Section 6

Impacts, Mitigation and Management



6 IMPACTS, MITIGATION AND MANAGEMENT

This chapter contains a description of the existing environment, an assessment of the potential environmental issues/impacts relevant to the Project, and a description of the mitigation measures committed to by ProTen so as to ensure the potential for impacts to occur is avoided or minimised.

6.1 Land Use Conflict

6.1.1 Surrounding Agricultural Land

As described above in **Section 2.4**, the primary surrounding land use is agricultural, consistent with the dominant land use across the region. The potential for conflict between the development and the existing surrounding agricultural production activities is therefore considered low. The footprint of the five proposed PPU sites will be relatively small at 90 hectares and the commercial activity associated with the development will be largely confined to this area. ProTen intend to continue using the land outside of the disturbance footprint for continued agricultural production purposes (crop cultivation and/or livestock grazing) under some form of lease or share farming arrangement. On this basis, the proposal will not deny access to large areas of viable agricultural lands nor significantly reduce the land area available for agricultural production.

6.1.2 Murrumbidgee Valley National Park

One exception to the surrounding agricultural landuse is the nearby South West Woodland Nature Reserve and Murrumbidgee Valley National Park. The north-west corner of the development site abuts the 'Banandra' portions of the South West Woodland Nature Reserve and Murrumbidgee Valley National Park as shown on **Figure 1.2**. The nearest PPU will be located 100 metres from the development site boundary that abuts the National Park. All other project related development will be considerably further away from the site boundary, with the next nearest PPUs being 1.3 km and 1.4 km to the south and south-east respectively.

In assessing potential impacts of the Project the document *Guidelines for developments adjoining land and water managed by the Department of Environment Climate Change and Water (DECC (now OEH) 2010*) has been considered.

These guidelines list a number of matters to be considered when assessing proposals adjoining land managed by the National Parks and Wildlife Service, which include erosion and sediment control, stormwater runoff, wastewater, pests, weeds and edge effects, fire, access through DECCW land, visual, noise, odour and air quality impacts, threats to ecological connectivity and groundwater dependant ecosystems, and cultural heritage. Each of these aspects in relation to the proposed development has been considered with the outcomes presented in **Table 5.1**

Table 6.1 Matters to be considered with respect to the adjoining National Park

Aspect	Impacts and management
Erosion and sediment control	The risk of erosion and subsequent sedimentation of downstream areas will be an important consideration during construction of the Project. Erosion and sediment control measures will be implemented during construction in accordance with the publication *Managing urban stormwater: soils and construction, Volume 1(Landcom 2004)* (the 'Blue Book'). This will include the use of temporary erosion and sediment control structures, such as hay bales and silt fencing, to prevent soil loss and sediment-laden runoff throughout the duration of construction activities. It is important to note however that the area of National Park adjacent to the development site is at a higher elevation than the development site. The closest PPU will be constructed in area which is at an elevation of 133-134 metres AHD, whilst the National Park is slightly higher, ranging from 135 to 141 metres AHD

Aspect	Impacts and management
	within the adjacent Lot (Lot 48 DP 750898). Notwithstanding, particular focus will be placed on the erosion and sediment controls around the north-western PPU (PPU1). Disturbed areas will be promptly rehabilitated and revegetated to a stable landform, as described in **Section 3.12**. A regular maintenance program will be implemented during the construction period to ensure the continued integrity of the temporary erosion and sediment control structures. All unsealed access tracks will be constructed in accordance with the publication *Managing urban stormwater: soils and construction, Volume 2C Unsealed Roads*. It is also noted that the vast majority of the development site is already cleared, with the site having undergone extensive agricultural related activities for many years. The Project therefore does not present an increased risk of erosion and sedimentation compared to the current landuse of the site. Given the above, the risk of offsite impacts on the National Park as a result of erosion and sedimentation is therefore considered negligible.
Stormwater runoff	Stormwater runoff to be managed within the poultry production complex will be as a result of rainfall runoff from the shed roofs and rainfall runoff from the ground surfaces surrounding the poultry sheds and additional improvements. This runoff will be managed by an engineered surface water drainage system to ensure no offsite impacts occur. Rainfall runoff will be directed into grassed swales around the sheds, which will be designed to allow infiltration of the water into the topsoil for nutrient uptake by the grass, which will be regularly slashed. During heavy rainfall events, excess water will be directed to four small storage dams, one constructed at each corner of each PPU, via catch drains. This water will then be allowed to evaporate, or will be used to irrigate landscape plantings around the sheds. The runoff to be captured in the stormwater dams will predominantly be clean runoff. The washdown water that will enter this system may have some level of nutrients, however levels are predicted to be very low as per ProTen's other farms, given that the floors in the sheds are regularly cleaned. The vegetated swale drains around the sheds will provide a very effective means of nutrient removal, as discussed further in **Section 6.5.2**. Therefore, when already starting with a very low nutrient level, and with vegetated swales providing an effective take up of nutrients, there is negligible risk of nutrient high runoff flowing offsite. In addition, as mentioned above the adjacent National Park is at a slightly higher elevation that the development site, meaning that the risk of offsite runoff into the National Park is negligible. The engineered drainage system to be implemented is described further in **Section 3.11**.
Wastewater	The proposed poultry development will be a largely dry operation, with no effluent generated as a result of the poultry-rearing itself. There will therefore be no effluent from the poultry operation to dispose of. Each poultry shed will be fully enclosed and have concrete flooring. Each shed will also be surrounded by a dwarf concrete bund wall to prevent rainwater and runoff entering the sheds thereby minimising the wastewater to be managed by the farm. Sewage generated by the on-site staff amenities and residences will be appropriately treated and disposed of via on-site wastewater management systems installed and operated in accordance with the requirements of Council and the relevant standards/guidelines. The only other wastewater generated by the poultry operation will be the wash down water from within the sheds at the end of each nine week production cycle. This water will be managed within the engineered drainage management system, as described above. No offsite impacts on the National Park relating to wastewater are therefore anticipated as a result of the Project.
Pests, weeds and edge effects	The development site will be managed in strict compliance with ProTen's standard operating procedures with regards to pest control, which are described in detail in **Section 3.16**. Weeds will also be controlled across the development site as part of the site maintenance program. A wheel wash will be constructed at the entrance to the PPUs to control pests and weeds both entering and exiting the site, as described in detail in **Section 3.18**.

Aspect	Impacts and management
Fire and asset protection zones	As described in **Section 2.13**, the nearest PPU will be 100 metres from the development site boundary in the vicinity of the National Park. The area within this 100 metre buffer is devoid of trees, having been cleared as part of the current agricultural land use of the development site, as shown on **Figure 1.3**. This area therefore provides a buffer between the National Park and the nearest PPU, should fire occur within the National Park, or vice versa.
Access through DECCW land	No access will be gained to the development site from the National Park. The development site will be fenced in accordance with OEH's boundary fencing policies to prevent access from the National Park.
Visual	The proposed PPU sites are relatively small and the commercial activity associated with the development will be largely confined to these sites. The footprint of the Project, including the PPUs, ancillary infrastructure, associated residences and internal access roads will be approximately 90 hectares, comprising just 8 percent of the total development site. A landscaping strategy will be implemented to reduce residual impacts of the proposed development. Visual amenity is addressed in further detail in **Section 6.10**.
Noise and vibration	A noise and vibration impact assessment of the Project was conducted by Global Acoustics (2015). The assessment predicts all noise levels associated with the development to be well within the relevant criteria at all nearest residences. Noise and vibration is discussed in further detail in **Section 6.3**.
Odour and air quality	An air quality impact assessment of the Project was conducted by Pacific Environment (2015). **Figure 6.1** (refer **Section 6.2** below) shows that the predicted one second peak to mean odour concentration in the eastern portion of the National Park (Lot 48 DP 750898) closest to the development site, will be around 7 OU, which is equivalent to the odour criterion adopted for the Project. This level occurs across a small portion of the National Park, with levels then reducing across the middle and western section of the park to between 5 OU and 2 OU, well below the adopted odour criterion. Air quality is discussed in further detail in **Section 6.2**.
Threats to ecological connectivity and groundwater dependent ecosystems	There will be no change to ecological connectivity as a result of Project. As previously mentioned the existing landuse of the development site is agricultural which has resulted in the majority of the development site being cleared of vegetation for many years. Some isolated trees remain within the site; however these are no significant patches of vegetation, and none providing ecological connectivity with the adjacent National Park. The potential ecological impacts of the Project are discussed in further detail in **Section 6.7**. Water for the proposed development will be supplied via new groundwater bores to be constructed within the development site, at a rate of approximately 460 ML per year. The drawdown associated with this groundwater extraction is anticipated to be within the minimal impact considerations of the NSW Aquifer Interference Policy. The potential groundwater related impacts as a result of the Project are addressed in **Section 6.5**, with further detail on GDEs provided in **Section 6.6**.
Cultural heritage	Impacts on Aboriginal objects in a National Park may result from erosion, sedimentation and stormwater runoff in adjoining developments. As described above in this table, offsite impacts resulting from erosion, sedimentation and stormwater runoff as a result of the development are predicted to be negligible. Further, an Aboriginal Cultural Heritage Assessment of the Project was conducted by OzArk (2015), who concluded that the Project would not impact upon cultural heritage within the bounds of the development site. It follows that there will be no offsite impacts on cultural heritage as a result of the development.

6.1.3 Mitigation Measures

No significant impacts on landuses around the development site are anticipated, as described above in **Section 6.1.1** and **6.1.2**, and summarised in **Table 6.1**. Notwithstanding, a number of measures will be implemented to minimise and manage the potential for land use conflict, as summarised below.

Landscaping Strategy

Landscape plantings (vegetation screens) will be established as described in **Section 3.14** and illustrated on **Figure 3.8**. In addition to screening off the property, the plantings will reduce the magnitude and frequency of any adverse air quality impacts and noise emissions.

Erosion and Sediment Control, and Stormwater Management

An engineered stormwater management system as described in **Section 3.11** will be constructed and appropriately maintained to ensure no offsite impacts related to stormwater runoff occur.

Erosion and sediment control measures will be implemented during construction and operation of the Project in accordance with the Blue Book.

Chemical Use

Staff members will be instructed in the proper use and handling of all chemicals used on-site. If appropriate, this will include completion of training such as SMARTtrain or ChemCert (or similar).

All chemical use will be undertaken in full compliance with the relevant statutory requirements, including the *Pesticides Act 1999*.

Where appropriate, chemicals used will be approved by the Australian Pesticide and Veterinary Medicine Authority as safe and fit for that particular use.

Environmental Complaints and Incidents

The Complaints and Incidents Management Strategy contained within **Appendix C** will be implemented to ensure that all complaints and incidents relating to the poultry operation are promptly and effectively addressed. Appropriate documentation of complaint/incident handling will assist in identifying and implementing measures to negate the possibility of re-occurrence in the future.

6.2 Air Quality

6.2.1 Introduction

Air quality is a sensitive issue associated with intensive poultry developments. Given the nature of such operations it in inevitable that there may be the intermittent release of fugitive odours and particulate matter during the poultry production cycle. However this statement is applicable to many agricultural pursuits. The odour and particulate matter produced in broiler farms, such as that proposed, is generally less than that associated with older poultry and also other intensive livestock operations such as piggeries and cattle feedlots. The poultry industry has come a long way over the past 20 years and operates on the basis of continual environmental improvement driven by environmental legislation and community expectations.

The proposed development site offers several advantages in terms of potential air quality impacts. These include being removed from any urban areas, low density of surrounding residences and significant separation distances.

Pacific Environment was engaged to undertake the appropriate assessment and reporting of air quality issues associated with the Project. The assessment was undertaken in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (Approved Methods) (DEC 2005) and *Assessment and Management of Odours from Stationary Sources in NSW* (DEC 2006). A copy of Pacific Environment's Air Quality Assessment (2015) is contained within **Appendix E**, with the key findings summarised below.

6.2.2 Existing Environment

The prevailing wind directions around the development site are from the south-west and east, as illustrated on **Figure 2.2** (refer **Section 2.7**). Overall the wind data shows a calm to light winds (up to 3 m/s), occurring 12.5% of the time.

