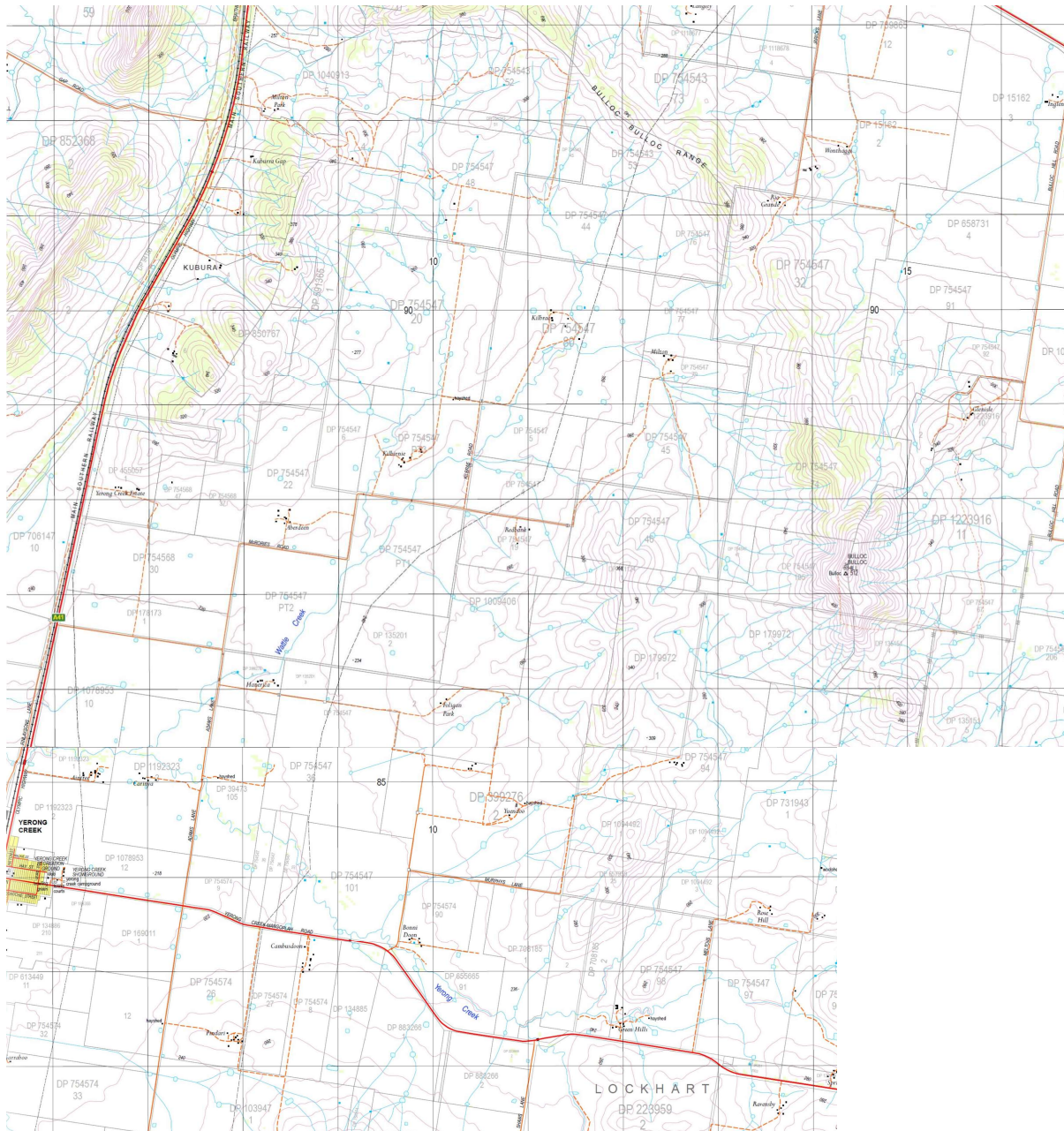


Figure 40 – Topography of Yerong Creek Farm (Reuse)

3.2.5. C.2.e Adjoining Communities, Dwellings and Existing Land Uses

The main surrounding land uses include broadacre cropping and grazing. Birgit Ronnfeldt, Administration Assistant - Planning at Lockhart Council was consulted about whether there were any intensive livestock facilities with development approval near the piggery site (pers. comm. 25th March 2019). She advised that there were no other intensive livestock facilities with development approval in the district, although there could be some temporary / drought feeding facilities. Such a facility is located some 1.85 km to the south-south-east of the property near house 4.

There are no close towns or rural residential developments. However, there are a number of houses on nearby farms; Figure 41 shows the location of these. The closest residences not owned by one of the owners of KBM Farms are house 1, house 3 and house 7, which will both be separated from the piggery site by distances of approximately 1.5 km, 1.6 km and 1.75 km, respectively. (House 3 is owned by the mother of one of the owners of KBM Farms.

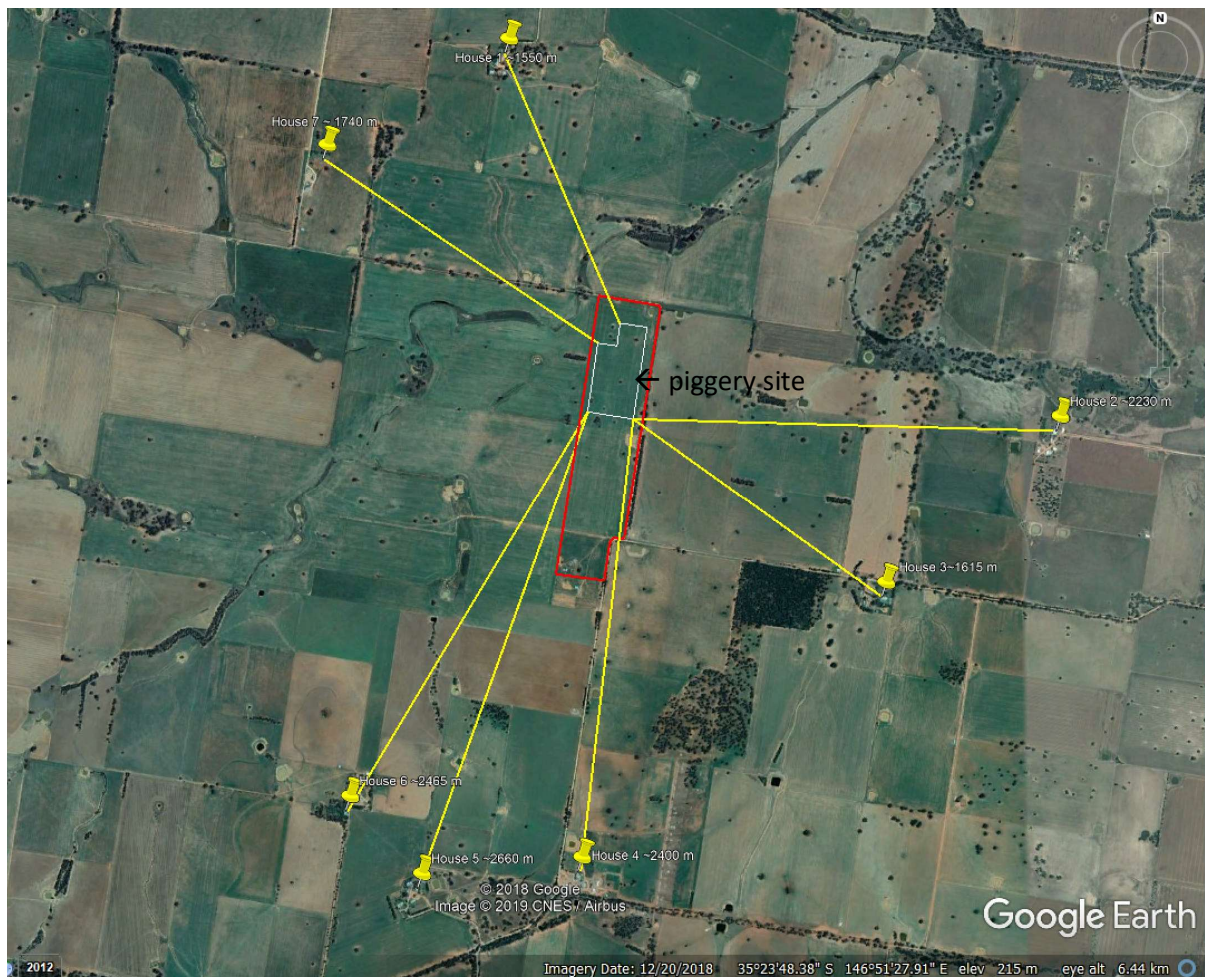


Figure 41 – Nearby Houses

3.2.6. C.2.f Sight Lines from Dwellings or Public Places

Because the piggery site is close to the property boundary, it is visible from nearby roads.

Because the surrounding land has relatively flat terrain that has been cleared for farming, the site will also be visible from some of the nearby houses. Figure 42 to Figure 48 show the terrain between the piggery and houses 1 to 7 (as shown on Figure 41). Photograph 6 to Photograph 11 show the view from the piggery complex from house 1 to house 7. Because the houses are at similar or slightly higher elevations, the piggery site will also be visible from some of these houses. To soften the visual impact, several rows of trees and shrubs will be planted around the perimeter of the piggery complex. Details are provided in section 2.3.5.