Published information on existing air quality within the locality is limited, with no known monitoring sites in the vicinity. However, as the development site is situated in a rural area with no major sources of air pollution, the local air quality is likely to be good and concentrations of pollutants are unlikely to exceed air quality criteria.

In order to gain an understanding of what current pollutant levels may be within the vicinity of the site, Pacific Environment (2015) looked at PM_{10} (particulate matter with a diameter of equal to or less than 10 microns, with a micron being one-millionth of a metre) data collected by the EPA at a monitoring station near Albury, which is considered to be representative of the proposed development site. This data shows that the average PM_{10} concentration for the last six years of monitoring is 16 micrograms per cubic metre ($\mu g/m^3$), which is well below the EPA annual average assessment criterion of 30 $\mu g/m^3$. The highest annual average PM_{10} concentration was 21 $\mu g/m^3$ recorded in 2007, which is still well below the criterion.

With regards to atmospheric stability, the data show that the combined frequency of E and F stability classes, the most critical for air quality impacts, is 44%. The frequency of neutral conditions is also relatively high, occurring 25% of the time. The data is consistent with the expectations for sites in inland southern regions of Australia.

6.2.3 Assessment Criteria

When assessing any development proposal with potential significant air emissions, it is necessary to compare the potential impacts with relevant air quality criteria. Such criteria are used to assess the potential for ambient air quality to give rise to adverse health or nuisance effects.

Odour

The Approved Methods (DEC 2005) include ground-level concentration (glc) criterion for complex mixtures of odorous air pollutants. They have been refined to take account of population density in the area. **Table 6.2** lists the odour glc criterion to be exceeded not more than one percent of the time, for different population densities.

Table 6.2 Odour Performance Criteria for Odour Assessment

Population of Affected Community	Ground Level Concentration Criterion (OU)
≤2	7
~10	6
~30	5
~125	4
~500	3
Urban (2000) and/or schools and hospitals	2

Based on discussions between Proten and the EPA, Pacific Environment adopted an odour criterion of $C_{99\ 1sec}$ = 7 odour units (OU), which is considered appropriate for the development given the surrounding sparsely populated area.

Particulate Matter

In its modelling and assessment guidelines, the EPA specifies air quality assessment criteria relevant for assessing impacts from dust generating activities (NSW EPA, 2005). **Table 6.3** summarises the air quality criteria for dust that are relevant to the Project.

Table 6.3 Adopted Criteria for Particulate Emissions

Pollutant	Standard/Criterion	Averaging Period	Agency
Particulate matter < 10µm (PM_{10})	50 µg/m^3	24-hour maximum	NSW EPA
	30 µg/m^3	Annual mean	NSW EPA

6.2.4 Impact Assessment

The air dispersion modelling conducted by Pacific Environment (2015) was based on an advanced modelling system using the models TAPM and CALPUFF. This system substantially overcomes the basic limitations of the steady-state Gaussian plume models such as AUSPLUME, and is described below.

TAPM is a three dimensional meteorological and air pollution model that predicts airflow important to local scale air pollution, such as terrain induced flows, against a background of larger scale meteorology provided by synoptic analyses.

CALPUFF is a multi-layer, multi-species, non-steady state puff dispersion model that can simulate the effects of time and space varying meteorological conditions on pollutant transport, transformation and removal. Emission rates and source details, terrain and surface details, and meteorology are the three major model inputs.

Odour

Odour emission rates were estimated by Pacific Environment (2015) using a modelling approach based on data from a variety of broiler farms in Australia, as well as theoretical considerations. The approach generates hourly varying emission rates from broiler sheds based on the following factors:

- Number of birds, which varies later in the batch as harvesting takes place;
- Stocking density of birds, which is a function of bird numbers, bird age and shed size;
- Ventilation rate, which depends on bird age and ambient temperature; and
- Design and management practices, particularly those aimed at controlling litter moisture.

Data from existing farms were gathered from tunnel-ventilated sheds and chicken batches at approximately five weeks of age or more. Given that maximum emissions occur around 5 weeks and later, these samples represent the maximum odour generating potential.

Figure 6.1 shows a contour plot of the predicted one second peak to mean odour concentrations for site.

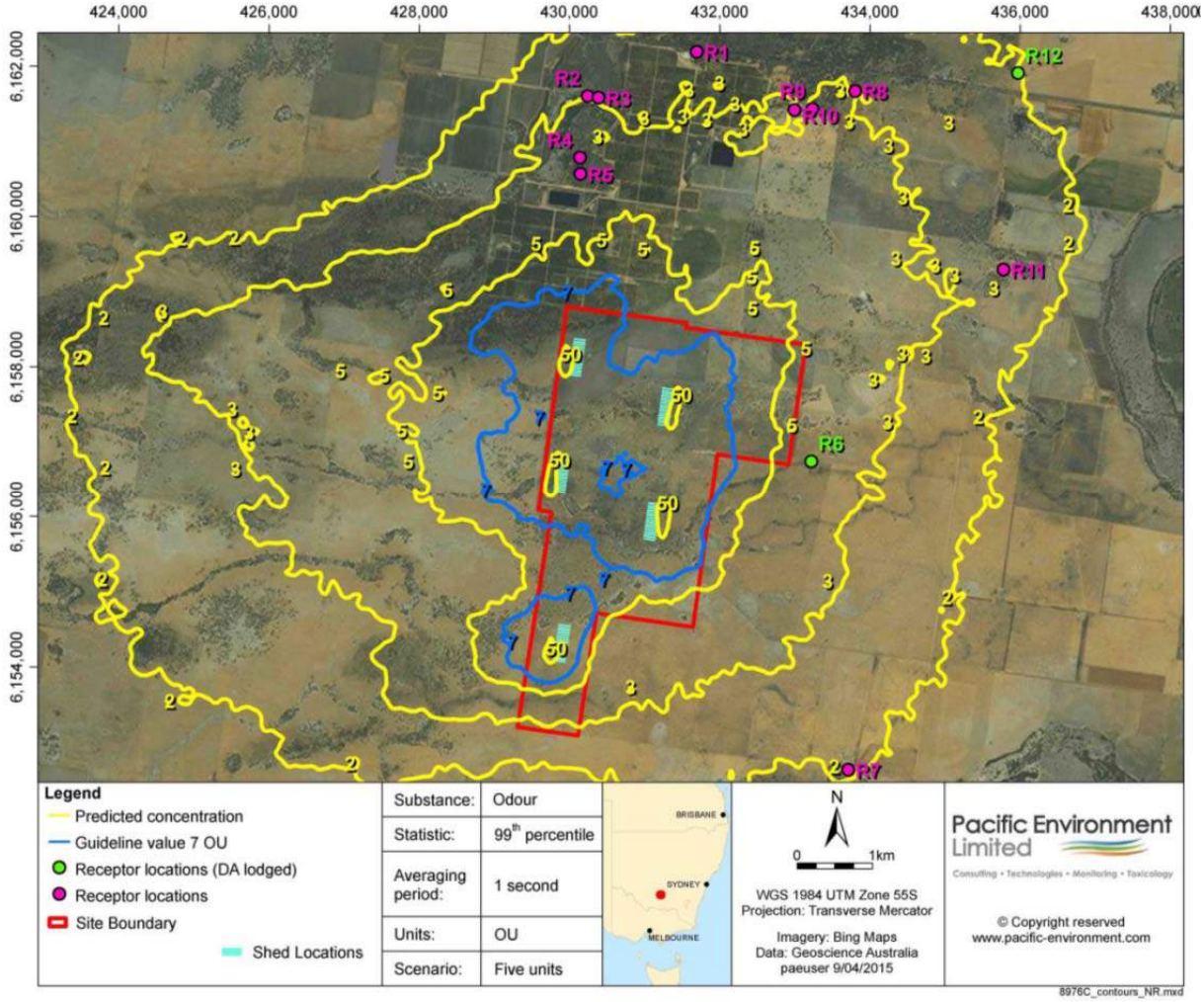


Figure 6.1 Predicted 1-second peak to mean concentration

As evident on **Figure 6.1**, the predicted odour concentration at all of the nearest receptors is predicted to be well below the criterion of 7 OU, with odour concentrations at all receptors being at or below 5 OU.

Particulate Matter

Pacific Environment (2015) estimated particulate emission rates for the proposed poultry production complex based on a modelling approach using data from broiler farms in NSW, as well as theoretical considerations. Data from an existing farm with tunnel-ventilated sheds and cup and nipple drinkers was gathered for chicken batches between one to eight weeks of age (i.e. over a full production cycle). The approach generates hourly varying emission rates from each shed based on the following factors:

- Total weight of all of the birds, which varies later in the batch as harvesting takes place;
- Ventilation rate, which depends on bird age and ambient temperature; and
- Design and management practices.

Figures 6.2 and **6.3** show the predicted 24-hour maximum and annual average PM_{10} levels respectively at the nearest sensitive receptors due to the operations of the proposed poultry production complex. Modelling results show that maximum 24 hour and annual average PM_{10} levels as a result of the Project will be below the respective assessment criterion at all of the sensitive receptors.