Figure 42 – Terrain from Piggery Complex to House 1



Photograph 6 – View from Piggery Complex to House 1

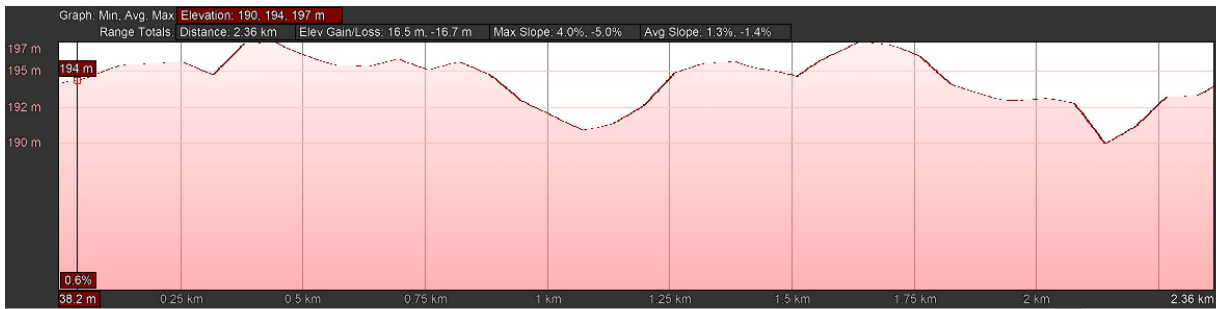


Figure 43 – Terrain from Piggery Complex to House 2



Photograph 7 – View from Piggery Complex to House 2

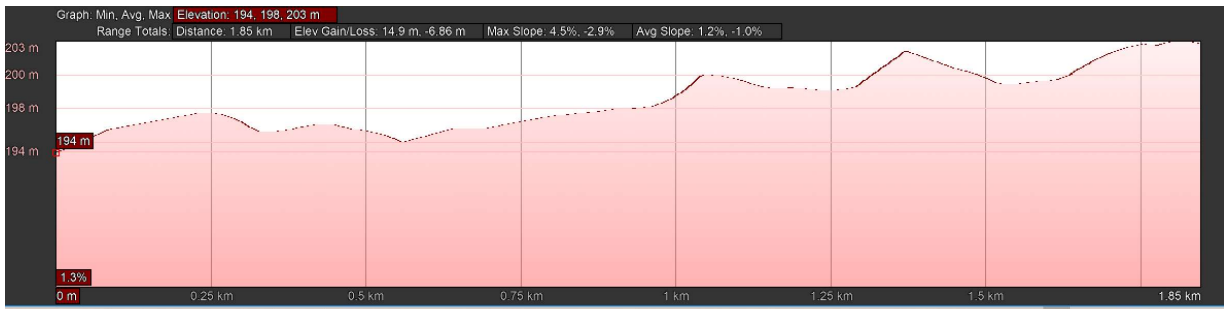


Figure 44 – Terrain from Piggery Complex to House 3



Photograph 8 – View from Piggery Site to House 3



Figure 45 – Terrain from Piggery Complex to House 4



Photograph 9 – View from Piggery Site to House 4



Figure 46 – Terrain from Piggery Complex to House 5



Photograph 10 – View from Piggery Site to Houses 5 and 6



Figure 47 – Terrain from Piggery Complex to House 6

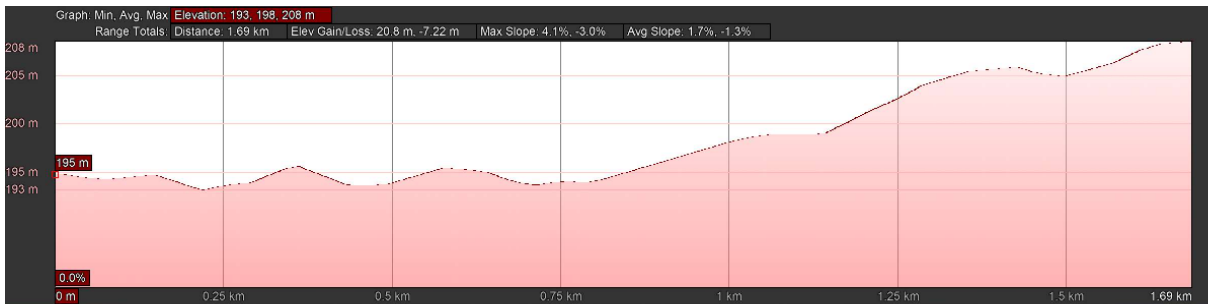


Figure 48 – Terrain from Piggery Complex to House 7



Photograph 11 – View from Piggery Site to House 7

3.2.7. C.2 g Utilities

Power will need to be connected to the site. This will most likely be a mix of three phase and single phase. The proponents have obtained a quote for this connection and have costed it into their construction budget. Two diesel generators will be installed to provide back-up power. Once the piggery is developed to stage 3, it is intended that the anaerobic pond will be covered and biogas collected to generate heat and power for use within the piggery. Refer also to section 2.2.3.

Water will be accessed from an on-farm bore and harvested roof run-off (see section 2.4.3).

The piggery will utilise existing roads for transport. Traffic routes are described in section 2.4.5. Site access will be via Dick Knobels Road and Semlers Lane. Other local roads that will be used include: Henty-Pleasant Hills Road, Alma Park Road, Walbundrie-Alma Park Road, Kywong-Howlong Road. The Riverina Highway and National Highway M31 will also be used. Refer to section 2.4.5 for details.

3.3. C.3 OVERVIEW OF THE AFFECTED ENVIRONMENT

3.3.1. C.3.a Surface Water and Ground Water

A hydrogeological report has been prepared for the piggery site by Water Technology. It is provided as Appendix E. While its focus is on groundwater, it includes an overview of surface water resources.

The Munyabla property is situated within the Bullenbong Creek catchment. The local gradient is generally to the north towards the Murrumbidgee River. Regionally, the land surface gradient is generally to the west. The property is located to the south and south-east of the ephemeral Mittagong Creek. The ephemeral nature of this creek suggests that it is a losing stream. The site is to the south-west of an isolated area of seasonal inundation which is probably where local surface drainage collects temporarily. It is about 1 km to the south-west of Mundawaddery Creek which is identified as a Riparian Lands Watercourse in the Lockhart Shire Local Environmental Plan (LEP) (Lockhart Shire Council, 2012) (see Figure 26). Mundawaddery Creek is a tributary of the Bullenbong Creek. Some 6 km to the north-east of the site are wetlands identified in the LEP. Doodle Corner Swamp near Henty is located some 14 km to the south-east of the property, near Henty.

According to Appendix E, groundwater within the landscape is mainly found within unconfined fractured rock aquifers, with groundwater moving through fractured basalt or fresh bedrock. While minor groundwater resources may be found within colluvial and alluvial sediments, these are likely to be seasonally perched. Because the regional land surface slopes gently to the west, it is likely that the fractured rock aquifer also drains to the west towards the Cullivel / Urana region. It is possible that the system discharges as lateral inflow into the Tertiary groundwater systems of the eastern Murray Basin sediments.

Groundwater data was obtained from the NSW Office of Water groundwater portal. The location of nearby bores is shown on Figure 49. Hydrogeological data in the vicinity of the proposed piggery is limited. However, a review of a number of bore logs in close proximity to the site (e.g. GW000877, GW 011025, GW 028217, GW 021429, GW 02894) suggest that shallow groundwater is unlikely to be present beneath the site and is likely to be protected by thick clay layers (24 m->50 m) in the upper stratum. GW 000877 had a drilled depth of 87.8 m with water at 62.8 m; the other bores were deeper. Most boreholes are 90-120 deep, suggesting this is the main target groundwater supply in the area.

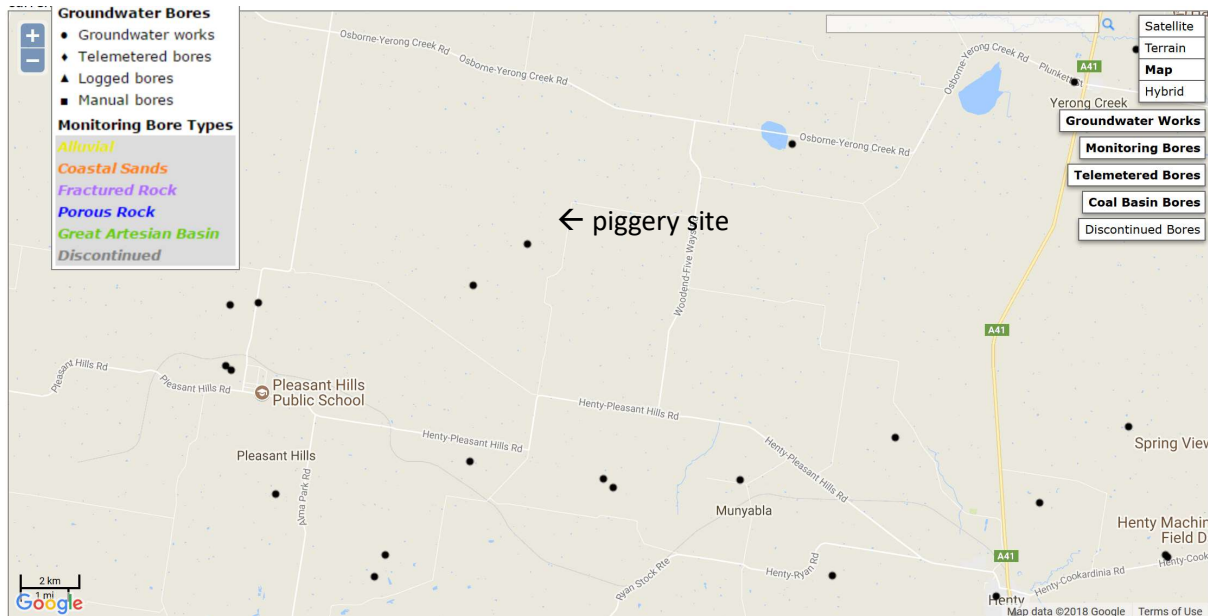


Figure 49 – Location of Groundwater Bores in the Vicinity of the Property

A bore has recently been drilled near the southern boundary of the piggery block (GW416900, Works Licence 40WA41717210). From the bore log, weathered granite was found at 21 m, with fresh granite to 114 m. Groundwater was encountered from 74 m. As the static groundwater level was reported as 38 m deep, the fractured rock aquifer is likely semi-confined (sub-artesian). The bore yield was reported as 2 L/sec with salinity of 2300 mg/L or ~4100 $\mu\text{S}/\text{cm}$.

Because the static depth of the groundwater exceeds 35 m, it is unlikely that this semi-confined system is discharging to the surface in the vicinity of the piggery site, it is unlikely that there are associated groundwater dependent ecosystems.

As part of Appendix E, the capacity of the groundwater aquifer to support a demand of 30-40 ML/yr was assessed. As no hydrogeological parameter investigations were undertaken, the results must be considered a guide only.

The assessment suggested that pumping at a continuous flow rate of 1-1.3 L/s drawdown at 10 m from the proposed bore could be 16-20 m using conservative aquifer parameters, or 2-2.5 m using mid-range aquifer parameters. Ignoring rainfall recharge, a zone of drawdown influence could extend 5 km from the extraction point after 5000 days (13.7 years). How the groundwater salinity may be affected by pumping is unknown, particularly if there is draw-down from adjoining aquifers that may contain water with different salinity levels. The yield and quality of groundwater over time will need to be carefully monitored. If an additional bore needs to be drilled to help satisfy the water needs of the piggery, it should be drilled at a suitable distance from the newly drilled piggery bore in order to minimise well-interference.

The closest neighbouring bore (GW011025) is approximately 1500 m to the west of the proposed piggery bore (GW416900). It is licensed for stock and domestic purposes. It is estimated that

continuous pumping from the piggery bore at 1-1.3 L/s could result in drawdown in bore GW011025 of 2.4-4 m of drawdown based on conservative estimates and 0.3-0.4 m of drawdown using mid-range estimates. It is thought that the proposed development will not prevent the ongoing use of this bore for stock water.

Bore GW0282 is approximately 4 km to the south-west of the proposed piggery bore (GW416900). This bore is also licenced for stock and domestic purposes. This bore appears to be constructed to access the same aquifer as the piggery bore. However, it is not expected that the use of this bore for stock and domestic purposes will be impacted by the use of groundwater by the proposed piggery.

Appendix E also addresses water sharing plans. These plans must share water between all water users and the environment, improve river health, provide security of access for water users, meet the social and economic needs of rural communities and provide for water trading. Hence, they aim to achieve sustainable groundwater extraction by limiting extractions to part of the aquifer recharge, leaving the balance to meet environmental requirements, namely aquifer through flow and groundwater dependent ecosystem needs (NSW Office of Water, 2011). The proposed development is located within the Lachlan Fold Belt Groundwater Management Area of the NSW Murray Darling Basin Fractured Rock Area, within the Murrumbidgee Catchment (NSW Government, 2013).

From Appendix E, the Lachlan and South Western Fractured Rock and New England Fractured Rock and Northern Basalts Water Resource Plan Areas consist of nine Sustainable Diversion Limit (SDL) resource units with different geological characteristics. The Lachlan Fold Belt MDB SDL unit (GS20) consists of strongly deformed/metamorphosed marine sedimentary rocks, cherts, siltstones, and mafic to intermediate volcanic and plutonic rocks of early Cambrian to Devonian age from 541 to 359 million years ago. This is the most extensive of the groundwater systems, extending from the Great Dividing Range through to the western rangelands around Cobar. It provides stock and domestic groundwater supplies across its extent. The salinity of the groundwater tends to increase towards the west as the climate becomes drier and the topography flatter.

Within this fractured rock SDL unit, groundwater is stored and moves through fractures, joints, bedding planes, faults and cavities in the rock. The transmission of economic quantities of water depends on the interconnection of these higher permeability features. Groundwater flow is often dependent on their orientation. The degree of rock weathering is also important in determining groundwater availability. Recharge to these systems is mainly through infiltration from rainfall, runoff and surface water. Groundwater may discharge as springs in localised areas where there is a permeability change in the rock mass, at the break-of-slope or where there is a change in soil texture. Groundwater discharges may also contribute base flows to streams, particularly in the high rainfall tablelands and slopes in the east. Bore yields from the fractured rocks are generally less than 3 litres per seconds (L/s) (Appendix E).

An SDL resource unit defines the boundary of an SDL area under the Basin Plan. SDLs represent the maximum long-term average quantities of water that can be taken in any one year, i.e. the long-term average annual limit. From Appendix E, in the Lachlan Fold Belt SDL area, there were 18,110 Stock and Domestic Bores, 1,024 Production bores and 31 Local Water Utility bores listed in the August 2017 Status and Issues Paper¹. The Lachlan Fold Belt SDL is estimated to contain 259,000 ML/yr. The allocation volume is 73,146 Shares (at 1 ML/Share per year), with estimated average annual extraction at 5,163 ML. There are no SDL monitoring bores near Munyabla.

To utilise groundwater as a water supply for this proposed development the proponents will need to apply for:

- Water Use Approval (industrial);
- Water Access Licence (WAL) – initially for zero share allocation;
- Available volumetric shares (to match the projected demand volume) on the open water market.

There are no known licenced points of groundwater extraction in the Munyabla area. This low density of groundwater demand is likely to favour the granting of an authority to take groundwater, assuming adequate allocation entitlements are available to buy.

Appendix E provided a range of recommendations that the proponents can use to collect further hydrogeological data and information on the extent of impact the proposed piggery will have on the targeted groundwater resource.

The Water Sharing Plan for the Murrumbidgee Unregulated Alluvial Water Sources 2012 (NSW Government, 2017) also applies to the property. The extraction management unit (EMU) is the Unregulated Billabong EMU Burkes/Bullenbung water source. As the proposed piggery does not intend to source alluvial water, the water sharing rules of this water source are not applicable.

The main waterway associated with the Urana farm is Billabong Creek. Drainage lines from this creek pass through the property and most of the farm is subject to occasional flooding.

Wattle Creek is the main watercourse through the Yerong Creek farm.

More detail on watercourses at the Urana and Yerong Creek farms is available in section 3.2.4.

3.3.2. C.3.b Geology

From the hydrogeological assessment provided as Appendix E, the local geology is thin Quaternary sediments of riverine clays, silts, sands and gravels overlying Ordovician to Devonian variably weathered and fractured granites, and metasediments of the Lachlan Fold Belt Orogen. Groundwater is mainly found within unconfined, fractured rock aquifers, with groundwater flowing through fissures and weaknesses with the weathered granites. While minor groundwater occurrences may be found within the colluvial and alluvial sediments, these are likely to be seasonally perched.

Limited groundwater bores have been drilled in the area, although most are 90-120 m deep, suggesting this is where good groundwater supplies can be accessed. The drillers report for the bore drilled on-farm indicates that weathered granite was encountered to 21 m, then fresh granite to 114 m, with groundwater intersected from 74 m. Static groundwater was reported at 38 m below ground level, suggesting a semi-confined, fractured rock aquifer (sub-artesian). The groundwater salinity was 2300 mg TDS/L (EC ~4100 μ S/m). Another bore ~1500 m to the south-west of the subject property intersected groundwater in fractured shale at a depth of 82-93 m. The static water level was 57.3 m below ground level and also semi-confined.

The depth to static groundwater level suggests that this semi-confined groundwater system would not be discharging to the land surface. Hence, there are no groundwater-dependent ecosystems associated with this system near the proposed development.

Recharge of the groundwater system is likely to be local, from rainfall infiltration. It is expected that this is localised along drainage lines and areas where bedrock is exposed.

3.3.3. C.3.c Soils

McMahon Earth Sciences in East Wagga Wagga were engaged to undertake a soil survey and assessment of the proposed piggery site. This is presented as Appendix B. The site lies within the mapping unit Va17 from the Digital Atlas of Australian Soils (CSIRO, 1991). Va17 is described as: "flat to undulating country with some swamps and broken by an occasional low gravelly or stony ridge or hillock: chief soils are hard alkaline yellow mottled soils (Dy3.43) and D2.33) both containing ironstone gravel and sometimes forming soil complexes. Associated are: ridges and hillocks of (Dr2.32, Dr2.42) and (Um4.1) soils similar to unit Qc3; small flat areas of (D2.23); and various undescribed soils in local situations, e.g. subjacent to swamps and on stream terraces".

The investigation included a field survey and analysis of samples from the piggery site and adjacent areas. Figure 1 of Appendix B shows the sampling points. Two typical profiles were encountered: chromosols and sodosols.

The chromosols consisted of soils with a darker moderately deep, friable clay loam organic surface layer underlain by a harder clayey, structured subsurface horizon that was neither strongly acidic nor sodic but is low in organic matter. The soils were non-cracking, non-dispersive, well-drained and aerated. The favourable physical properties of the soils make them suitable for the intended reuse.

The sodosols consisted of soils with a darker moderately deep, friable clay loam organic surface layer underlain by a harder clayey, structured subsurface horizon that is not strongly acidic but is sodic. Like the chromosols, these soils were non-cracking, well-drained and aerated. While the topsoil was non-dispersive, the subsoils were low in organic matter and dispersion testing suggested that they could be sodic. Nevertheless, the favourable physical properties of the soils make them suitable for the intended reuse.

Based on the Soil Landscapes of the Wagga Wagga 1:100,000 sheet, (Chen XY and McKane DJ, 1996), the remaining land on the Munyabla farm is also likely to consist of chromosols and sodosols on similar landscapes with very gently to gently undulating plains. Limitations could include localised erosion hazard and waterlogging, hard setting and strong acidity.

Ten representative samples of soil were tested in a laboratory to compile baseline data. Full results are provided in Appendix B. For the topsoil, the results can be summarised as follows:

- pH – topsoil pH ranged from 5.5-6.0 which is moderately to strongly acidic.
- Saturated extract EC – ranged from 0.3-1.4 dS/m which is non-saline.
- Cation exchange capacity (CEC) – ranged from 4.8-7.9 cmol(+)/kg which is very low to low.
- Exchangeable sodium percentage (ESP) – ranged from 0.6% to 10% which is non-sodic to marginally sodic. Field determination of dispersion showed nil-dispersion in the topsoil samples with some slaking in two samples, suggesting few structural limitations in the topsoil.

- Colwell phosphorus – generally ranged from 9-23 mg/kg (very low) with an isolated high level of 150 mg/L. Phosphorus buffering index (PBI) ranged from 44 to 130 which is very, very low to low.
- Calcium to magnesium ratio: these ranged from 1.7 to 4.1; at the higher ratios there is potential for soil dispersion on wetting.
- Saturated hydraulic conductivity – based on the field textures (structured loams and clay loams) indicative saturated hydraulic conductivity rates are 20-60 mm/hr or moderate infiltration.

For the subsoil, the results can be summarised as follows:

- pH – topsoil pH ranged from 6.9-8.9 which is neutral to strongly alkaline.
- Saturated extract EC – ranged from 0.4-3.3 dS/m which is non-saline to slightly saline.
- Dispersion – field testing suggested that all subsoils are likely to be sodic, with partial to complete dispersion observed in five samples, and slaking in the remaining three samples. This indicates that some subsoil structural limitations could be expected.
- Saturated hydraulic conductivity – based on the field textures (structured clay loams and light clays) indicative saturated hydraulic conductivity rates are 20-60 mm/hr or moderate infiltration.

McMahon Earth Sciences compared the analysis results with the indicators of sustainability provided in “Use of Effluent by Irrigation” (NSW Department of Environment and Conservation, 2004). The only moderate limitation was an acidic topsoil and, in some cases, a relatively low CEC that can be addressed by soil amelioration. It is noted that the addition of composted organic matter will assist in addressing structural concerns such as hard crusting while also improving fertility and enhancing nutrient retention.

While soil sampling was not undertaken on the balance of the Munyabla farm, Figure 50 shows that chromosols are likely to be the predominant soils, with some sodosols and possibly areas of kandosols. Kandosols are even textured, non-calcareous soils. They have a weak or massive subsoil structure with a clay content exceeding 15%. These soils are often very deep (>3 m). Red kandosols are the most common variation, including in the Riverina. In south-east Australia, these soils are suitable for cereal and oilseed cropping (Peveirill KI, Sparrow LA and Reuter DJ (editors), 1999). They are suitable for reuse of effluent and compost.

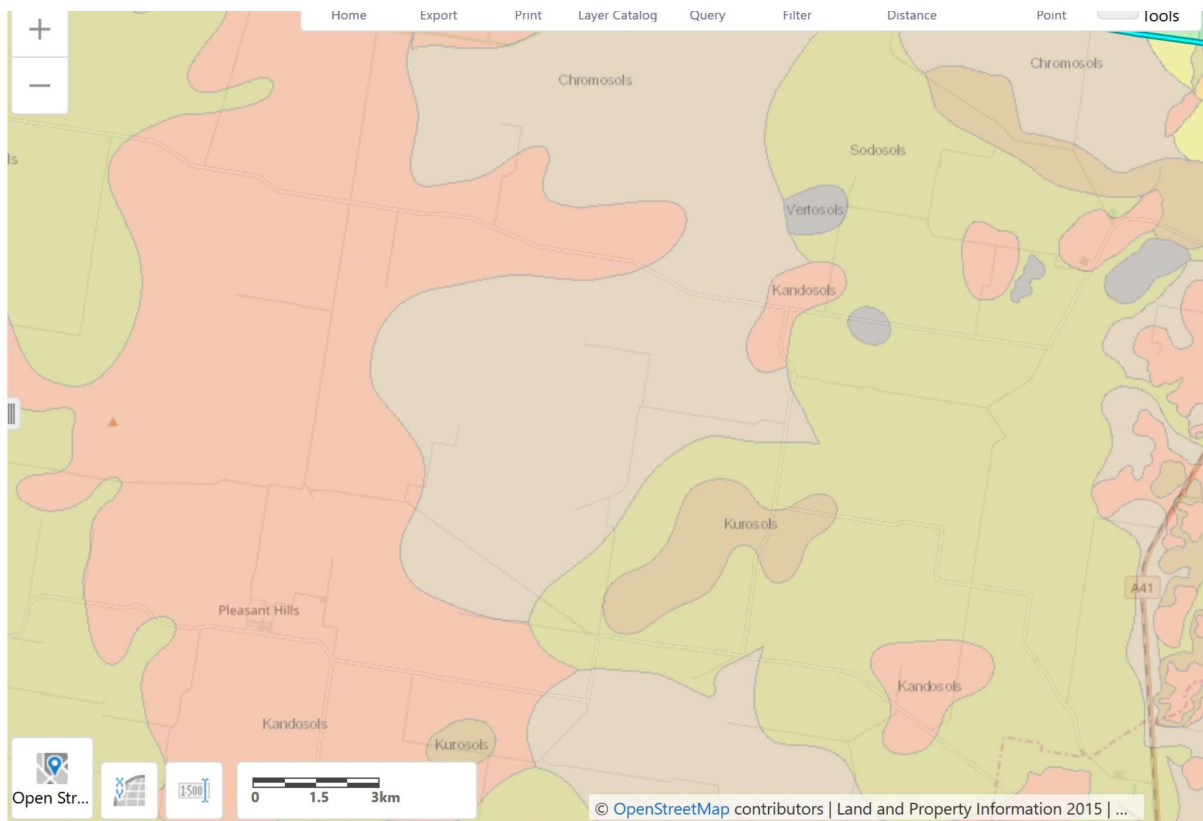


Figure 50 – Munyabla Farm: Soils Map

The soils of the Urana farm are predominantly vertosols. These are soils with a clay content exceeding 35% with shrink-swell properties that cause deep, wide cracks on drying (Peeverill KI, Sparrow LA and Reuter DJ (editors), 1999). Figure 51 shows soil mapping from eSpade for the Urana farm and surrounds while Photograph 12 shows the typical landscape and soil of the property. The grey and brown vertosols found on the farm are productive soils often used to grow winter cereal crops and fodder.