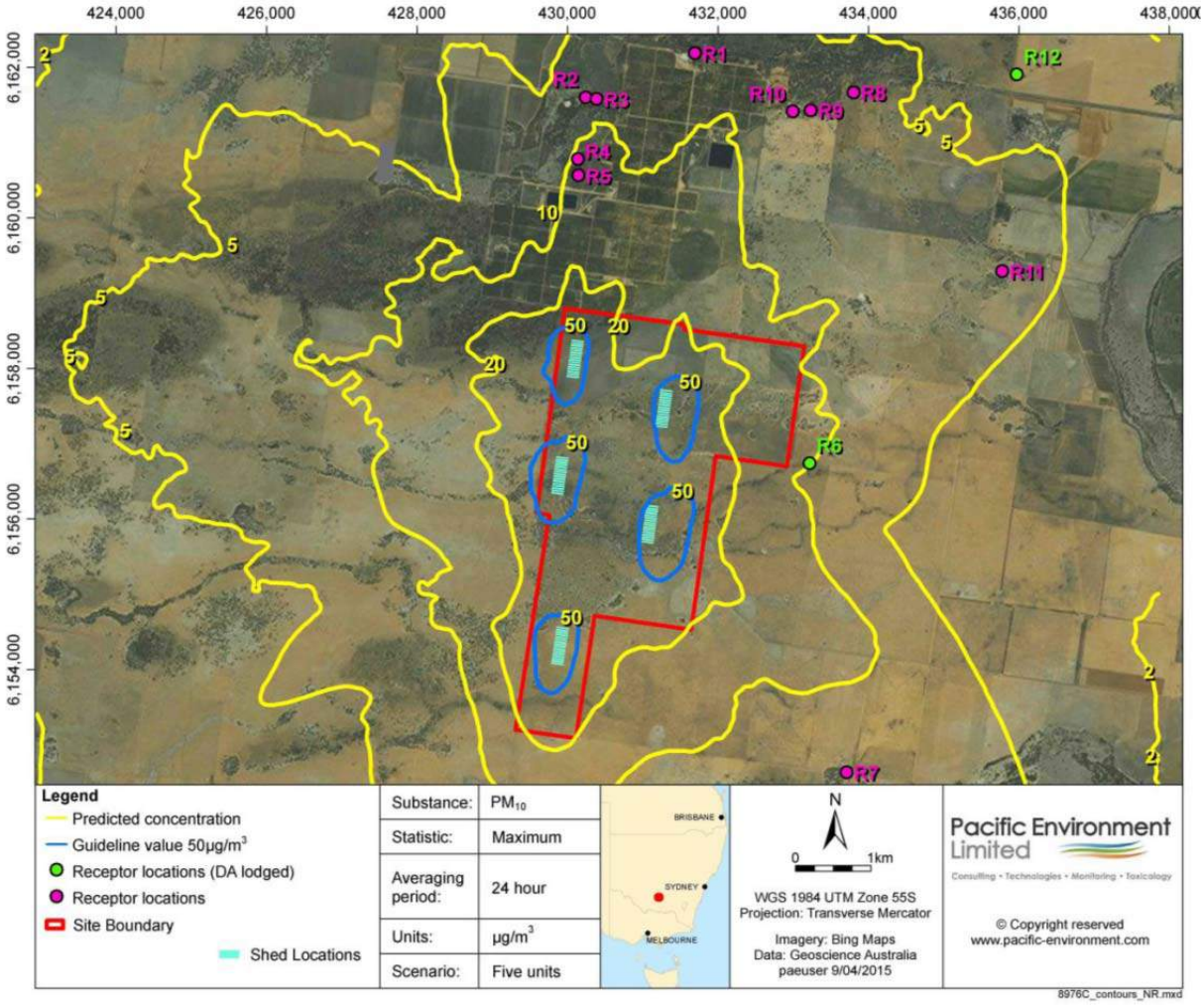


Figure 6.2 Predicted maximum 24-hour PM_{10} concentration

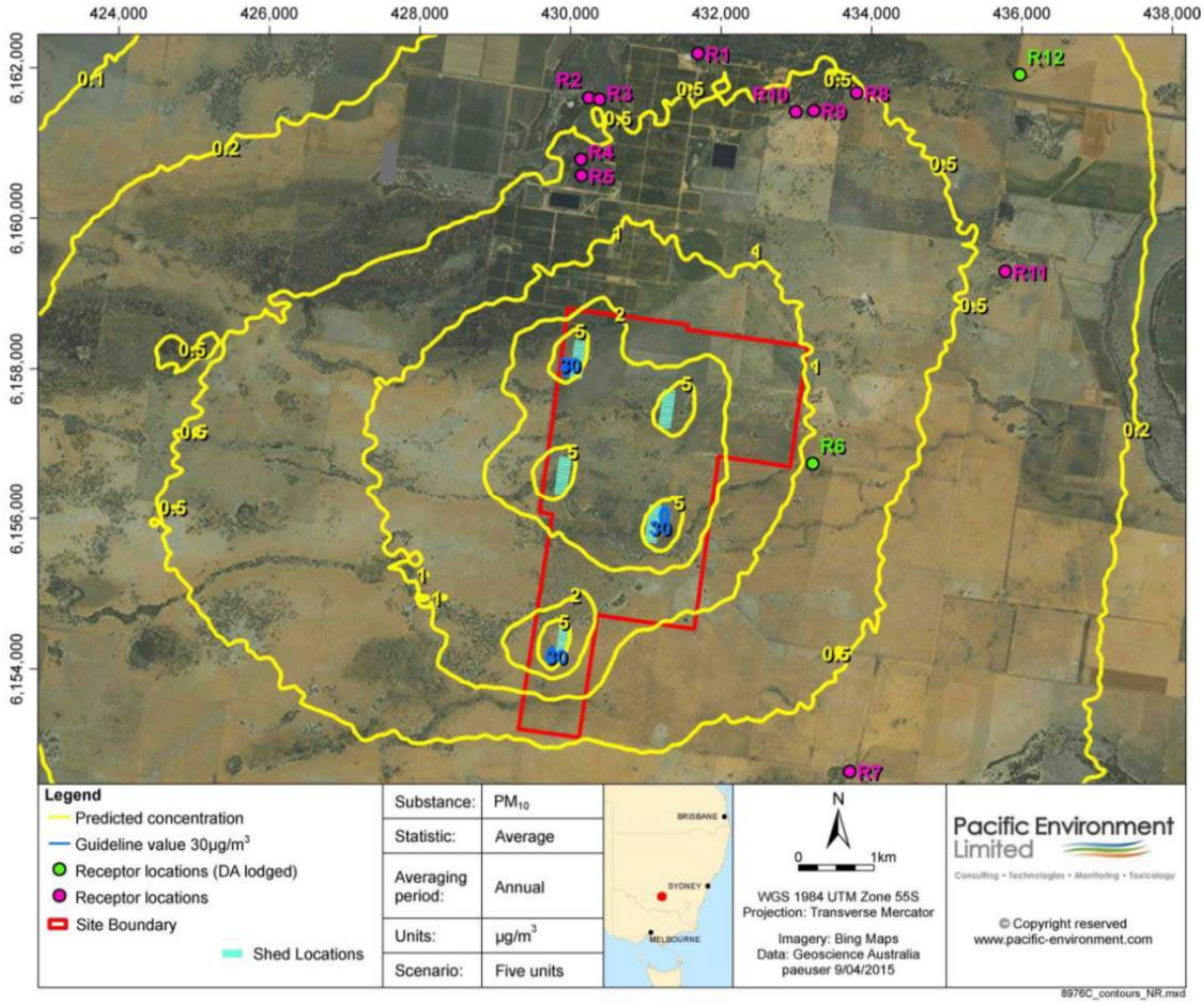


Figure 6.3 Predicted annual average PM_{10} concentration without background

Wheel generated dust

Given the size of the property and the extent of internal roads, as shown on **Figure 1.3**, the potential for wheel generated dust from these roads was considered in the Air Quality Assessment (Pacific Environment, 2015).

The internal roads will be 7 metres wide and will be constructed as follows:

- Compacted clay base to 98%
- 200mm of road base, as follows:
  - 120mm of 80mm “Jawbone” rock
  - 80mm of 40mm “DGS” gravel on top.

Pacific Environment concluded that given the roads will be constructed rather than consisting of unformed tracks, the emission potential of the roads will not be significant due to a lower silt loading on the constructed road surface. Should dust emissions become an issue, standard control methods could be applied such as limiting the internal speed on the roads.

6.2.5 Mitigation Measures

ProTen understands that air quality issues are directly related to farm operation, with good management practices playing a significant role in reducing the potential for offensive odour and particulate matter emissions. Again, the proposed development site offers several advantages in terms of the potential for air quality impacts, including low density of surrounding residences and significant separation distances.

While the Project is predicted to have negligible impact on local amenity with respect to odour and dust impacts, ProTen will take reasonable and practicable measures to prevent or minimise emissions. As listed below, a range of complementary design features, best management practices and mitigation measures will be applied to minimise and manage potential air quality impacts.

Development Design

- The poultry sheds will be fully enclosed, have adequate roof overhang (wide eaves) and be surrounded by dwarf concrete bund walls to prevent rainwater entering the sheds and to allow for the controlled discharge of wash down water from the sheds. These measures will all reduce the level of moisture within the poultry sheds, which is identified as a significant potential odour source.
- The feed silos will be fully enclosed to both prevent the entry of rainwater, with wet feed also identified as a potential odour source, and minimise emissions of dust/particulate matter when loading and unloading.
- The poultry sheds will be tunnel-ventilated, which will allow control over the moisture levels and promote optimum growing conditions and bird health. The increased airflow and improved feed conversion in tunnel-vented sheds helps to maintain bedding material within the optimal moisture range.
- All sheds will be fitted with nipple drinkers with drip cups, as opposed to traditional cup drinkers, to minimise water spillage and reduce the risk of increased shed moisture.

Operation and Maintenance

- Regular monitoring and maintenance of the tunnel ventilation systems and bird drinkers will be undertaken to avoid spillage, leaks and uneven distribution.
- Stocking densities and bird health within each of the poultry sheds will be regularly checked and, if necessary, appropriate corrective measures will be implemented.
- Daily monitoring and maintenance of the bedding material will occur to identify, remove and replace any caked material beneath drinking lines and/or areas with excessive moisture content.
- Poultry litter (spent bedding material) will be promptly removed from the sheds and transported off-site in covered trucks at the end of each production cycle during the clean-out phase. Wherever possible the handling of the material will be avoided during adverse climatic conditions, such as times of cold air drainage during early morning or towards nights and strong winds. The shed ventilation systems will not be used during the removal of bedding material.
- Dead birds will be collected from the sheds on a daily basis and stored in on-site chillers prior to removal from site.
- The insides of the poultry sheds and the surrounds will be maintained at all times to ensure a clean and sanitary environment.
- During sanitisation, the amount of air released from the sheds while any sanitising scent is present will be minimised and, if possible, a low scent sanitiser will be utilised.
- Internal access roads will be appropriately maintained to minimise dust emissions.

Landscaping Strategy

- Landscape plantings (vegetation screens) will be established in accordance with the Landscaping Strategy described in **Section 3.14**. In additional to screening the PPUs, the plantings will act to effectively slow and filter air movement, which will enhance dust deposition and odour dispersion.

Meteorological Station

- A meteorological station will be installed within the development site to collect on-going and up-to-date weather data. The collected data will assist in responding to any complaints relating to possible odour emissions.

Environmental Complaints and Incidents

- The Complaints and Incidents Management Strategy contained within **Appendix C** will be implemented to ensure that all complaints and incidents relating to the poultry operation are promptly and effectively addressed. Appropriate documentation of complaint/incident handling will assist in identifying and implementing measures to negate the possibility of re-occurrence in the future.

6.2.6 Conclusion

On the basis of dispersion modelling undertaken by Pacific Environment (2015), the poultry production complex will operate within the proposed development site without significant adverse effects on local amenity with respect to odour and air quality.

6.3 Noise and Vibration

6.3.1 Introduction

While noise generated by construction and operational activities has the potential to impact upon surrounding residences, noise has been demonstrated not to be an issue for well-managed poultry broiler production operations.

Again, the proposed development site offers several advantages in terms of potential noise impacts, including being removed from any urban areas, low density of surrounding residences and significant separation distances. Furthermore, the five proposed PPU sites are relatively small and the commercial activity associated with the development will be largely confined to these areas.

Global Acoustics was engaged to undertake a noise impact assessment to determine potential noise impact at the nearest residential receptors to the site. This assessment was undertaken in accordance with the *Interim Construction Noise Guideline* (DECC, 2009), *Industrial Noise Policy* (EPA, 2000) and the NSW *Road Noise Policy* (DECCW, 2011). Acoustic modelling was undertaken using CadnaA, noise prediction software developed by DataKustic.

A copy of Global Acoustics' Noise Impact Assessment (2015) is contained within **Appendix F**, with the key findings summarised in the sub-sections below.

A summary of acoustic terminology used in the assessment is as follows:

- L_A, the A-weighted root mean squared (RMS) noise level at any instant.
- L_{A1}, the noise level which is exceeded for 1% of the time.
- L_{A90}, the level exceeded for 90% of the time, which is approximately the average of the minimum noise levels. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes.
- L_{Aeq}, the average noise energy during a measurement period.
- dB(A), noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise.

6.3.2 Existing Environment

The development site is in a quiet rural area with road traffic noise as the only significant noise source. Global Acoustics therefore conservatively assumed that background levels may be less than L_{A90} 30 dB during all time periods, which is typical of a rural environment that primarily comprises traditional agricultural activities with some vehicle traffic on the road network. It is reasonable to say that the existing noise levels in the area are directly related to the current land use activities and infrastructure.

6.3.3 Assessment Criteria

Construction Noise

The *Interim Construction Noise Guideline* (DECC, 2009) specifically relates to construction, maintenance and renewal activities. It specifies standard construction hours as:

- Monday to Friday, 7.00 am to 6.00 pm;
- Saturday, 8.00 am to 1.00 pm; and
- No construction work on Sunday and public holidays.

For major construction projects a quantitative assessment is required, with comparison to relevant criteria. The criteria for work undertaken in the standard construction hours are:

- LAeq,15min equal to background plus 10 decibels (dB); or
- LAeq,15min 75 dB.

An LAeq criterion of background plus 5 dB is specified for work outside the standard construction hours.

Given the rural location of the development site, Global Acoustics (2015) has adopted the Industrial Noise Policy's (EPA 2000) default minimum rating background noise level (RBL) of 30 dB for all time periods for the Project, and subsequently a construction noise criterion of $L_{Aeq,15min}$ 40 dB. This is a conservative daytime construction criterion.

Operational Noise

The Industrial Noise Policy (EPA 2000) states that objectives for environmental noise are '*to account for intrusive noise and … to protect the amenity of particular land uses*'. To achieve this, limits are specified where the 'intrusiveness criterion essentially means that the equivalent continuous (energy-average) noise level of the source should not be more than 5 dB above the measured background level'. Amenity is protected by 'noise criteria specific to land use and associated activities'. Amenity criteria 'relate only to industrial-type noise and do not include road, rail or community noise'.

As advised above, a minimum RBL of 30 dB for all time periods has been adopted by Global Acoustics (2015) for the Project. The development is in a quiet rural area with road traffic noise as the only real noise source. Because of this an L_{A90} of 30 dB has been assumed, which results in an $L_{Aeq,15}$ min intrusiveness criterion of 35 dB.