Table 36 shows 2017 soil test results for the Urana farm pre-planting. Most of the nutrients are at reasonable levels, with calcium, sulphur and zinc typically at marginal levels. Manganese levels are very high. The soils are mildly to moderately acidic. They are non-saline. About half the paddocks are sodic, including the Shed, Road, Red Block, One Tree North Frontage and East Billabong paddocks. Fertiliser recommendations generally included the addition of 55-100 kg/ha MAP (nitrogen and phosphorus) and 50-85 kg/ha Gran am (nitrogen and sulphur) (Siberia, Shed, Red Block paddocks) at sowing, 2-2.5 t/ha of gypsum (to add calcium, address sodicity and improve soil structure), usually followed by 80-145 kg/ha of urea (nitrogen). Fertiliser recommendations for the Bore paddock include 90 kg/ha DAP (nitrogen, phosphorus and sulphur) followed by 70kg/ha of urea (nitrogen). For the Billabong Paddock, 90 kg/ha DAP, 80 kg/ha Gran-am and 2 t/ha of gypsum are suggested. The fertiliser recommendations indicate that more of these nutrients are needed to optimise yields.

The soils of the farm are very suitable for reuse of compost and their structure would benefit from the addition of organic matter.

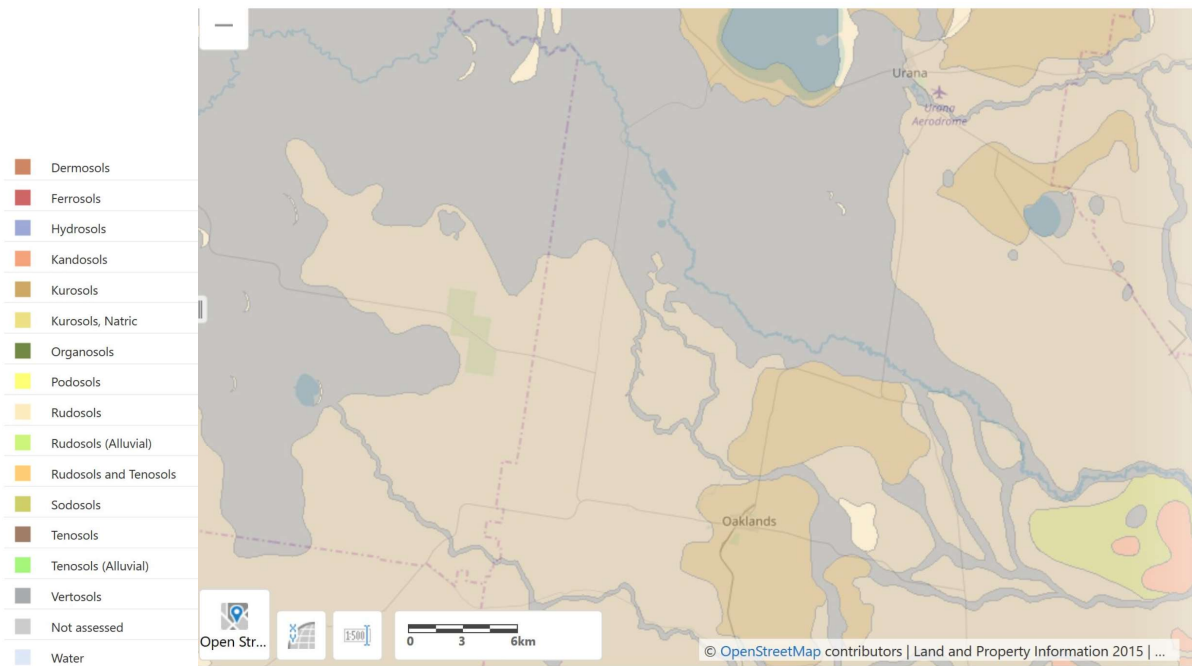


Figure 51 – Urana Farm: Soils



Photograph 12 – Soils of Urana Farm

Table 36 – 2017 Soil Test Results (0-10 cm) for Urana Farm

Analyte	Paddock Name											
	South Frontage	Siberia	Shed Paddock	Road Paddock	Red Block	Parkinsons	One Tree	North Frontage	East Billabong	Bore Paddock	Billabong Paddock	
pH (1:5 water)	5.8	6.0	5.9	6.1	6.3	6.4	6.2	6.2	6.2	5.9	6.3	
pH (1:5 CaCl ₂)	5.0	5.1	4.9	5.1	5.2	5.5	5.3	5.4	5.2	5.1	5.4	
EC (1:5 water) (dS/m)	0.16	0.12	0.14	0.12	0.13	0.14	0.14	0.19	0.14	0.11	0.13	
Cl (mg/L)	85	44	50	28	43	46	42	98	31	25	22	
Organic C (%)	1.5	1.3	1.0	1.0	1.1	1.0	1.1	1.2	1.2	1.1	1.2	
NO ₃ N (mg/kg)	24	11	26	27	16	15	26	15	25	20	19	
Colwell P (mg/kg)	74	57	33	53	58	66	77	79	63	49	63	
Sulfur (mg/kg)	17	8	15	9	8	6	8	10	7	14	8	
CEC (cmol/kg)	18.4	20.5	9.5	13.7	15.5	20.2	16.5	21.2	18.6	16.4	23.9	
Ca (cmol/kg)	9.1	9.5	4.3	5.8	6.0	9.4	7.3	9.6	7.9	9.0	11	
Mg (cmol/kg)	7.1	8.8	3.5	5.9	6.9	8.1	6.8	8.4	7.8	5.8	11	
Na (cmol/kg)	0.78	0.76	0.74	0.85	1.3	0.98	0.94	1.3	1.1	0.42	1.0	
K (cmol/kg)	1.4	1.5	0.92	1.2	1.3	1.8	1.5	2.0	1.8	1.2	1.5	
Avail. K (mg/kg)	560	580	360	470	490	700	570	760	710	480	580	
Al. (cmol/kg)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Al % of cations	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Ca % cations	49	46	45	42	39	46	44	45	42	55	44	
Mg as % cations	39	43	37	43	45	40	41	40	42	36	45	
Na as % cations	4.2	3.7	7.8	6.2	8.4	4.8	5.7	6	6	2.5	4.3	
K as % cations	7.8	7.2	9.7	8.7	8.2	8.8	8.9	9.2	9.8	7.5	6.2	
Ca:Mg	1.3	1.1	1.2	1.0	0.9	1.2	1.1	1.1	1.0	1.6	1.0	
Zn (mg/kg)	0.58	0.68	0.37	0.36	0.58	0.74	0.59	1.9	0.69	0.33	0.78	
Cu (mg/kg)	1.9	2.1	1.5	1.8	1.8	1.8	1.8	2.1	1.9	1.9	2.0	
Fe (mg/kg)	93	71	71	71	64	58	83	76	82	86	56	
Mn (mg/kg)	84	89	94	91	77	57	83	70	87	73	73	

Figure 51 shows soil mapping from eSpade for the Yerong Creek farm and surrounds while Photograph 13 shows the typical landscape and the red soils of the property.

The soils of the Yerong Creek farm are likely to include kurosols, sodosols, chromosols and kandosols. All of these soils have been described above. The land on the farm has been used for growing cereal and oilseed crops for many years.

Table 36 shows 2017 soil test results for the Yerong Creek farm pre-planting. The soils are moderately acidic to near neutral pH. Most nutrients are at optimal levels, with available phosphorus, zinc and sulphur marginal for some sites. Nitrate-nitrogen is relatively high, which is desirable prior to planting. Manganese levels are high to very high. The soils are non-sodic and non-saline. Fertiliser recommendations included the addition of 90-130 kg/ha MAP (nitrogen and phosphorus) and 80-100 kg/ha of Gran-AM (nitrogen and sulphur) at sowing, followed by 100-150 kg/ha of urea (nitrogen) and 130 kg/ha of sodium molybdate (molybdenum). The fertiliser recommendations reflect the need to provide more of these nutrients in order to optimise yields.

The land is suitable for reuse of sludge and compost and the farming system would benefit from the addition of nutrients and organic matter.

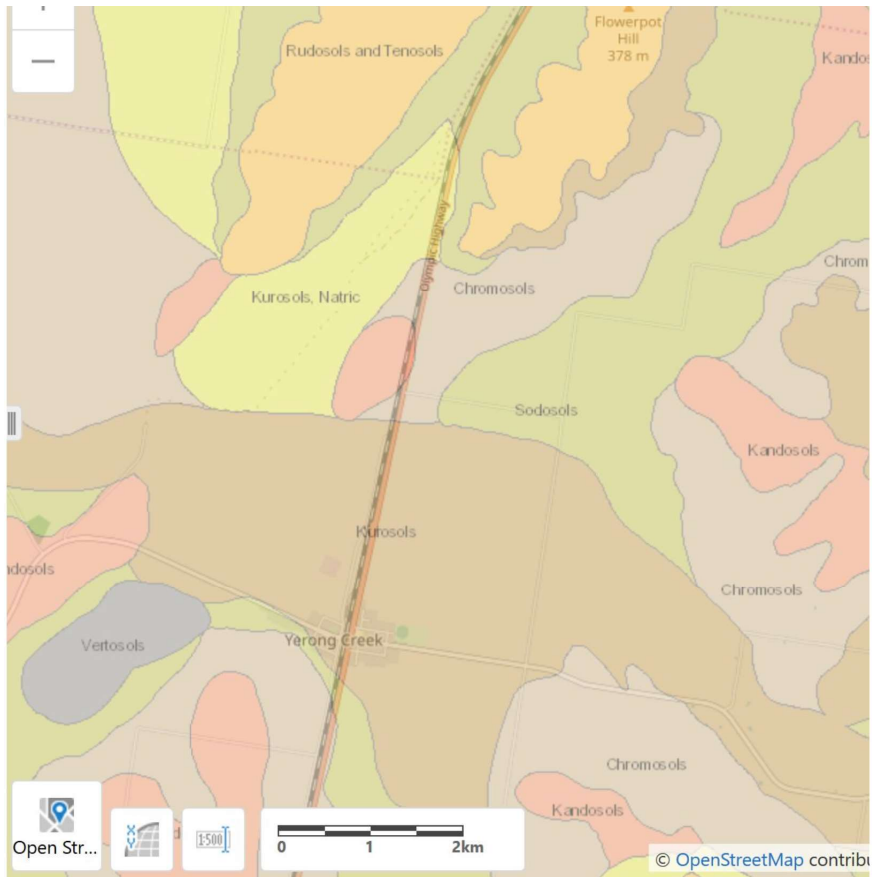


Figure 52 – Yerong Creek Farm: Soils



Photograph 13 – Soils of Yerong Creek Farm

Table 37 – 2017 Soil Test Results (0-10 cm) for Yerong Creek Farm

Analyte	Aberdeen	Aberdeen	Aberdeen	Redbank	Redbank	Redbank
	near Barwon	Mock Oranges	Middle	North	House West	House East
pH (1:5 water)	5.3	5.7	6.2	6.9	6.1	6.6
pH (1:5 CaCl ₂)	4.5	5.0	5.6	6.5	5.3	6.1
EC (1:5 water) (dS/m)	0.15	0.11	0.16	0.18	0.09	0.12
Cl (mg/L)	21	<10	17	20	15	13
Organic C (%)	1.9	1.8	1.8	1.9	1.9	1.6
NO ₃ N (mg/kg)	50	39	41	28	12	14
Colwell P (mg/kg)	22	22	39	43	46	41
Sulfur (mg/kg)	7	7	17	14	13	13
CEC (cmol/kg)	4.6	5.5	6.7	11.5	6.2	6.9
Ca (cmol/kg)	2.8	3.9	5.0	10.0	4.6	5.2
Mg (cmol/kg)	0.5	0.6	0.5	0.6	0.7	0.7
Na (cmol/kg)	0.10	0.07	0.09	0.09	0.04	0.07
K (cmol/kg)	0.94	0.86	0.93	0.79	0.86	0.95
Avail. K (mg/kg)	370	340	360	310	330	370
Al. (cmol/kg)	0.2	0.1	0.1	<0.1	0.1	<0.1
Al % of cations	4.5	2.1	1.6	<1.0	1.6	<1.0
Ca % cations	61	70	75	87	73	75
Mg as % cations	11	11	8.1	5.3	11	10
Na as % cations	2.1	1.2	1.3	0.75	0.7	0.93
K as % cations	21	16	14	6.9	14	14
Ca:Mg	5.4	6.3	9.3	16	7.0	7.5
Zn (mg/kg)	0.73	0.88	1.10	0.65	0.58	0.69
Cu (mg/kg)	0.62	0.6	0.58	0.58	0.46	0.52
Fe (mg/kg)	210	150	160	96	150	82
Mn (mg/kg)	130	100	100	50	34	49

3.3.4. C.3 d Meteorological Characteristics

Yerong Creek is about 15 km east of the piggery site. Table 38 provide monthly rainfall statistics for Yerong Creek from www.bom.gov.au. The median rainfall for the locality is approximately 540 mm per annum, distributed fairly equally over the full 12 months with a slight winter dominance.

Weather statistics for Wagga Wagga were sourced from www.bom.gov.au. Wagga Wagga is approximately 50 km to the north-east of the site. Average monthly statistics are provided in Table 39. Maximum temperatures in summer are warm. Relative humidity is generally low in the summer months and high throughout the winter months which are cool to cold.

Rainfall intensity duration and frequency data for the subject property are presented in Table 40. Figure 53 provides wind direction and strength data at 9 am and 3 pm. From the monthly data on www.bom.gov.au, at 9 AM winds are predominantly from the east to north-east in summer and the east in winter while at 3 PM winds are predominantly from the west to south-west throughout the year.

Table 38 – Monthly Rainfall Statistics for Yerong Creek Fertiliser Depot

Statistics (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Annual
Yerong Creek Fertiliser Depot													
Mean	36.0	37.2	41.9	37.1	44.3	59.0	53.4	50.2	42.5	50.6	40.3	38.8	539.9
Lowest	0	0	0	0	0	1.6	10.6	1.0	2.8	0	0	0	209.0
5 th percentile	0	0	0	2.2	5.2	12.6	15.1	9.2	8.0	2.7	1.3	0	328.6
10 th percentile	0.2	0.5	0.9	4.4	10.4	20.6	19.0	15.4	10.5	13.5	5.6	1.3	349.5
Median	23.4	26.9	26.6	29.6	33.8	55.4	52.1	51.5	37.5	48.5	34.5	34.6	508.5
90 th percentile	89.8	87.2	110.4	79.4	90.1	103.8	85.8	79.6	76.3	92.8	83.9	77.5	773.1
95 th percentile	103.4	121.5	139.8	111.8	120.1	122.9	101.1	99.2	88.2	105.9	97.9	89.8	812.6
Highest	144.8	215.6	215.8	138.9	146.1	222.0	141.4	131.3	161.2	168.6	117.8	117.7	917.1

Table 39 – Monthly Temperature and Evaporation Statistics for Wagga Wagga

Statistics	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Annual
Mean max. temp (°C)	31.8	30.9	27.7	22.6	17.4	13.9	12.8	14.5	17.7	21.6	25.9	29.5	22.2
Mean min. temp (°C)	16.3	16.4	13.4	9.2	5.9	3.7	2.8	3.5	5.1	7.8	10.9	13.9	9.1
Mean daily evaporation (mm)	10.1	9.0	6.8	4.0	2.1	1.3	1.2	1.9	3.0	4.9	7.2	9.4	5.1
Mean monthly evaporation (mm)	313	252	211	120	65	39	37	59	90	152	216	158	1862

Table 40 – Rainfall IFD Data – Subject Property

Duration	Annual Exceedance Probability (AED)						
	63.2%	50%	20%	10%	5%	2%	1%
1 min	1.66	1.89	2.64	3.16	3.68	4.38	4.93
2 min	2.83	3.23	4.99	5.35	6.20	7.31	8.18
3 min	3.85	4.39	6.10	7.28	8.44	9.98	11.2
4 min	4.73	5.39	7.50	8.96	10.4	12.3	13.8
5 min	5.50	6.27	8.73	10.4	12.1	14.4	16.2
10 min	8.31	9.48	13.2	15.8	18.5	22.0	24.8
15 min	10.2	11.6	16.2	19.4	22.6	27.0	30.5
30 min	13.6	15.5	21.6	25.8	30.1	35.9	40.4
1 hr	17.1	19.5	27.1	32.4	37.6	44.6	50.1
2 hr	21.0	23.9	33.0	39.2	45.4	53.7	60.2
3 hr	23.6	26.7	36.7	43.6	50.4	59.6	66.7
6 hr	28.6	32.3	44.0	52.2	60.3	71.3	79.9
12 hr	34.6	39.0	52.9	62.8	72.7	86.2	96.8
24 hr	41.7	46.8	63.5	75.5	87.8	104	118
48 hr	49.1	55.1	74.8	89.2	104	124	140
72 hr	53.1	59.6	81.0	96.6	113	134	151
96 hr	55.7	62.5	84.9	101	117	139	157
120 hr	57.4	64.4	87.4	104	120	142	160
144 hr	58.6	65.8	89.0	105	121	144	161
168 hr	59.4	66.8	90.1	106	122	144	161

Rose of Wind direction versus Wind speed in km/h (18 Aug 1941 to 11 Aug 2017)
 Custom times selected, refer to attached note for details
WAGGA WAGGA AMO
 Site No: 072150 • Opened Jan 1941 • Still Open • Latitude: -35.1563° • Longitude: 147.4579° • Elevation 212m
 An asterisk (*) indicates that calm is less than 0.5%.
 Other important info about this analysis is available in the accompanying notes.

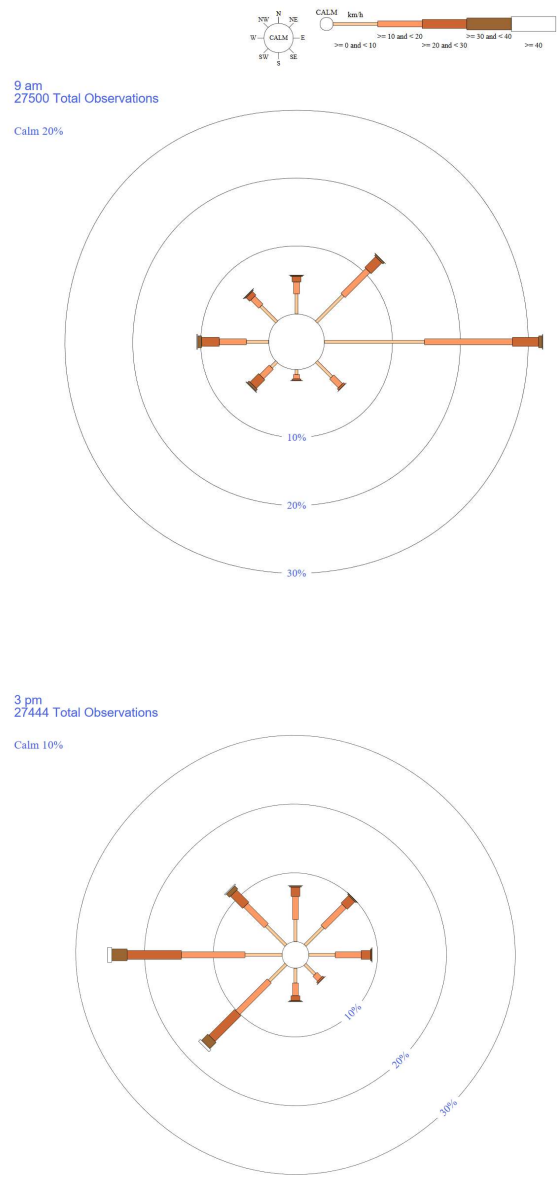


Figure 53 – Mean Annual Wind Directions at Wagga Wagga at 9 AM and 3 PM

3.3.5. C.3.e Slope of the Land and Topography

From the Pleasant Hills 1:50,000 Topographic Map sheet (8227-S), the proposed piggery site has an elevation range of approximately 196 m to 200 m AHD. The site slope is level to very gently inclined. The landform is classed as a flat.

Elevation levels taken from Google Earth for the length (Figure 54 and Figure 55) show an elevation drop from south to north. Figure 56, Figure 57 and Figure 58) show that the site is relatively flat, with changes in elevation of 1-2 m in this direction.