Table 6.4 summarises the intrusiveness and amenity criteria adopted by Global Acoustics (2015) that apply for day, evening and night periods. The lower of the two (intrusiveness or amenity) apply, where applicable, and is adopted as the Project Specific Noise Level (PSNL).

Table 6.4 Project Specific Operational Noise Level Criteria

Period[1]	Adopted RBL (dB)[2]	Intrusiveness Criterion L_{Aeq}(dB)	Acceptable Amenity Criterion L_{Aeq}(dB)	Project-Specific Noise Level L_{Aeq}(dB)
Day	30	35	50	35
Evening	30	35	45	35
Night	30	35	40	35

Notes:

1. Day: 7.00 am to 6.00 pm; Evening: 6.00 pm to 10.00 pm; Night: 10.00 pm to 7.00 am; and
2. An RBL of 30 dB has been assumed for a rural environment.

Sleep Disturbance

The potential for sleep arousal has been assessed using the guidance provided in the INP Application Notes and the *NSW Road Noise Policy* (RNP) (DECCW, 2011). The INP guideline suggests that the $L_{A1(1minute)}$ level of 15 dBA above the RBL is a suitable screening criteria for sleep disturbance for the night-time period. The RNP also provides the following conclusions from research on sleep disturbance:

- Maximum internal noise levels below 50 - 55 dBA are unlikely to awaken people from sleep.

- One or two noise events per night, with maximum internal noise levels of 65 - 70 dBA, are not likely to affect health and wellbeing significantly.

The night period background noise levels around the development site are likely to be less than or equal to L_{A90} 30 dB. Therefore, a sleep disturbance criterion of $L_{A1,1minute}$ 45 dB (30dB +15dB) has been adopted for the Project.

Traffic Noise

The RNP outlines the traffic noise criteria applicable to the Project. The Policy applies different noise limits dependent upon the road category and type of development/land use. **Table 6.5** contains the criteria considered the most suitable for the Project, which relies on the Sturt Highway for access. Direct access to site will occur via an access road which will be constructed as part of the development, however vehicles travelling on the site access road are assessed as an operational noise impact against a conservative operational criterion. Only potential noise impacts for residents along the Sturt Highway have been assessed by Global Acoustics (2015) against the road traffic noise criteria.

Table 6.5 Project Specific Traffic Noise Criteria

Road Category	Development Type / Land Use	Assessment Criteria	
		Day $L_{Aeq,15hr}$ dB	Night LAeq,9hr dB
Freeway/arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	60	55

A secondary objective of the RNP is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria. In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person. The relative increase in road traffic noise levels was also considered in the assessment.

6.3.4 Impact Assessment

Nearest Sensitive Receptors

The surrounding residential dwellings are reasonably well removed from the Project, with the closest located approximately 2.1 kilometres from the nearest PPU. As outlined in **Section 2.5**, thirteen nearest sensitive receptors (NSR) have been identified in the local region surrounding the development site (refer **Figure 1.2**).

Of these thirteen receptors, two locations (R12 and R13) were found to have a predicted noise level of <20 dB for all construction and operational conditions assessed. Noise impacts at these two receptor locations are unlikely to be audible to residents and were therefore not considered further. Noise impacts for the remaining 11 NSR were generally greater than 20 dB and have been included. It is important to note however that of these 11 receptors, 10 represent existing residential dwellings. As mentioned in **Section 2.5**, R6 represents a property for which a development application has been lodged with Council, however it is understood that this development application has not been determined and as such a residential dwelling has not been constructed. This location has however been conservatively assessed as a possible receptor.

Construction Noise

A construction noise model was created for the construction of the Project, and noise levels predicted by Global Acoustics using the CONCAWE calculation methodology within the CadnaA software.

The construction period for the Project is expected to take 18 months with all construction activities scheduled to be undertaken during standard daytime construction hours. Construction activities during this time period will include:

- Site Preparation;
- Earthworks;
- Foundation and slab construction;
- Superstructure construction including portal frames, roofing, and cladding;
- Electrical installation and installation of equipment and silos;
- Construction of a new intersection with the Sturt Highway;
- Construction of a new access road form the Sturt Highway to the development site, and one-way circulating ring roads around the perimeter of each PPU (standard rural all-weather property access roads);
- Construction of ten dwellings to house farm managers and farm assistant managers within the development site, as well as an amenities facility encompassing office space, toilets and staff change rooms at each PPU;
- Construction of a workshop and other storage facilities;
- Construction of storm water management systems; and
- Landscaping.

Of these tasks, site preparation/earthworks and road construction are considered to represent the worst case for noise impact. These activities will likely involve the use of the greatest amount of noise generating equipment.

Construction of the Sturt Highway intersection and site access road has been modelled to represent the worst case construction impact for the Project due to the close proximity to some of the NSR (R10). However it is also noted that whilst the intersection construction represents the worst case scenario for construction noise impact, it will not take place for the entire construction period. The construction of the new Sturt Highway intersection is expected to take approximately 2-3 weeks, with the access road taking a further 4 weeks.

Construction model predictions are presented in **Table 6.6** for neutral atmospheric conditions, as construction is to occur in the daytime only, and represent the worst-case impact for the roadworks construction scenario. No exceedance of the construction noise criterion ($L_{Aeq,15min}$ 40 dB) is predicted.

Table 6.6 Calculated LAeq, 15minute Construction Noise Levels (dB)

Receptor ID	Neutral Conditions
R1	27
R2	<20
R3	<20
R4	<20
R5	<20

Receptor ID	Neutral Conditions
R6	<20
R7	<20
R8	28
R9	33
R10	36
R11	<20

Operational Noise

An operational noise model was created for the Project and noise levels predicted by Global Acoustics for three operational scenarios using the CONCAWE calculation methodology within the CadnaA software.

The primary noise sources associated with the operation of a poultry production complex are:

- Continuous operation of ventilation fans;
- Operation of heaters and water pumps;
- The mechanical feed delivery system and feed silo refill pump and auger;
- Heavy vehicle movements;
- Occasional tractor and other farm type machine and vehicle movements; and
- Night movements of trucks and forklifts during bird delivery and collection.

Ventilation fans have been identified as the primary continuous noise generating activity. Feed silo refill and bird delivery/collection have been identified as the primary intermittent noise generating activities. All of these sources were modelled in the noise assessment.

The three operational scenarios developed to assess the various combinations of noise sources that could occur are:

Scenario 1 - Worst-case continuous operation

This scenario models all 18 ventilation fans running continuously on each shed. During the production cycle the ventilation fans turn on automatically as required to maintain the required temperature. The fans are not always operated all together, with only a few required early in the production cycle or in the cooler months. All fans are only typically required late in the production cycle as the birds become larger in size. This scenario therefore represents the worst case continuous operation of all 18 fans. Daytime and evening/night-time meteorological conditions have been considered in this assessment.

Scenario 2 - Feed silo refilling

This scenario includes the continuous noise sources in Scenario 1, as well as the maximum result from the assessed feed silo refilling scenarios. Feed deliveries will occur during daytime delivery hours only so only daytime meteorological conditions have been considered.

Scenario 3 – Site Access Road

Due to the close proximity of R10 to the access road the largest potential impact from transport would be road traffic on the access road to site. Bird collection is the most traffic intensive activity associated with this development and will occur predominantly at night time when noise impact is the greatest. A FHWA road traffic model was therefore used to determine the impact of traffic noise on the site access road at the most affected residence (R10). To conservatively assess site access road impacts all continuous noise sources in Scenario 1 were included in this scenario.

Sound power data for noise sources were typically sourced from the Global Acoustics database of representative sound powers. Where possible, sound power data from plant measured at similar facilities was adopted. Sound power for ventilation fans and feed silo refill pump were measured at an existing ProTen Poultry Complex in Bective NSW.

Based on a site inspection and attended noise measurements at a similarly designed broiler production complex (ProTen Bective Complex), water pumps, feed augers and heaters were not included in modelling. These sources were not audible above the ventilation fans and would not contribute to overall noise levels measured off site. As such they were not included in Global Acoustics (2015) assessment.

Model predictions for Scenarios 1 and 2 are provided in **Tables 6.7** and **6.8**. All results indicate that the PSNL will below criteria for all scenarios.

Model results indicate general day to day operations from continuous noise sources would be less than the PSNL of 35 dB under both neutral and prevailing meteorological conditions, as shown in **Table 6.6**.

Table 6.7 Calculated LAeq, 15minute Operational Noise Levels – Scenario 1 (dB)

Receptor ID	Neutral	Inversion	East-north-east Wind	South-west Wind	Maximum
R1	<20	21	<20	20	21
R2	<20	22	<20	21	22
R3	<20	22	<20	21	22
R4	20	26	<20	25	26
R5	21	27	<20	26	27
R6	28	32	24	32	32
R7	<20	22	<20	<20	22
R8	<20	<20	<20	<20	<20
R9	<20	21	<20	21	21
R10	<20	21	<20	21	21
R11	<20	<20	<20	<20	<20

Event noise from feed silo refilling was shown to increase noise at the NSR, but as feed deliveries will only occur during daytime delivery hours there is no predicted exceedance of the PSNL, as shown in **Table 6.7**. The predicted noise levels presented in **Table 6.7** include worst-case impact due to silo refilling, combined with worst-case continuous noise source operations.

Table 6.8 Calculated LAeq, 15minute Operational Noise Levels – Scenario 2 (dB)

Receptor ID	Neutral
R1	<20
R2	<20
R3	<20
R4	21
R5	22
R6	29
R7	<20
R8	<20
R9	<20
R10	<20
R11	<20

Bird collection is the most traffic intensive impact associated with the operations. **Table 6.9** presents the maximum number of total vehicle movements per hour on the access road that will not cause an exceedance of the PSNL at the most affected NSR (R10). The cumulative effect of continuous operational noise sources outlined in Scenario 1 has been conservatively considered in this scenario, however in reality some of the ventilation fans will be turned off during collection.

Table 6.9 Calculated Allowed Heavy Vehicle Movements at R10

Access Road Speed Limit (km/hr)	Maximum Allowed Heavy Vehicle Movements (per hour)
40	25
60	10
80	5

As shown in **Table 3.2** 745 trucks (1490 movements) will be required for the removal of birds per production cycle, with movements occurring each night during the last 4 weeks of the cycle. Removal of birds will be between 8pm and 2pm with truck arrivals and departures spread out over that period. This equated to an average of 54 vehicle movements per day, or approximately 3 movements per hour. If a 60 km/h speed limit was adopted the noise impact from traffic on the site access road from the Sturt Highway would be well below the operational PSNL.

Sleep Disturbance

Sleep disturbance criteria typically only apply to the night period, which is defined in the INP as 10pm to 7am. Sleep disturbance is generally caused by short duration noise sources that give rise to a significant increase to noise emission over and above general operational noise. Global Acoustics (2015) identified that the primary noise generating activity that may cause sleep disturbance is bird collection, which will generally occur when it is dark (during evening/night time hours). Trucks on the site access road are the closest noise source to NSR and the most likely to cause a sleep disturbance impact.

Global Acoustics modelled sleep disturbance predictions for neutral atmospheric conditions, and for each of the assessed prevailing meteorological conditions (**Table 6.10**). No exceedance of the sleep disturbance criterion is predicted.

Table 6.10 Calculated $L_{A1,1minute}$ Sleep Disturbance Noise Levels (dB)

Receptor ID	Neutral	Inversion	East-north-east Wind	South-west Wind	Maximum
R1	21	24	22	22	24
R2	<20	23	<20	22	23
R3	<20	23	<20	22	23
R4	21	26	<20	25	26
R5	22	27	20	26	27
R6	29	33	24	32	33
R7	<20	22	<20	<20	22
R8	21	25	<20	25	25
R9	28	32	23	32	32
R10	33	36	27	36	36
R11	<20	20	<20	20	20

Road Traffic Noise

As detailed below in **Section 6.4.2**, approximately 565 vehicle trips (including 171 heavy vehicle movements) occur on the Sturt Highway daily, as determined by RoadNet (2015) as part of the Traffic Impact Assessment for the Project. Traffic generated by the development would account for a 17% increase in total traffic volume and a 36% increase in heavy vehicle traffic. The heavy vehicle trips will be mostly spread over the nine week production cycle and will be distributed relatively evenly over the predicted delivery hours.