Figure 54 – Topography from South-East to North-East Corners of Piggery Complex

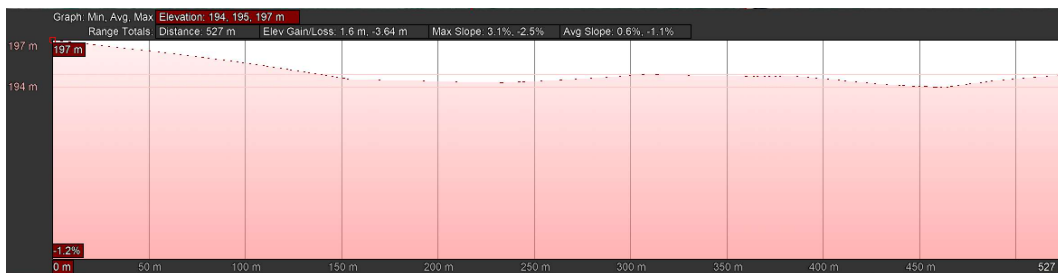


Figure 55 – Topography from South-West to North-West Corners of Piggery Complex

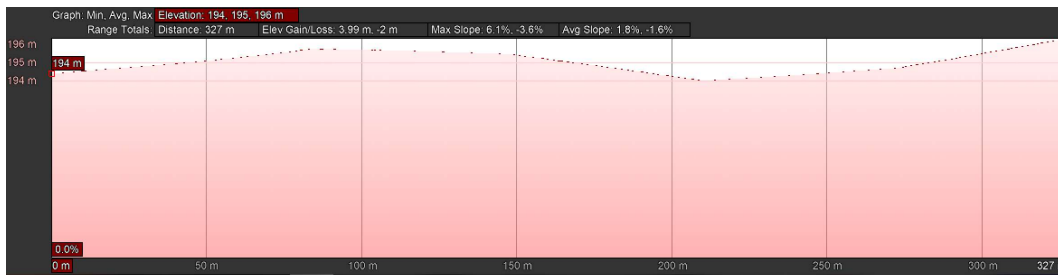


Figure 56 – Topography from North-West to North-East Corners of Piggery Complex

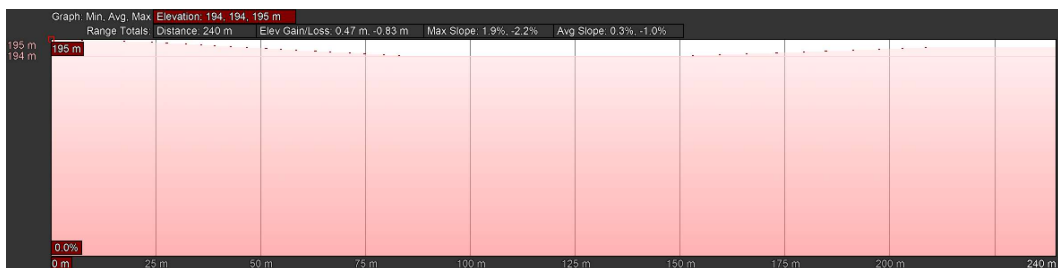


Figure 57 – Topography from Centre West to Centre East Points of Piggery Complex

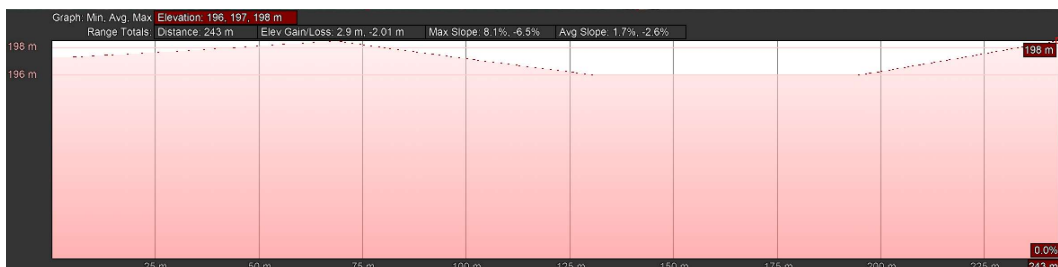


Figure 58 – Topography from South-West to South-East Corners of Piggery Complex

3.3.6. C.3.f Adjoining Land Use

The surrounding lands are mixed cropping and grazing operations.

3.3.7. C.3.g Vegetation

There are many tools and information sources for assessing the type and vulnerability of flora and fauna populations, communities and species. These range in scale from national to site-specific sources.

The Department of Environment Protected Matters Search Tool was applied to identify areas of national significance. The site sits within the Riverina Natural Resource Management Unit. Within 5 km of the site, there are no:

- protected areas
- Ramsar wetlands
- nationally important wetlands
- commonwealth heritage places
- world heritage properties
- national heritage places
- regional forest agreements
- key ecological features

The closest important area is the Doodle Corner Swamp near Henty (to the south-east of the piggery site) which is a nationally important wetland and most of the swamp is a protected area (see Figure 59). Given the distance to the swamp, and the fact that the site does not drain towards it, the operation of the piggery will not impact Doodle Corner Swamp in any way.

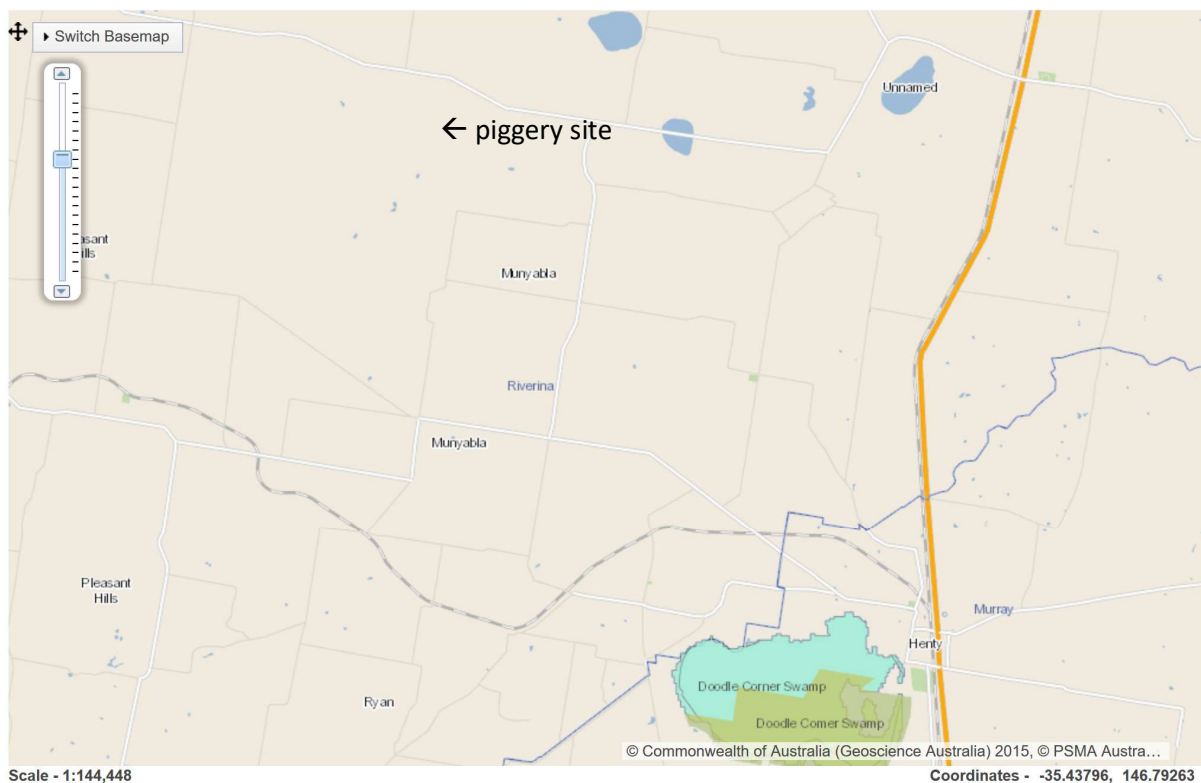


Figure 59 – OEH Protected Matters Search Tool Mapping

Native vegetation regulatory (NVR) mapping covering the piggery site and the Munyabla farm is provided as Figure 60. On this figure, the orange line represents category 2 vulnerable regulated land which is rural land that is riparian, steep and highly erodible and special category land (as declared). Clearing of native vegetation from vulnerable regulated land is more restricted than for other category 2 land. The pink shading is category 2 sensitive regulated land. This is rural land where clearing of native vegetation is more restricted than for other category 2 land. It includes lands that are sensitive due to factors like the presence of coastal wetlands, littoral rainforests, rainforests, or land that is subject to protective covenants such as conservation or incentive property vegetation plans (NSW Office of Environment and Heritage, ND).

While the proposed piggery site is not covered by vulnerable vegetation as shown by the NVR mapping, there are areas of vulnerable vegetation close to some of the reuse areas. These have been protected by the provision of buffers.

Figure 61 and Figure 62 shows vegetation formation mapping from <https://geo.seed.nsw.gov.au>. Figure 63 provides a key for these maps. The road-side vegetation along Dick Knobels Road to the south of Semlers Lane appears to be a semi-arid woodlot formation classed as riverine sandhills woodlands. This is a yellow box-white cypress pine grassy woodland on deep sandy loam alluvial soils of the eastern Riverina bioregion and the western NSW south western slopes bioregion.

The closest large mapped formation (just to the south-east of the piggery site and to the west) is a grasslands formation classed as western slopes grassland. It is derived tussock grassland of the central western plains and lower slopes of NSW.

Also, to the south-east of the site is a large area of a grassy woodland formation classed as floodplain transition woodlands. It is a western grey box-white cypress pine tall woodland found on the alluvial plains of the NSW south western slopes bioregion. This type of vegetation is also present along some of the roads in the vicinity of the subject property.

Patches of the grassy woodlots formation floodplain transition woodlands are found in the land around the property. These are yellow box-river red gum tall grassy riverine woodlands of the NSW south western and Riverina bioregions.

The grassy woodlands western slopes grassy woodlands is prevalent along roadsides in the vicinity of the property. It consists of a white box-white cypress pine-western grey box shrub / grass / forb woodland in the NSW south western slopes bioregion.

There are some small, isolated pockets of the semi-arid woodland (shrubby subformation) classed as inland rocky hill woodlands. This is a Dyers red gum – white cypress pine – currawang shrubby woodland mainly found in the NSW south western slopes bioregion.



Colour	Category	Definition
Blue	Category 1 Unregulated Land	Rural lands where clearing is not regulated by the Part 5A of the LLS Act. Other legislation may apply.
Yellow	Category 2 Regulated Land	Rural lands where clearing is regulated and can be carried out in accordance with the Part 5A of the LLS Act or other legislation. This includes complying with the Codes and Allowable activities.
Orange	Category 2 Vulnerable Regulated Land	Rural land where clearing of native vegetation is more restricted than on other Category 2 land. This includes steep and highly erodible lands and riparian land and special category land (as declared).
Pink	Category 2 Sensitive Regulated Land	Rural lands where clearing of native vegetation is more restricted than other Category 2 land. This includes lands that are Sensitive Lands due to factors such as the presence of coastal wetlands, littoral rainforests, rainforest, or land that is subject to protection covenants such as conservation or incentive property vegetation plans.
Grey	Excluded Land	Land not regulated by the Part 5A of the LLS Act. This land includes urban zones, environmental conservation zones and R5 large lot residential as gazetted under a Local Environment Plan (LEP). It also includes public conservation lands such as National Parks and State Forests.

Figure 60 – Native Vegetation Regulatory (NVR) Mapping – Munyabla Farm and Surrounds

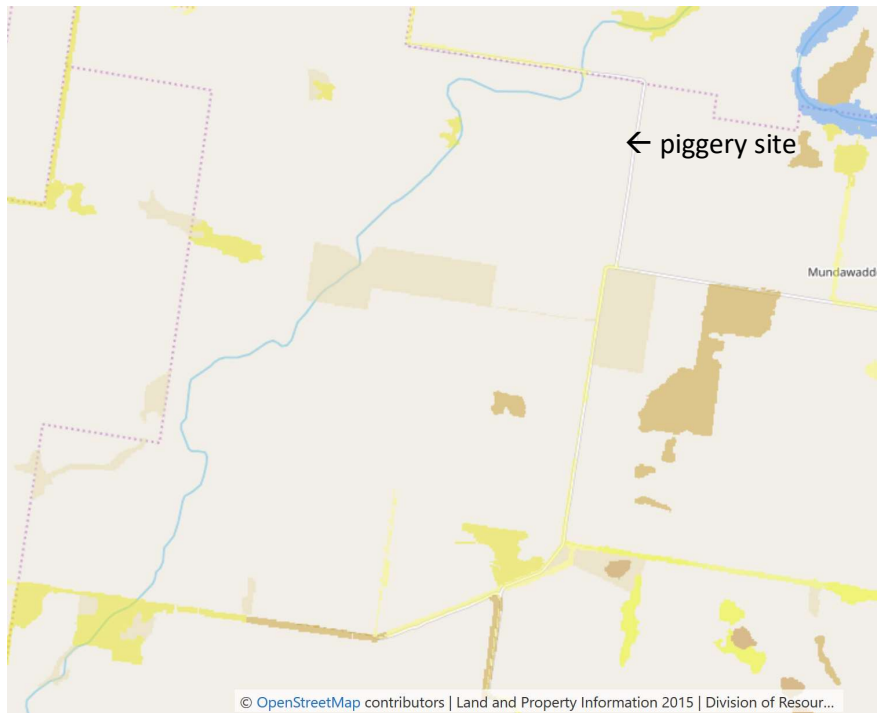


Figure 61 – Vegetation Formations on Piggery Property and Immediate Surrounds



Figure 62 – Vegetation Formations on Piggery Property, Reuse Areas and Surrounds

- 

Vegetation formation: Forested Wetlands
 Vegetation Class: Inland Riverine Forests
 PCT Name: River Red Gum wallaby grass tall woodlot wetland on the outer River Redgum Zone mainly in the Riverina Bioregion
 PCTID 9
- 

Vegetation formation: Grassy Woodlots
 Vegetation Class: Floodplain Transition Woodlands
 PCT Name: Yellow Box – River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion
 PCTID 74
- 

Vegetation formation: Semi-arid Woodlots
 Vegetation Class: Riverine Sandhill Woodlands
 PCT Name: Yellow Box – White Cypress Pine grassy woodland on deep sandy-loam alluvial soils of the eastern Riverina Bioregion and western NSW South Western Slopes Bioregion
 PCTID 75
- 

Vegetation formation: Grassy Woodlands
 Vegetation Class: Floodplain Transition Woodlands
 PCT Name: Western Grey Box – White Cypress Pine tall woodland on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion
 PCTID 80
- 

Vegetation formation: Semi-arid Woodlands (Shrubby subformation)
 Vegetation Class: Inland Rocky Hill Woodlands
 PCT Name: Dyers Red Gum – White Cypress Pine – Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion
 PCTID 185
- 

Vegetation formation: Grasslands
 Vegetation Class: Western Slopes Grasslands
 PCT Name: Derived tussock grassland of the central western plains and lower slopes of NSW
 PCTID 250
- 

Vegetation formation: Grassy Woodlands
 Vegetation Class: Western Slopes Grassy Woodlands
 PCT Name: White Box – White Cypress Pine - Western Grey Box shrub / grass / forb woodland in the NSW South Western Slopes Bioregion
 PCTID 267

Figure 63 – Key to Mapping Given as Figure 61 and Figure 62

The Office of Environment and Heritage BioNet Atlas of NSW Wildlife was searched to identify threatened biota listed under the NSW Biodiversity Conservation Act 2016 (NSW Government, 2016) close to the piggery site. The search covered an area of at least 5 km around the subject property using the extents:

- north: -35.36
- west: 146.96
- east: 146.84
- south: -35.47

The mapped area is shown on Figure 64.

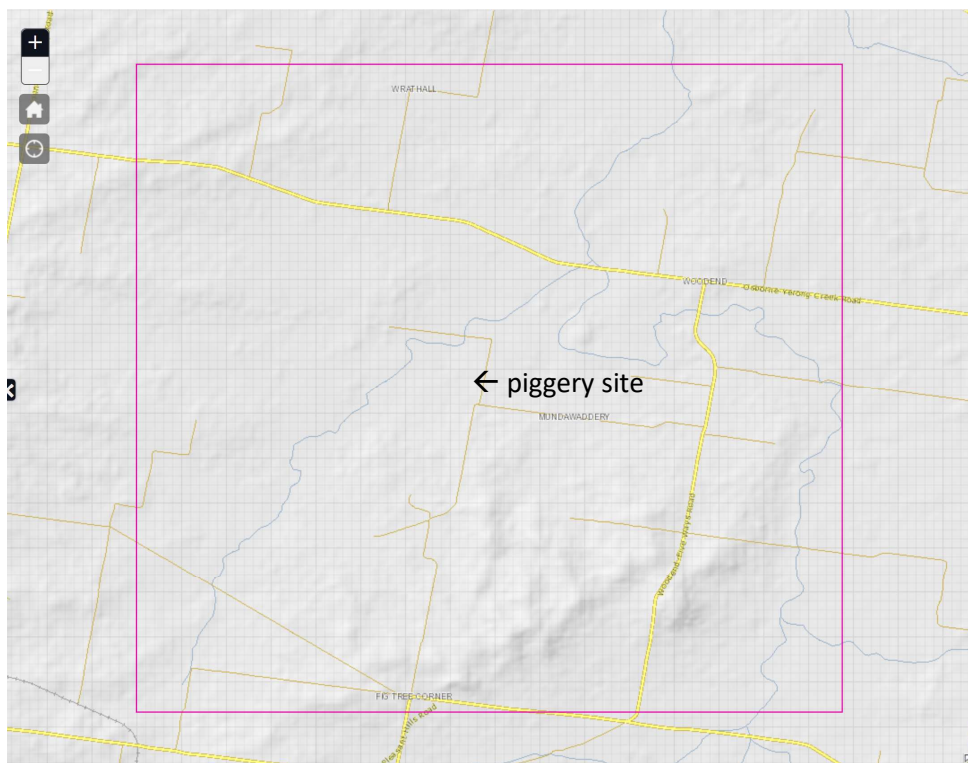


Figure 64 – Mapped Area for NSW Atlas Search

No endangered populations were found. However, six endangered communities are reported as per Table 41. Of these, five are classed as endangered ecological communities under the Biodiversity Conservation Act (NSW Government, 2016). One, the mallee and mallee-broombush dominated woodland and shrubland, lacking triodia, in the NSW south western slopes bioregion, is critically endangered. Two of the communities are recognised as endangered by the Commonwealth Environment Protection and Biodiversity Conservation Act (1999). One, the white box yellow box Blakely’s red gum woodland, is considered critically endangered.

Table 41 – List of Communities on Atlas of NSW

Common name	Scientific name	Map [Clear all]	NSW status	Comm. status	No. of records
Community Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions		E3		K
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions		E3	E	K
Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion	Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion		E4B		K
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions		E3	E	K
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions		E3		P
White Box Yellow Box Blakely's Red Gum Woodland	White Box Yellow Box Blakely's Red Gum Woodland		E3	CE	K

Information on the endangered inland grey box woodland community was sourced from: <https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20072>. Inland grey box communities are typically found on fertile soils of the western slopes and plains of New South Wales. They are generally open woodlands with trees 15–25 m tall, although sometimes the overstorey has been cleared and only an understorey may remain. Inland grey box woodlands typically include *Eucalyptus microcarpa* (Inland Grey Box), often in association with *E. populnea* subsp. *bimbil* (Bimble or Poplar Box), *Callitris glaucophylla* (White Cypress Pine), *Brachychiton populneus* (Kurrajong), *Allocasuarina luehmannii* (Bulloak) or *E. melliodora* (Yellow Box), and sometimes with *E. albens* (White Box). There are generally few or no shrubs, although these can be locally common, particularly in the drier western parts of the community. Grass and herbaceous species are variable and may be absent at severely disturbed sites. Most remnant patches of Inland Grey Box Woodland survive with trees largely intact but with the shrub or ground layers degraded as a result of grazing or pasture modification.

Table 42 shows reported flora. Almost all of the observations were part of a vegetation survey undertaken on the Woodend travelling stock reserve. The exception was a reporting of *Centaureum tenuiflorum* (branched or slender centaury) at Mundawadra 16 km north-west of Henty. The only endangered species reported is the small scurf-pea (*Cullen parvum*) reported at latitude - 35.400009262 and longitude 146.934618398 on both sides of a creek in the Woodend travelling stock route on 5/12/2007. Small scurf pea is a small perennial pea that has been reported near Jerilderie, in travelling stock reserves south-west of Wagga Wagga, on a roadside near Galong and near Young, with larger populations in grassy areas in Barmah State Park (northern Victoria) (www.environment.nsw.gov.au). Multiple species associated with inland grey box woodlands are reported, including the western grey box (*Eucalyptus macrocarpa*), the white cypress pine (*Callitris glaucophylla*), bulloak (*Allocasuarina luehmannii*) and yellow box (*E. melliodora*).

Table 42 – List of Flora on Atlas of NSW

	Common name	Scientific name	Map [Clear all]	NSW status	Comm. status	No. of records
Plantae						
Flora	Lesser Joyweed	Alternanthera denticulata	<input type="checkbox"/>			1
Amaranthaceae						
Anacardiaceae	Pepper Tree	Schinus areira*	<input type="checkbox"/>			1
Anthericaceae	Chocolate Lily	Dichopogon strictus	<input type="checkbox"/>			1
	Yellow Autumn-lily	Tricoryne elatior	<input type="checkbox"/>			1
Asteraceae	Purple Burr-Daisy	Calotis cuneifolia	<input type="checkbox"/>			1
	Common Sneezeweed	Centipeda cunninghamii	<input type="checkbox"/>			1
	Catsear	Hypochaeris radicata*	<input type="checkbox"/>			1
		Solenogyne dominii	<input type="checkbox"/>			1
	A Fuzzweed	Vitadinia cuneata	<input type="checkbox"/>			1
Brassicaceae	Common Peppergrass	Lepidium africanum*	<input type="checkbox"/>			1
Campanulaceae	Bluebell	Wahlenbergia spp.	<input type="checkbox"/>			2
Casuarinaceae	Bullock	Allocastrum luehmannii	<input type="checkbox"/>			2
Chenopodiaceae	Salt-bushes	Chenopodiaceae indeterminate*	<input type="checkbox"/>			1
	Climbing Saltbush	Einadia nutans	<input type="checkbox"/>			1
Clusiaceae	St. Johns Wort	Hypericum perforatum*	<input type="checkbox"/>			1
Convolvulaceae		Convolvulus angustissimus	<input type="checkbox"/>			1
Cupressaceae	White Cypress Pine	Callitris glaucophylla	<input type="checkbox"/>			1
Cyperaceae	Tall Sedge	Carex appressa	<input type="checkbox"/>			1
Fabaceae (Faboideae)	Small Scurf-pea	Cullen parvum	<input type="checkbox"/>	E1		1
	Twining glycine	Glycine clandestina	<input type="checkbox"/>			1
	Variable Glycine	Glycine tabacina	<input type="checkbox"/>			1
	A Clover	Trifolium spp.*	<input type="checkbox"/>			1
Fabaceae (Mimosoideae)	Varnish Wattle	Acacia verniciflua	<input type="checkbox"/>			1
Gentianaceae	Branched Centaury, Slender centaury	Centaurium tenuiflorum*	<input type="checkbox"/>			1
Juncaceae	A Rush	Juncus spp.	<input type="checkbox"/>			1
Lamiaceae	White Horehound	Marrubium vulgare*	<input type="checkbox"/>			1
	Vervain	Salvia verbenaca*	<input type="checkbox"/>			1
Lomandraceae	Wattle Mat-rush	Lomandra filiformis	<input type="checkbox"/>			1
	Mat-rush	Lomandra spp.	<input type="checkbox"/>			1
Malvaceae	Corrugated Sida	Sida corrugata	<input type="checkbox"/>			1
		Sida spp.	<input type="checkbox"/>			1
Myrtaceae	River Red Gum	Eucalyptus camaldulensis	<input type="checkbox"/>			1
	Yellow Box	Eucalyptus melliodora	<input type="checkbox"/>			2
	Western Grey Box	Eucalyptus microcarpa	<input type="checkbox"/>			2
Oxalidaceae		Oxalis perennans	<input type="checkbox"/>			1
Phormiaceae	Blueberry Lily	Dianella longifolia	<input type="checkbox"/>			2
Poaceae	Wheatgrass, Common Wheatgrass	Anthosachne scabra	<input type="checkbox"/>			1
	Bunch Wiregrass	Aristida behriana	<input type="checkbox"/>			2
	Purple Wiregrass	Aristida ramosa	<input type="checkbox"/>			1
	Yanganbil	Austrostipa bigeniculata	<input type="checkbox"/>			1
	Rough Speargrass	Austrostipa scabra subsp. falcata	<input type="checkbox"/>			1
	A Speargrass	Austrostipa spp.	<input type="checkbox"/>			1
	A Brome	Bromus spp.	<input type="checkbox"/>			1
	Windmill Grass	Chloris truncata	<input type="checkbox"/>			1
	Common Couch	Cynodon dactylon	<input type="checkbox"/>			1
	Windmill Grass	Enteropogon spp.	<input type="checkbox"/>			1
	Hairy Panic	Panicum effusum	<input type="checkbox"/>			1
		Rytidosperma spp.	<input type="checkbox"/>			2
	Rat's-tail Fescue	Vulpia spp.*	<input type="checkbox"/>			1
Polygonaceae	Creeping Knotweed	Persicaria prostrata	<input type="checkbox"/>			1
	Swamp Dock	Rumex brownii	<input type="checkbox"/>			1
Pteridaceae	Cloak Fern, Mulga Fern, Rock Fern	Cheilanthes spp.	<input type="checkbox"/>			1

The SEARS for this EIS note that where the development is likely to significantly affect threatened species within the meaning of Section 7.2 of the Biodiversity Conservation Act (2016), the application for development consent is to be accompanied by a Biodiversity Development Assessment Report (BDAR). The need to undertake a Biodiversity Development Assessment Report (BDAR) was discussed with Simon Stirrat of the Office of Environment and Heritage on 26th April 2018 who indicated it may not be necessary to prepare one if no significant impacts were expected. The piggery site is land that has been cleared for grain farming. Some scattered paddock trees remain (see Figure 33). These are mostly white cypress pines with some grey box. Similarly, the reuse areas have been cleared and farmed for many years.