Heavy vehicle movements are likely to result in the most significant impact from the Project. An increase of 36% represents an increase of 1.3 dB to existing road traffic noise levels. This increase is unlikely to be perceptible to the human ear.

A goal of the RNP is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria. The policy recognises an increase of up to 2 dB as a minor impact that is considered barely perceptible to the average person. Given this an increase of 1.3 dB is considered acceptable.

6.3.5 Mitigation Measures

While Global Acoustics (2015) concludes that the Project will have negligible impact on local amenity with respect to noise impacts, ProTen will take reasonable and practicable measures to prevent or minimise noise emissions. As listed below, a range of complementary design features, best management practices and mitigation measures will be applied to minimise and manage potential noise impacts.

Construction

- Construction activities will be restricted to the following standard times:
  - Monday to Friday – 7.00 am to 6.00 pm;
  - Saturday – 8.00 am to 1.00 pm; and
  - No audible construction work will take place on Sundays or public holidays.

- Plant and equipment operators will be appropriately instructed on how to minimise noise generation at all times. Measures may include avoiding the operation of noisy plant and equipment simultaneously.
- All plant and equipment will be maintained to meet regulatory and industry standards, as well as ensure optimal operating conditions.

Operation and Maintenance

- A 60 km/hr speed limit will be adopted on the site access road between the development site and the Sturt Highway.
- Plant and equipment operators will be appropriately instructed on how to minimise noise generation at all times. Measures may include avoiding the operation of noisy plant and equipment simultaneously and/or close together.
- Noise generating equipment purchased by the operator will comply with relevant occupational health and safety requirements.
- Emergency standby diesel generators will only be used when power from the electricity grid is lost and they will be appropriately sited and housed to minimise noise emissions.
- All plant and equipment will be maintained to meet regulatory and industry standards, as well as ensure optimal operating conditions.
- A unidirectional traffic movement system, via a one-way circulation road around each PPU site, will be established to minimise the use of reversing alarms.
- Internal access roads will be appropriately maintained to minimise noise levels.
- Suitable signage will be erected to direct traffic, limit traffic speed and minimise night time noise levels.

Landscaping Strategy

- Landscape plantings will be established in accordance with the landscaping strategy described in **Section 3.13**. In additional to screening the PPUs, the plantings will provide some noise buffering.

Environmental Complaints and Incidents

The Complaints and Incidents Management Strategy contained within **Appendix C** will be implemented to ensure that all complaints and incidents relating to the poultry operation are promptly and effectively addressed. Appropriate documentation of complaint/incident handling will assist in identifying and implementing measures to negate the possibility of re-occurrence in the future.

6.3.6 Conclusion

The noise impact assessment concludes that construction, operational and sleep disturbance noise levels will comply with project specific noise levels at all nearest sensitive receptors for all scenarios. Furthermore, an assessment of road traffic noise showed no discernible impact.

6.4 Traffic and Transport

6.4.1 Introduction

RoadNet undertook an assessment of the potential traffic and transport issues associated with the Project. A copy of RoadNet's Traffic Impact Assessment (2015) is contained within **Appendix G**, and a summary of the key findings provided below.

6.4.2 Existing Environment

The development site has extensive frontage to the Sturt Highway, which is a sealed, 2-lane rural highway under the control of RMS. In the vicinity of the development site, the Sturt Highway is approximately 7.0 metres wide with 1.0 metres wide sealed shoulders and a speed limit of 100 kilometres per hour (kph). Existing access to the development site is via a number of unsealed rural tracks.

RoadNet (2015) obtained traffic volumes for the Sturt Highway for the 18 month period between January 2011 and June 2012, which were collected by RMS via an Infra-Red Traffic Logger (TIRTL) located just west of the development site. The data generally indicates a very low daily and hourly traffic volume across the frontage of the development site, with the total number of vehicles on the majority of days less than 200 vehicles per day. Traffic volumes generally increase during the morning to a mid-day peak before reducing through the afternoon to an over-night low (four vehicles per hour (vph)). Traffic volumes are generally evenly split between eastbound and westbound directions at most times of the day.

RoadNet also conducted an onsite traffic count on Friday 25 July 2014. The count indicated a peak hour of 57 vehicles between 12:15pm – 1:15pm. This peak hour traffic count was used for assessment of the impacts of the Project, as the volumes were higher than the traffic volume data provided by the RMS.

6.4.3 Impact Assessment

Operational Traffic Movements

As detailed in **Section 3.7**, the Project is expected to generate additional operational traffic amounting to approximately 34,060 vehicle movements per year, of which 21,950 will be heavy vehicle movements. On average, this is equivalent to approximately 96 vehicle movements per day, of which 62 will be heavy vehicle movements. The majority of traffic generated by the Project will travel between the site and Hanwood (approximately 6 kilometres south of Griffith).

The following points are noted in terms of the volume of traffic to be generated by the Project:

- It is estimated that close to 35 percent of the total traffic will be generated by light vehicles (car/ute/van);
- With the exception of live bird removal, which will generally occur between the hours of 8.00 pm and 2.00 pm, all transport activities will occur during daylight hours;
- There will typically be one daily shift for farm workers between 7:00 am and 4:00 pm each day; and
- Heavy vehicle trips will be mostly spread over the nine week production cycle and will be distributed relatively evenly over the predicted delivery hours.

RoadNet (2015) advises that the additional traffic generated by the poultry operation will be minimal and will not impact on the safety or operation of the external road network. The additional traffic anticipated to be generated by the development, compared with existing vehicle movements on the Highway, is presented in **Table 6.11**.

Table 6.11 Additional Traffic on the Sturt Highway

Road Section	Existing Vehicle Trips per Day			Additional Vehicle Trips per Day			Percentage Increase		
	Cars	Heavy Vehicles	Total	Cars	Heavy Vehicles	Total	Cars	Heavy Vehicles	Total
Sturt Highway – West of Narrandera	394	171	**565**	34	62	**96**	8.6%	36%	**17%**

The expected increase in light vehicle trips is anticipated to be approximately 34 per day, with 14 of these movements expected during the peak periods at the start and end of a 7am - 4pm shift. This additional traffic, representing just an 8.6% increase in light vehicle movements, will have minimal impact on the Sturt Highway and the external road network.

Heavy vehicles on the Sturt Highway are expected to increase by approximately 36%, once the site is fully operational. This seemingly large increase is due to the already low traffic volumes currently utilising the Sturt Highway. RoadNet (2015) advises that the additional 62 heavy vehicle trips per day is not expected to have any operational impacts on the external road network due to the relatively low volume of traffic currently utilising the highway.

As previously noted in **Section 6.4.2**, the current traffic volumes on the Sturt Highway generally peak around the middle of the day, while the peak volumes generated by the Project are estimated to coincide with the beginning and end of daytime staff shifts i.e. 7 am and 4 pm. The counted traffic volumes along the Sturt Highway adopted for the analysis are also substantially higher than those recorded by the RMS Infra-Red Traffic Logger.

Allowing for these two factors, an adjustment to the peak hour traffic volumes on the Sturt Highway used in the analysis to accommodate 10 years of background traffic growth (as per normal RMS requirements for examining future intersection requirements) has not been explicitly undertaken, since the volumes adopted in the assessment already more than compensate for this adjustment and are therefore conservative for the purposes of considering the future intersection requirements at the site access.

Sturt Highway Intersection

As described in **Section 3.7.3**, construction of a new intersection off the Sturt Highway will be required to access the development. The proposed location of the intersection is illustrated on **Figure 6.4** and on **Plates 12** and **13**.

Due to the low traffic volumes predicted to use the intersection, a basic right turn treatment (BAR) and basic left turn treatment (BAL) is the minimum required of a highway intersection to the development site access road, as per the requirements set out in *Austroads Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections*, and as described above in **Section 3.7.3**. This will allow adequate room for development generated vehicles to manoeuvre or queue without impacting on highway traffic.

The peak hour traffic volumes at the Sturt Highway and the additional traffic to be generated by the development are well below the intersection volumes nominated in *Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis* for which capacity analysis is necessary. RoadNet (2015) have estimated that all through and turn movements at the intersection will have a Level of Service of 'A', and result in minimal delays and queuing, and as such the proposed intersection will operate adequately.

Figure 6.4 Proposed Intersection Location

Plate 12 - Proposed intersection location looking east towards Narrandera

Plate 13 - Proposed intersection location looking west towards Darlington Point

Safe Intersection Sight Distance (SISD) has been assessed for the proposed intersection using *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*. For a design speed of 110km/hr (10 km above the posted speed of 100 km/hr to allow for a factor of safety) and a maximum reaction time of 2.5 seconds, the SISD for cars is calculated as 311 metres to the west and 305 metres to the east. The approaches from both the direction of Griffith and Narrandera exceed these sight distance requirements, with the location of the proposed access point optimally located between two crests to maximise sight distance.

Stopping Sight Distance (SSD) along the Sturt Highway in the vicinity of the proposed access has also been checked in accordance with *Austroads Guide to Road Design Part 3: Geometric Design*, Table 5.4 based on the same design speed, reaction time and grade corrections. The required SSD values of 219 metres to the west and 213 metres to the east are exceeded along the subject section of highway.

Heavy Vehicle Routes

Heavy vehicles will generally travel to and from the site from facilities located in Hanwood 6 kilometres south of Griffith on a daily basis via the Sturt Highway. Deliveries of day old chicks, feed etc. will be delivered from sources generally based around Griffith, which will be delivered in articulated or rigid trucks, and are already accommodated on the road network in the region.

A designated B-double route currently exists along the Sturt Highway through to Narrandera. The Sturt Highway is also an approved Road Train Route. The daily volumes along this route are low. The additional 62 heavy vehicle trips per day (6 in each of the peak hours) for the development along the Sturt Highway are not expected to have any significant traffic impacts. It is possible that future contractors may use B-doubles to service the site.

Goods delivered to and from Narrandera, or locations further east, will utilise the Sturt Highway and Newell Highways which are both suitable for B-doubles. RoadNet (2015) advises that this route is considered adequate and has sufficient capacity to accommodate the additional heavy vehicles generated by the Project without any upgrades to the roadway or intersections.

Construction related impacts

There is not expected to be a significant impact to the external road network during construction of the Project. Construction of the poultry sheds, internal roads and other features will attract some heavy vehicles associated with deliveries of materials and equipment, as well as construction site worker trips to the site. Construction traffic will likely originate from Griffith in the west and Narrandera in the east, and will generally follow the Sturt Highway to the development site.

The number of vehicle movements associated with the construction phase will be lower than that anticipated during operation of the poultry complex, as shown in **Table 3.2** and **Table 3.4**, with approximately 96 daily vehicle movements predicted during farm operation compared to around 68 daily movements during construction. As described above, the increased volume of traffic during operation of the poultry complex is not expected to have any operational impacts on the external road network due to the relatively low volume of traffic currently utilising the highway. Therefore, it follows that the smaller volume of construction generated traffic is also not expected to impact on the operation or safety of the external road network.

Construction of the new intersection of the Sturt Highway may require short term shoulder and lane closures at times. This will be undertaken in accordance with the appropriate traffic control guidelines and by approved traffic control contractors. The impact of this traffic control, in terms of delays and queuing, is expected to be minimal due to the relatively low traffic volumes on this section of the Sturt Highway.

6.4.4 Mitigation Measures

ProTen commits to the following road works and mitigation measures, some of which are recommendations of RoadNet (2015), to ensure that safe and appropriate vehicular access in accordance with RMS requirements is provided and to prevent and/or minimise potential traffic related issues:

Road and Intersection Construction

- A new intersection of the Sturt Highway will be provided with BAR and BAL type turn treatments (see **Figures 3.5** and **3.6**) at the location shown on **Figure 6.4**.
- The BAL and BAR treatment warranted will be supplemented with advance signposting in both directions warning of trucks turning. In addition, an intersection direction sign opposite the access will be erected to further help identify the access point.
- The site access road between the development site and the Sturt Highway will be constructed along the proposed easement as shown on **Figures 1.2** and **3.3** to a minimum 6.5 metres in width, and to provide a surface suitable for B-doubles.
- The access road will be bitumen sealed for a minimum length of 50 metres from the Sturt Highway intersection.
- The farm access will meet the minimum requirements of AS 2890.2, to accommodate the turning movements of the largest vehicles generated by the poultry development, which will initially be semi-trailers however may include B-doubles in the future.
- The internal PPU access roads will be constructed as one-way circulation roads (ring roads) around the perimeter of each PPU to enable traffic to enter, exit and manoeuvre in a forward direction. The roads will be constructed as all-weather rural-type roads able to carry the anticipated heavy vehicle movements.