The biodiversity assessment and approvals decision support tool was applied to the proposal. A BDAR is not required in this case because:

- no part of the proposed development will take place on land included on the biodiversity values map;
- the proposed development does not involve clearing native vegetation (not including ‘Category 1’ land under the Local Land Services Act 2013) in excess of the area clearing thresholds; and
- the proposed development is not likely to significantly affect threatened species or ecological communities, or their habitats, and is not being carried out in a declared area of outstanding biodiversity value.

Reported fauna are provided in Table 43. Four protected species are reported. These are the pied butcherbird (*Cracticus nigrogularis*) (31/5/2018) and the white-winged chough (*Corcorax melanorhamphos*) (26/5/2018) both observed at “Pine Lodge” on Osborne-Yerong Creek Road, Wrathall (latitude and longitude: -35.380651 & 146.92691 and -35.380651 & 146.92691 respectively), and observed as part of Dan Lunney’s community wildlife survey; the short-beaked echidna (*Tachyglossus aculeatus*) (reported twice on 1/7/2004) (latitude and longitude: -35.44485953 & 146.850204887 and -35.460326031 & 146.870430289); and the brushtail possum (*Trichosurus spp.*) (1/7/2004) (latitude and longitude: -35.44485953 & 146.850204887). There were also two reportings of an introduced pest, the fox (*Vulpes vulpes*), observed as part of Dan Lunney’s community wildlife survey (1/7/2004) (latitude and longitude: -35.44485953 & 146.850204887) and at “Pine Lodge” on Osborne-Yerong Creek Road, Wrathall (19/5/2018) (latitude and longitude: -35.380651000 & 146.92691).

It is worth noting that when Mr Mark Saddler of Bundyii undertook his Aboriginal cultural heritage visit on 14th January 2019, he observed many species of bird including grass parrots, willy wag tails, galahs, cockatoos, eagles and white winged choughs.

Table 43 – List of Fauna on Atlas of NSW

	Common name	Scientific name	Map [Clear all]	NSW status	Comm. status	No. of records
Animalia	Pied Butcherbird	<i>Cracticus nigrogularis</i>	<input type="checkbox"/>	P		1
Aves						
Artamidae						
Corcoracidae	White-winged Chough	<i>Corcorax melanorhamphos</i>	<input type="checkbox"/>	P		1
Mammalia						
Tachyglossidae	Short-beaked Echidna	<i>Tachyglossus aculeatus</i>	<input type="checkbox"/>	P		2
Phalangeridae	brushtail possum	<i>Trichosurus sp.</i>	<input type="checkbox"/>	P		1
Canidae	Fox	<i>Vulpes vulpes*</i>	<input type="checkbox"/>			2

The NSW DPI Threatened and Protected Species Records Viewer (NSW DPI, ND) was used to identify species reported as threatened, endangered or protected under the Fisheries Management Act 1994. Species reported in waterways in the vicinity of the piggery site include:

- Flathead galaxia – critically endangered
- Southern pygmy perch – endangered.

In order to identify sensitive vegetation close to the possible reuse areas on the Urana and Yerong Creek farms, native vegetation regulatory (NVR) mapping for these sites was also collected and is provided as Figure 65 and Figure 67, respectively. On these figures, the orange lines are category 2 vulnerable regulated land and the pink shading is category 2 sensitive regulated land. These areas need to be protected by providing suitable buffers (see Table 18 and Figure 9 and Figure 10) (NSW Office of Environment and Heritage, ND). Also shown below is the biodiversity mapping for the Urana farm (Figure 66) which is associated with the same drainage lines as the NVR mapping, and the biodiversity mapping for the Yerong Creek farm.

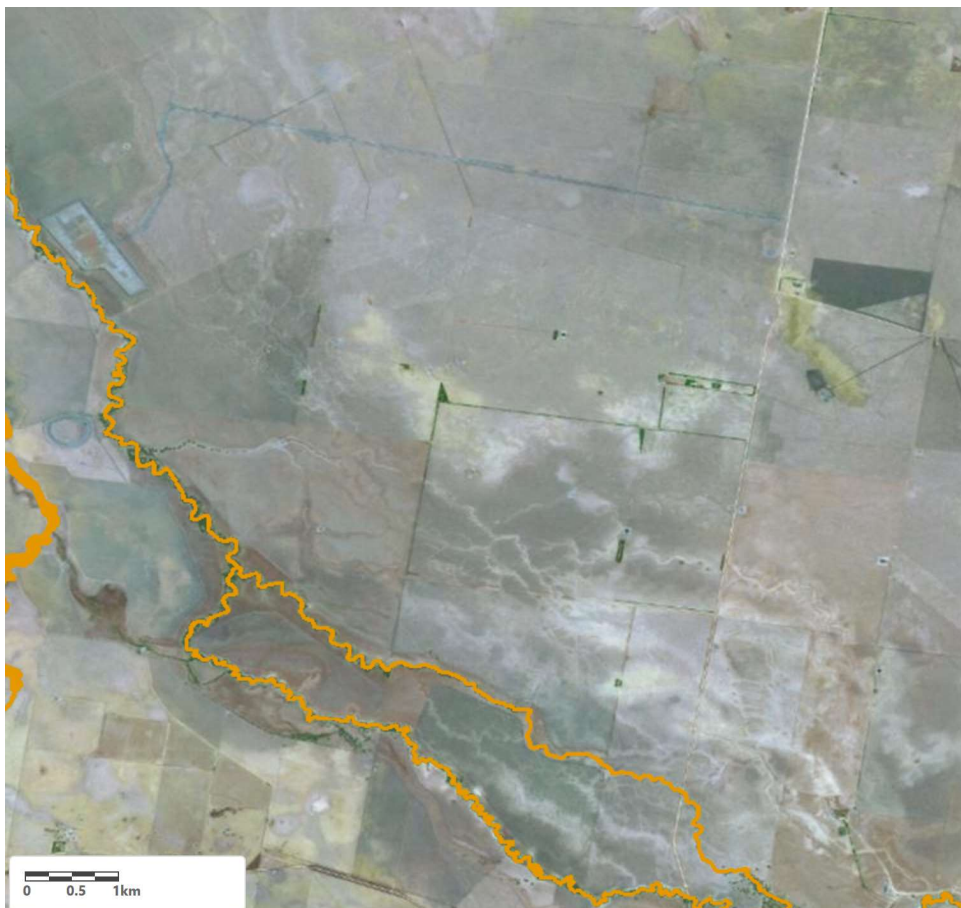


Figure 65 – Native Vegetation Mapping of Urana Property and Surrounds

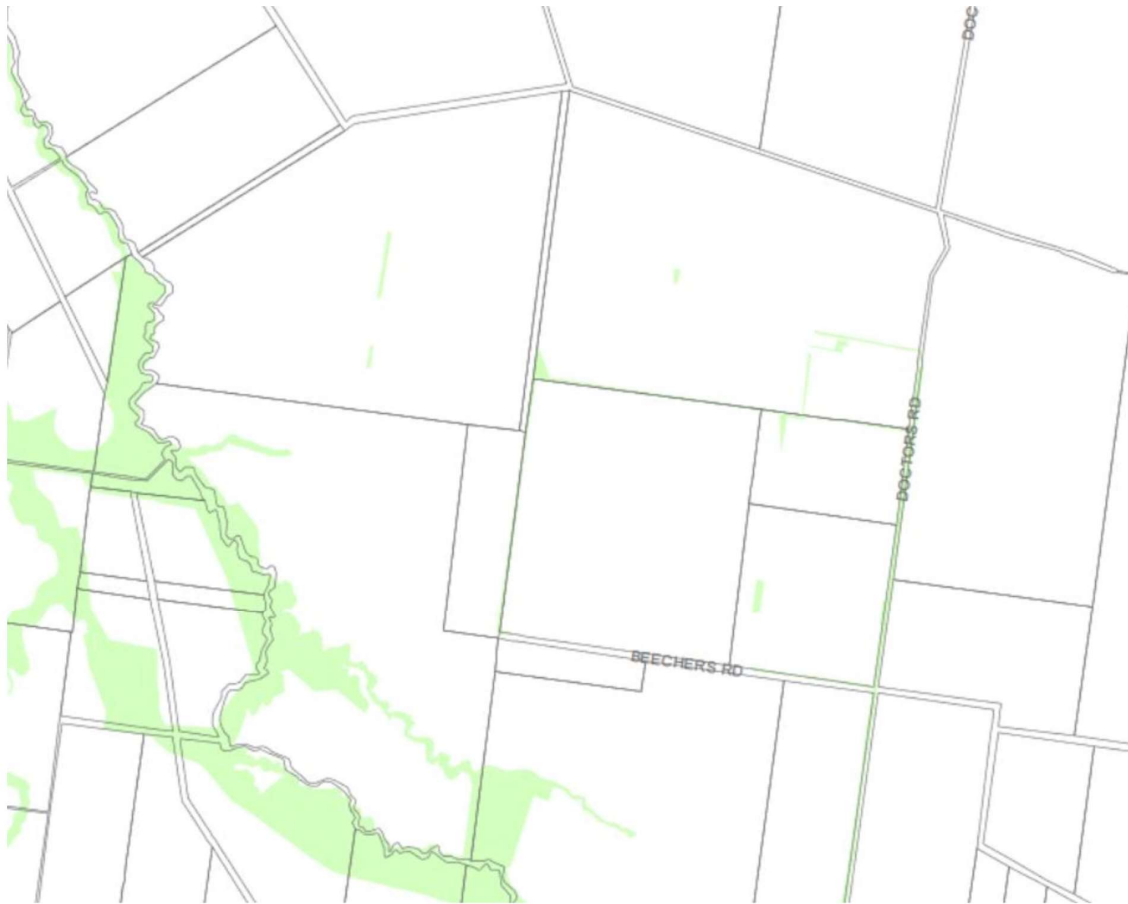


Figure 66 – Urana Farm: Biodiversity Mapping



Figure 67 – Yerong Creek Farm: Native Vegetation Mapping



Figure 68 – Yerong Creek Farm: Biodiversity Mapping

3.3.8. C.3.h Water Quality

There are no watercourses through the lot on which the piggery will be situated, so no water quality sampling has been done. Mittagong Creek does pass through the Munyabla farm reuse areas.

Like all the creeks in the Lockhart Shire, Mundawaddy Creek and Mittagong Creek are ephemeral. There is limited water quality data available. The Lockhart Shire State of the Environment Report 1 July 2019 to 30 June 2017 (Lockhart Shire Council, 2017) identifies that when these creeks do flow, water clarity is very poor due to eroded soil entering in runoff and the moving sediment load of the streams.