Operation and Maintenance

- All internal roads will be appropriately maintained to minimise noise and dust emissions.
- Suitable signage will be erected indicating internal traffic direction and speed limits to ensure the orderly and safe use of the site, as well as to minimise the potential for traffic conflict and noise.
- All internal roads will be maintained clear of obstruction and used exclusively for the purposes of transport, loading-unloading and parking. Under no circumstances will these areas be used for storage of goods or waste products.
- Heavy vehicles will follow designated B-double routes, when travelling to and from facilities south of Griffith.

6.4.5 Conclusion

The existing traffic volumes on the Sturt Highway in the vicinity of the development site are low, and the additional traffic generated by the development can be easily accommodated. Provided the recommendations as per RoadNet (2015) and as outlined in this EIS with regards to traffic and transport are met, the Project is not expected to cause any significant impacts in terms of road safety or operation, and there are no issues from a traffic perspective that warrant refusal of the Project.

6.5 Surface Water and Flooding

6.5.1 Introduction

SLR undertook an assessment of the potential surface water issues associated with the Project, including a flooding assessment. The full Flooding Assessment Report (SLR, 2015a) is contained within **Appendix H**, and a summary of the key findings provided below.

6.5.2 Existing Environment

As described in **Section 2.10**, the development site is located within the catchment of the Murrumbidgee River, which covers 84,000 square kilometres of southern NSW. The Murrumbidgee River flows to the north of the development site, flowing from Narrandera through to Darlington Point. At its closest point the river flows approximately 9 kilometres to the north of the site.

The nearest waterway to the development site is Yanco Creek, a regulated stream of the Murrumbidgee River System, flowing approximately 8 kilometres to the east of the site boundary at its closest point. Although inflows to Yanco Creek are controlled by Yanco weir under normal conditions, during large floods the Murrumbidgee River breaks out of its banks before the Yanco Weir and flows directly to Yanco Creek (SKM, 2000).

There are no notable surface water bodies or tributaries within the bounds of the development site. SLR's hydrologist observed two minor topographical depressions which act as minor drainage features for the site. The features have no formed banks and are only distinguishable as drainage features by their location topographically and the vegetation present within it. Some agricultural drains also run along the field boundaries in the north of the development site.

The nearest wetlands, as identified within the Narrandera LEP 2013 mapping, are shown to occur approximately 3.2 kilometres to the north of the northern-most PPU (PPU 1), and 5.8 kilometres to the east of the north-eastern PPU (PPU 2).

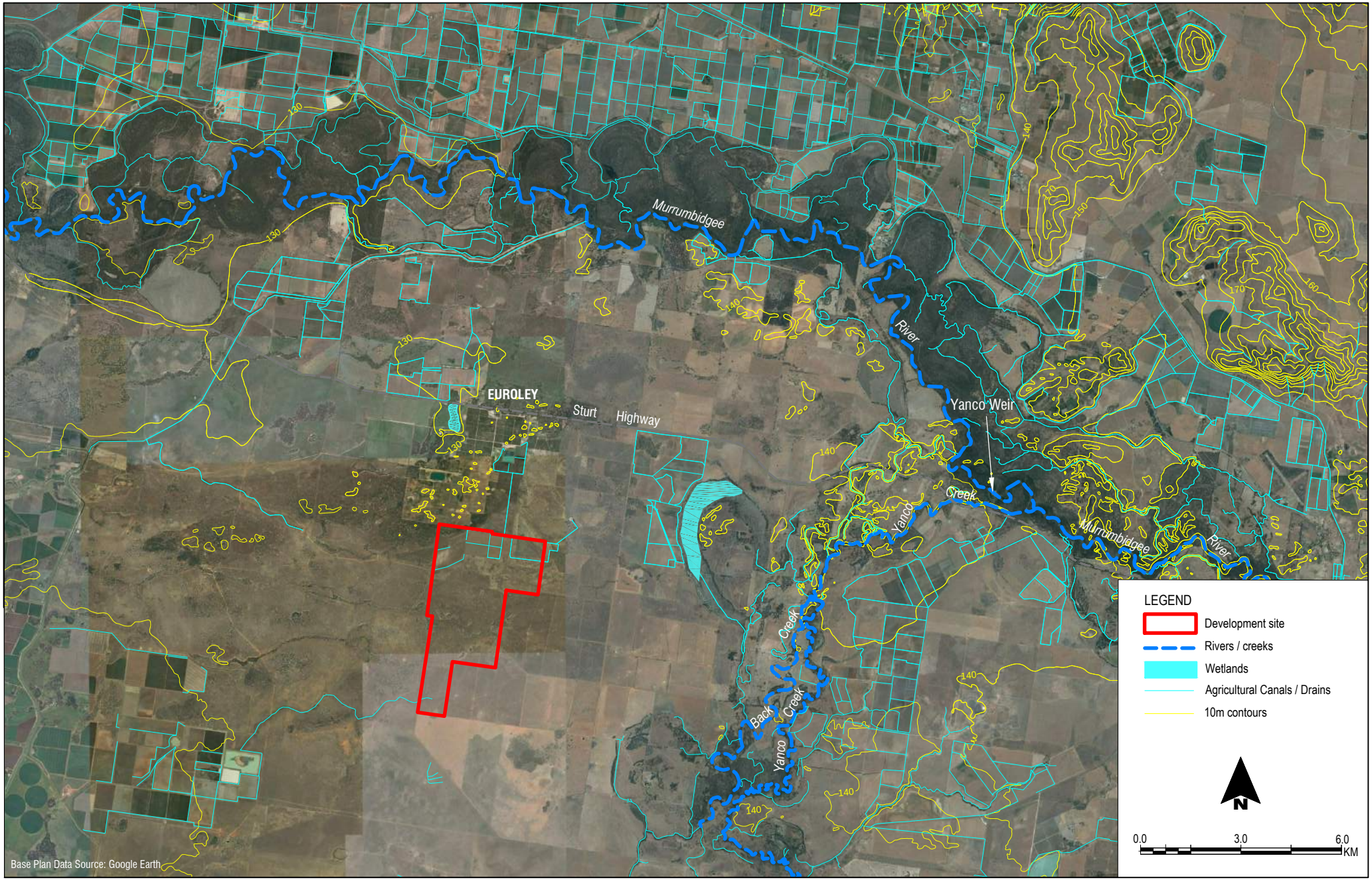
Regional surface water features are illustrated on **Figure 6.5**, and the topography within the development site is illustrated on **Figure 6.6**.

Mainstream Flooding

Council's existing flood mapping developed as part of the Narrandera Flood Study (SKM, 2000) terminates at Yanco weir, therefore flood extents for Murrumbidgee River and Yanco Creek have not been defined adjacent to the development site.

A review of the Narrandera Flood Study is currently being undertaken by Lyall & Associates for Narrandera Shire Council, who provided flood mapping developed as part of the review to SLR to assist in the preparation of this EIS. Lyall & Associates' flood model boundary does not extend to the development site, and so does not map flood extents within the site. However, based upon observations during the site walkover, the flood extent mapping (Lyall & Associates, 2015) and historical flooding anecdotal evidence, the development site is considered unlikely to be flooded as a result of the Murrumbidgee River or Yanco Creek floodplain at Dry Lake overtopping its banks in events up to and including the 100 year Annual Recurrence Interval (ARI) event. Notwithstanding, the flood risk to the development site from two zones where floodwater is shown to extend to the model boundary was assessed by SLR, as described below. These zones are the southern portion of Dry Lake, and the model extent at Euroley north of the development site.

As detailed in **Appendix H**, site observations indicate that an overland flow route does not exist between the Extreme Flood extent at Dry Lake and the development site.



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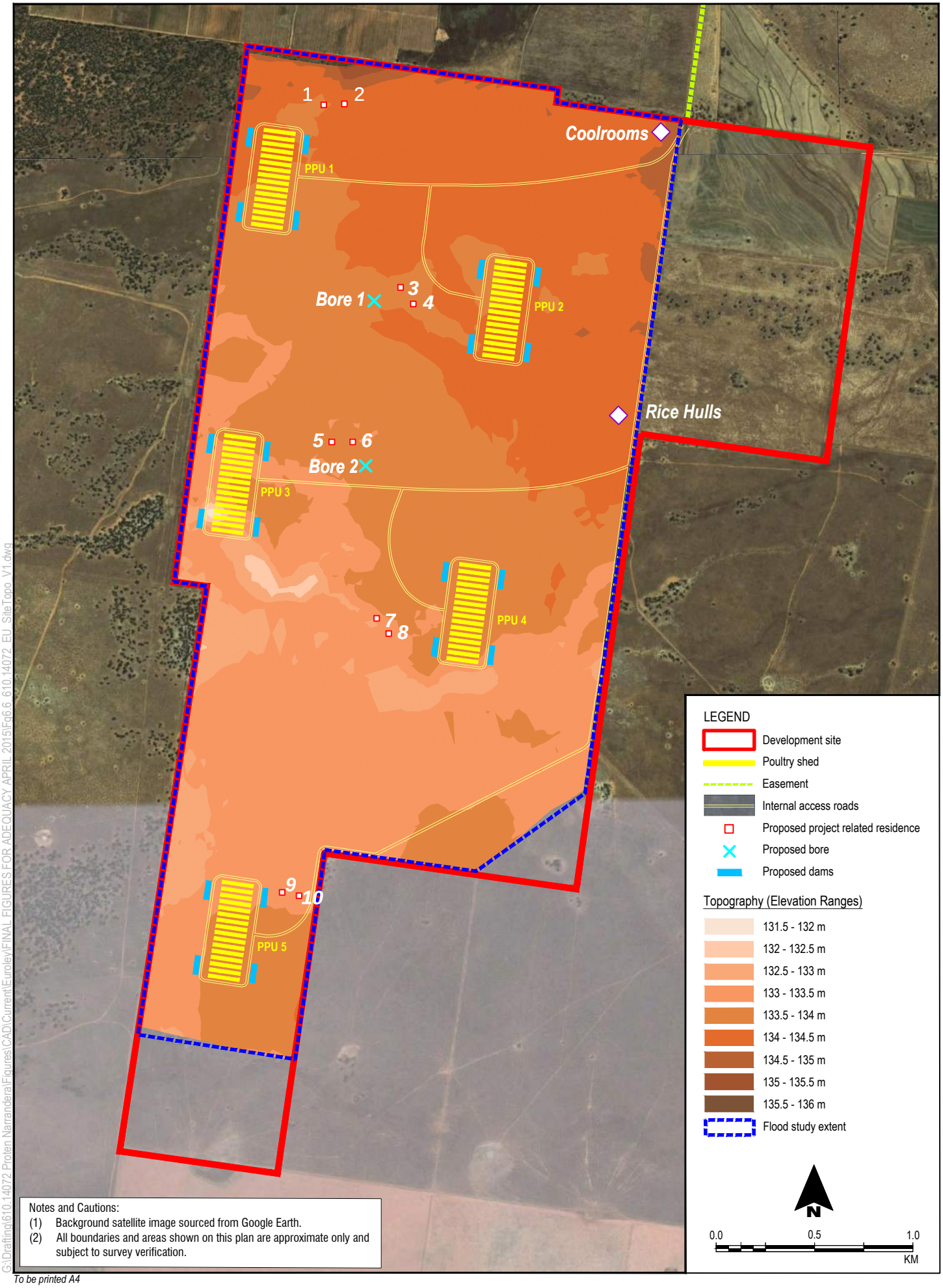
Regional Surface Water Features

FIGURE 6.5



Notes and Cautions:
(1) Background satellite image sourced from Google Earth.
(2) All boundaries and areas shown on this plan are approximate only and subject to survey verification.

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SLR

Site Topography

FIGURE 6.6

A conservative quantitative assessment was undertaken to assess the potential flow rate of floodwater associated with the zone of Murrumbidgee River Extreme Flooding at the Lyall & Associates flood model boundary near Euroley, and hence assess the potential for overland flows from this Extreme Flood extent to flow onto the development site. The Extreme Flood flow within this zone was predicted using Manning's equation and the Extreme Flood Map (Lyall & Associates, 2015), and was found to be less than 1% of the predicted Probable Maximum Flood (PMF) local overland flood flow rate and less than 10% of the 100 year ARI local overland flow rate. It is therefore considered that mainstream flooding presents a lower flood risk to the development site than local overland flooding. Due to the size of the Murrumbidgee catchment, main stream extreme events will not coincide with the local overland flooding events. Measures to manage local overland flooding (as detailed in **Section 6.5.5**) will therefore safeguard the development from main stream flooding.

Local Overland Flooding

Flood modelling, including RORB hydrological modelling and one dimensional (1D) hydraulic modelling in HEC-RAS, was undertaken by SLR to assess flood levels and velocities across the development site during the 100 year ARI and PMF flood events.

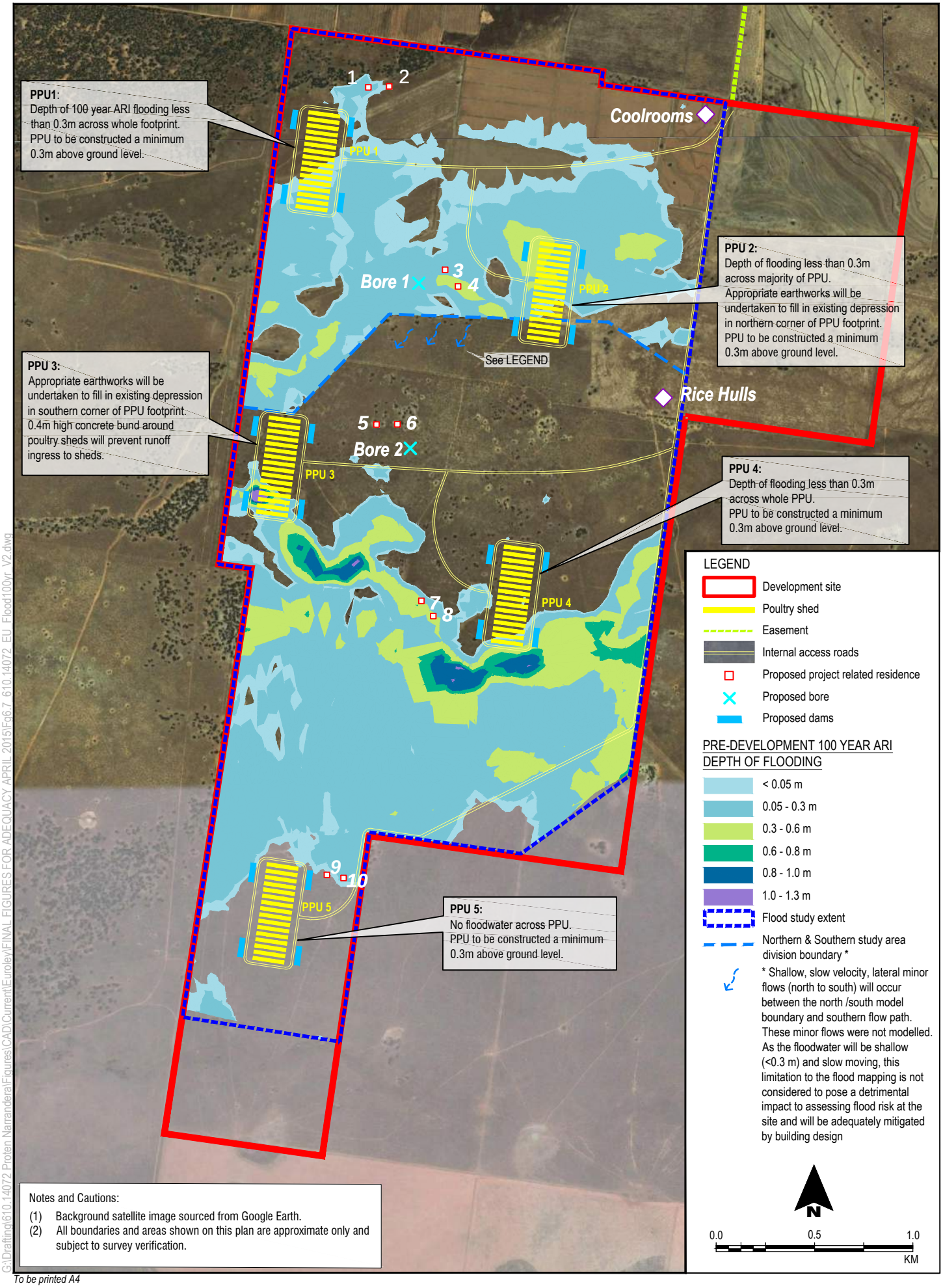
Full details of the modelling procedure are provided within **Appendix H**. Predicted flood levels at key locations are provided in **Table 6.12** below.

Table 6.12 Flood levels at the PPU locations

PPU	100 year ARI Flood Level (mAHD)	PMF ARI Flood Level (mAHD)
PPU 1	134.00	134.34
PPU 2	134.28	134.72
PPU 3	133.13 – 133.63	133.73 – 134.09
PPU 4	133.65	134.37
PPU 5	133.27	133.87

Flood velocities are predicted to range between 0.1 m/s and 0.18 m/s for the 100 year ARI event and 0.23 and 0.38 m/s for the PMF event.

Flood mapping for the 100 year ARI is provided in **Figure 6.7**.



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SLR

Pre-Development 100 Year ARI Flood Extent

FIGURE 6.7

Historical Flooding

Two large flood events have occurred in the region in recent history; in 1974, and more recently in 2012. The 1974 flood event was estimated to be a 1 in 99 year ARI event (SKM, 2000), and aerial photographs of the 1974 flood event taken within hours of the flood peak and presented in SKM (2000) do not appear to show the development site to be flood affected. Floodwater was identified in areas closer to the waterways. No relevant aerial photographs were available for review of the March 2012 flood event at the time of reporting.

Several road closures occurred during March 2012 event in the Euroley area (Irrigator, 2012). ProTen liaised with local landowners to gain anecdotal accounts of local flood impacts during this event. Anecdotal evidence indicates that the development site itself was not flood affected but floodwater did cut off a section of the Sturt Highway to the east and a section to the west of Main Canal Road for several days. Importantly, access/egress to the site was available during the entire period of flooding from the south.

Flood Warning

SKM (2009) reported that the Murrumbidgee River has a long time to peak flow at Narrandera, which means that Narrandera usually has in excess of one week until a flood may occur. SKM (2009) states that the location of Wagga Wagga upstream will also provide information on warning time as typically the flood peak is 5 days ahead of Narrandera. This flood warning time is also relevant to the development site. Importantly, in the event of an impending flood, ProTen would have sufficient time to stockpile feed and other necessary supplies on site, and also to transport the birds that are close to their required weight off site for processing, prior to flood waters reaching the Narrandera/Euroley area.

6.5.3 Impact Assessment - Surface Water Resources

Many traditional agricultural practices have the potential to impact upon surface resources. Livestock grazing on river flats, cultivating immediately adjacent to waterways and the application of agricultural chemicals can all contribute significant loads of faecal bacteria, nutrients and turbidity to water resources.

The potential for adverse impact to surface water from the development of intensive poultry production farms is very low, with the risk of impact considered far less than traditional agricultural activities. Given the controlled environment in which the proposed poultry development will operate, along with the environmental licensing conditions it will need to comply with, it poses a low risk to local water resources and no detectable impact is expected. Due to the low risk, no water monitoring program is warranted. Points to note in relation to the management of water on site include:

- The proposed poultry development will be a largely dry operation, with no effluent generated as a result of the poultry-rearing itself;
- The development site is removed from any identified watercourses or significant drainage features;
- The poultry shed will have fully sealed concrete flooring and will be surrounded by a 400 mm high dwarf concrete bund wall to prevent rainwater and runoff entering the sheds;
- Appropriate systems for chemical storage, handling and incident response will be implemented; and
- Improved flow from the PPU sites will be managed via an engineered surface water management system, as described in detail in **Section 3.11**, and discussed further below.

The main operational water sources to be managed within the PPU sites will be:

- Wash down water from within the sheds at the end of each eight week production cycle;
- Rainfall runoff from the shed roofs; and
- Rainfall runoff from the ground surfaces surrounding the poultry sheds and additional improvements.

An engineered surface water drainage system will be implemented to manage runoff and wash down water, providing long-term structural controls and management measures to mitigate the impact of surface water runoff throughout the life of the operation.

As described in **Section 3.11**, rainfall runoff from the shed roofs and around the sheds will be directed into grassed swales, which have been conservatively designed to capture a 1 in 100 year rainfall event (refer **Figure 3.7**). The swales will allow infiltration of the water into the topsoil for nutrient uptake by the grass, which will be regularly slashed. During heavy rainfall events, excess water from the grassed swales will be directed to underground pipes and into a catch drain that will be installed around the perimeter of the poultry sheds. The construction of the perimeter catch drain will ensure that all rainfall runoff from the ground surfaces surrounding the sheds is contained within the controlled storm water management system.

Runoff from this catch drain will be directed to four small storage dams, one constructed at each corner of each PPU. The total storage capacity at each PPU will be 28,000 m^3, which is equivalent to 170% of the capacity required to prevent runoff escaping the retention dams from a 1 in 100 ARI, 72 hour event. The runoff to be captured in these stormwater dams will predominantly be clean runoff. As already noted in **Section 6.1**, the washdown water that will enter this system may have some level of nutrients, however levels are predicted to be very low as per ProTen's other farms, given that the floors in the sheds are regularly cleaned. An analysis of the nutrient load in the washdown water was prepared by GHD (2007) for another of ProTen's operating farms, where litter is managed in the same way as proposed for the Euroley development. This analysis calculated the typical nutrient concentration of washdown water to be as follows:

- Total Suspended Solids: 2,500 mg/L;
- Total Nitrogen: 65 mg/L;
- Total Phosphorus: 45 mg/L.

The vegetated swale drains around the sheds will provide a very effective means of nutrient removal. The typical annual pollutant load removal efficiencies for vegetated swales according to Engineers Australia (2006) Australian Runoff Quality is as follows:

Table 6.13 Typical Annual Pollutant Load Removal Efficiencies for Vegetated Swales

Pollutant	Typical Removal
Total Suspended Solids	60-80%
Total Nitrogen	25-40%
Total Phosphorus	30-50%

Therefore, when already starting with a very low nutrient level, and with these vegetated swales providing an effective take up of nutrients, there is negligible risk of nutrient high runoff flowing offsite. Further, the swale drains have been designed to conservatively handle a 1 in 100 year rainfall event (refer **Figure 3.7**). The potential for impact to local water resources by runoff of nutrients, chemicals or pathogens is considered negligible. In addition, drilling of a test bore on the development site (refer **Section 6.6**) has confirmed the groundwater standing water level to be 27 metres below ground level (mbgl), so no interaction with groundwater is anticipated from infiltration of washdown water.

Waste Disposal

Stockpiling and/or disposal of waste materials, especially poultry litter, dead birds and chemical containers, can result in leaching of nutrients and pollution to surface waters and groundwater. However, as outlined in **Section 3.10**, appropriate systems will be implemented to ensure that each waste stream generated by the development is effectively managed and disposed of off-site. There will not be any on-site stockpiling or disposal of waste materials.

Waste Water Disposal

The waste water generated by on-site dwellings and staff amenities will be appropriately treated and disposed of via on-site waste water management systems installed and operated in accordance with the requirements of Council and the relevant standards/guidelines. No detectable impact to surface or groundwater quality is anticipated as a result the low volume that will be generated, the on-site system requirements, the available land area and available separation distances.

During Construction

While the proposed PPU sites are removed from any notable drainage features, construction activities could potentially impact upon water resources through changes to groundwater recharge as a result of soil compaction, loss of groundcover and generation of sediment-laden runoff. Given that the proposed PPU sites and associated disturbance footprint will be relatively small at just 8% of the development site, and that activity associated with the development will be largely confined to these areas, changes to the existing runoff/recharge pattern will be relatively minor. No detectable impacts to groundwater levels or yields are expected. The nature of the strata and the depth to the water bearing zones will provide a substantial buffer against infiltration of any potential pollutants, such as turbidity and/or hydrocarbons.

6.5.4 Impact Assessment - Flooding

The potential flooding impacts associated with the Project are summarised in the following dot points and discussed further below:

- Inundation of sheds and dwellings with local overland flood water during large flood events or overland flows from the Murrumbidgee floodplain during extreme flood events;
- Potential isolation of poultry stock and workers due to road closures during a flood event;
- Increase in post development runoff rates from the site which may lead to flooding impacts down gradient of the development site;
- Increase in flood levels within properties downstream as a result of increases in post development runoff rates;
- Reduction in local overland flood storage during large flood events.

Overland and Mainstream Flooding

As detailed in **Section 6.5.2**, mainstream flooding is not considered to pose a significant risk to the development site. Overland flooding has been considered through the development of a 1D hydraulic model, with modelling indicating that floodwater will be slow moving and shallow across the majority of the site with deeper flooding occurring within existing topographical depressions.

It is firstly relevant to note that the NSW Government's Floodplain Development Manual (DIPNR, 2005) states that an appropriate flood planning level for a residential development is generally the 1 in 100 year event, however "*the decision on appropriate levels for commercial and industrial developments relates more to economic benefits versus costs...therefore, there is greater potential for flood planning levels for these developments to be based on events more common than the 1% Annual Exceedance Probability [AEP] flood.*" The potential impacts associated with the 1% AEP flood (100 year ARI event) have been assessed for the proposed poultry development, and as such represent a conservative consideration with respect to flooding for such a development.

As illustrated on **Figure 6.7**, the 100 year ARI flood depth over the existing (pre-development) surface within the disturbance footprints of PPUs 1, 4 and 5 is predicted to be less than 0.3 m. The PPUs will all be constructed above the 100 year ARI event flood depth as shown in **Table 6.12**, at a minimum of 0.3 m above the existing surface, and with concrete perimeter bund walls 0.4 mm high around each poultry shed, as well as swale drains established between the sheds. On this basis, the ingress of floodwaters during a 1 in 100 year ARI event is not anticipated. Whilst topographical depressions exist in the northern corner of the PPU 2 disturbance footprint and in the southern corner of PPU 3, appropriate earthworks will be undertaken to fill in these depressions during shed construction to ensure the risk of floodwater ingress is minimised. The construction of 0.4 m high concrete bund walls around each shed will further mitigate the risk of floodwater ingress.

The farm managers' houses will all be constructed at a minimum of 0.5 m above the existing ground surface. As shown on **Figure 6.7**, the predicted pre-development flood depth within the footprint of the residences, with the exception of houses 4, 7 and 8, is below 0.3 m. The predicted flood depth at houses 4, 7 and 8 is below 0.5 m above existing ground surface elevation and as such, all farm managers' houses will be constructed above the 100 year ARI event flood depth.

The proposed buildings will act as a barrier to overland flow during flood events potentially causing hydraulic impacts including flood afflux and flood velocity increases. Hydraulic modelling (refer to **Appendix H**) was undertaken to assess the hydraulic impact of the current development layout. The modelling indicates that the 100 year ARI flood level will be raised by less than 150 mm locally upstream of the buildings and the PMF flood level will be raised less than 300 mm. However, the modelled onsite flood afflux impacts are highly conservative, and are considered to be already accounted for within the bounds of conservatism applied in the modelling of the pre-development scenario. No flood afflux impacts were shown to occur downstream of the western PPUs. Flood velocities generally decreased, with the maximum velocity increase predicted to be 0.08 m/s.

There are no existing buildings or infrastructure on neighbouring properties that are likely to be affected by the construction of the proposed PPUs and associated infrastructure, or any associated infilling earthworks.

The predicted flood depths (<2 m) and flood velocities during a PMF event (<0.4 m/s) are unlikely to damage any light structures based upon the criteria set out in the NSW Floodplain Development Manual (DIPNR, 2005).

Isolation during a flood event

Local flooding during minor and major events is known to block several roads in the area. The blocking of roads could lead to the poultry complex being isolated for several days until floodwaters subside. This in turn could lead to the entire food supply for birds being consumed and / or birds which are ready for processing offsite having to remain onsite. Isolated workers also risk running out of food although the State Emergency Service (SES) are likely to be able to service isolated workers during an emergency.

The risk of these consequences occurring as a result of flooding and isolation is considered low however due to the flood warning the site will be afforded, and the capacity to store significant food supplies on the site. In addition, given the size of the catchment and local topography, the depth of floodwaters across the majority of the development site (with the exception of localised topographical depressions) are likely to reside to safe levels relatively quickly (within hours).

As discussed in **Section 6.5.1**, the Murrumbidgee has a long time to peak at Narrandera, usually having in excess of a week before a flood would occur. This warning would allow ample time for further food supplies to be stockpiled on site (which will have the capacity to store at least eight days' supply of feed) and to remove birds who are close to their processing weight. Notwithstanding, a flood management plan has been prepared to ensure the potential flood related risks to the development site are effectively managed and mitigated, as described in **Section 6.5.6** below.

Post development runoff

The construction of the poultry sheds, farm residences and ancillary infrastructure will increase the impervious footprint onsite. An increase in the impervious footprint could increase the peak flow rate and volume of runoff discharged offsite which could potentially lead to localised downstream flooding impacts. However, it is noted that the impervious footprint associated with the development is very small relative to the size of the development site at less than 8 percent. In addition, a stormwater drainage system has been designed to manage runoff from impervious and disturbed areas. Four retention dams (one on each corner of the shed) will be constructed at each PPU to collect runoff. The combined dam capacity per shed is estimated to be 28,000 m^3 which is approximately 170% of the storage required to capture the predicted runoff volume from contributing areas for a 1 in 100 year ARI, 72 hour storm event. The proposed retention storage is therefore of sufficient capacity to prevent overflows from the dams occurring for events up to and including the 100 year ARI event and therefore prevent an increase in offsite discharge rates for events.

6.5.5 Mitigation Measures

The following best management practices and mitigation measures will be implemented to safeguard local water resources and/or minimise and manage potential adverse impacts:

Surface Water

Construction

- All clean extraneous surface water from upslope will be diverted around areas of disturbance.
- Temporary erosion and sediment control structures, such as hay bales and silt fencing, will be used to prevent soil loss and sediment-laden runoff, and will be constructed in accordance with the Blue Book.
- Disturbed areas will be promptly rehabilitated and revegetated (see **Section 3.12**) to a stable landform.
- A regular maintenance program will be implemented to ensure the continued integrity of the temporary erosion and sediment control structures.

Development Design

- Each poultry shed will be fully enclosed and have concrete flooring.
- Each poultry shed will be surrounded by a 400 mm dwarf concrete bund wall to prevent rainwater and runoff entering the sheds and to allow for the controlled discharge of wash down water from the sheds.

Operation and Maintenance

- Appropriate systems will be implemented to ensure that each waste stream generated by the development is effectively managed and disposed of off-site (see **Section 3.10**). There will not be any on-site stockpiling or disposal of waste materials.

Surface Water Management

- An engineered surface water management system will be constructed, as described in **Section 3.11** to provide long-term structural controls and management measures to mitigate the impact of surface water runoff throughout the life of the operation.

Chemical Use

- Staff members will be instructed in the proper use and handling of all chemicals used on-site. If appropriate, this will include completion of training such as SMARTtrain or ChemCert (or similar).
- All chemical use will be undertaken in full compliance with the relevant statutory requirements, including the *Pesticides Act 1999*.
- Where appropriate, chemicals used will be approved by the Australian Pesticide and Veterinary Medicine Authority as safe and fit for that particular use.

Environmental Complaints and Incidents

- The Complaints and Incidents Management Strategy contained within **Appendix C** will be implemented to ensure that all complaints and incidents relating to the poultry operation are promptly and effectively addressed. Appropriate documentation of complaint/incident handling will assist in identifying and implementing measures to negate the possibility of future re-occurrence.

Flooding

Building Design

- Habitable finished floor levels of the farm managers' and assistant managers' houses will be set at a minimum of 0.5 m above adjacent ground level to reduce the likelihood of floodwater ingress to buildings.
- Finished floor levels of the sheds will be set at a minimum of 0.3 m above adjacent ground level to reduce the likelihood of floodwater ingress to buildings, and will be constructed above the predicted flood depths associated with a 1 in 100 year ARI event.
- Concrete bund walls 0.4 m high will be constructed around each of the poultry sheds to prevent rainwater and runoff entering the sheds and to allow for the controlled discharge of wash down water from the sheds.

Engineered Surface Water Drainage and Management System

An engineered surface water management system will be constructed, as described in **Section 3.11**, to provide long-term structural controls and management measures, mitigating both the impact of surface water runoff throughout the life of the operation and to minimise the risk of flood ingress. This includes 0.4 m high concrete bunds around each of the poultry sheds and engineered swale drains which have been conservatively designed to capture a 1 in 100 year rainfall event.

Safe Refuge / Evacuation for Personnel

All farm workers should act in accordance with the SES Narrandera Flood Plan (SES, 1994) which outlines the processes for flood warning, safe refuge and evacuation during a flood event in the area.

Designated safe egress routes from building exits to onsite safe refuge areas will be provided for each of the buildings onsite to ensure safe passage to less flood affected portions of the site during local overland flood events where less warning time may be available. Site occupants should remain within the safe refuge areas until floodwaters reside. Given the size of the catchment and local topography, the depth of floodwaters across the majority of the site (with the exception of localised topographical depressions) are likely to reside to safe levels relatively quickly (within hours). All safe egress routes and refuge areas will be documented in the Site Operational Flood Management Plan (refer to **Section 6.5.6**). Safe egress routes and refuge areas will be selected based upon the Local Overland Flooding PMF map (refer to **Appendix H**) and the criteria set out in **Table 6.14** below.

Velocities during a PMF event are predicted to be less than 0.4 m/s. Therefore the following pedestrian wading and vehicle movement safe egress criteria is considered to be appropriate for identifying safe egress routes and safe flood refuge areas for all buildings onsite.

Table 6.14 Safe Access and Egress

Egress Method	Safe flood depth for route to safe refuge area	Reference
Pedestrian	0.7 m	Based upon safe child wading depth documented in the Floodplain management in Australia, best practice principles and guidelines (CSIRO, 2000)
Vehicle	0.3 m	Based upon small vehicle safe driving depth documented in the Floodplain management in Australia, best practice principles and guidelines (CSIRO, 2000)

6.5.6 Site Operational Flood Management Plan

To ensure the risk of flooding is appropriately planned for, a site-specific flood management plan has been developed for the development site. The plan is described below.

Purpose and Objectives

The purpose of the operational flood management plan is to ensure the safety of farm workers, the survival of the birds onsite that are too young for processing, and the safe removal of birds offsite if they are of appropriate age for processing.

The objectives of the flood management plan are to:

- Provide processes for collection and storage of surplus food onsite for birds and workers where a flood event is anticipated;
- Identify operational policies to reduce the rate of bird growth during a flood event (and thereby need to be transported offsite for processing); and
- Provide egress routes to processing centres during a flood event.

On-site feed storage

As discussed in **Section 6.5.1**, flood warnings are likely to be available several days prior to a flood event occurring at Euroley. If a flood warning is issued, extra feed will be brought to site and stored in a large 'rice hull' shed to be constructed on site, as shown on **Figure 1.3**, and/or stored under alternative cover on the farm. The rice hull shed will be capable of holding 3272 m^3 of feed which, including silo capacity, will provide at least eight days of feed.

If food supplies are exhausted, then birds will be transported offsite as detailed below.

Operational processes

The following modifications to the operational procedures will be implemented during a flood event:

- The environmental conditions within the sheds will be altered to reduce the food consumption rate and thereby bird growth; and
- Feeding frequency and duration will be altered to reduce the rate of bird growth.

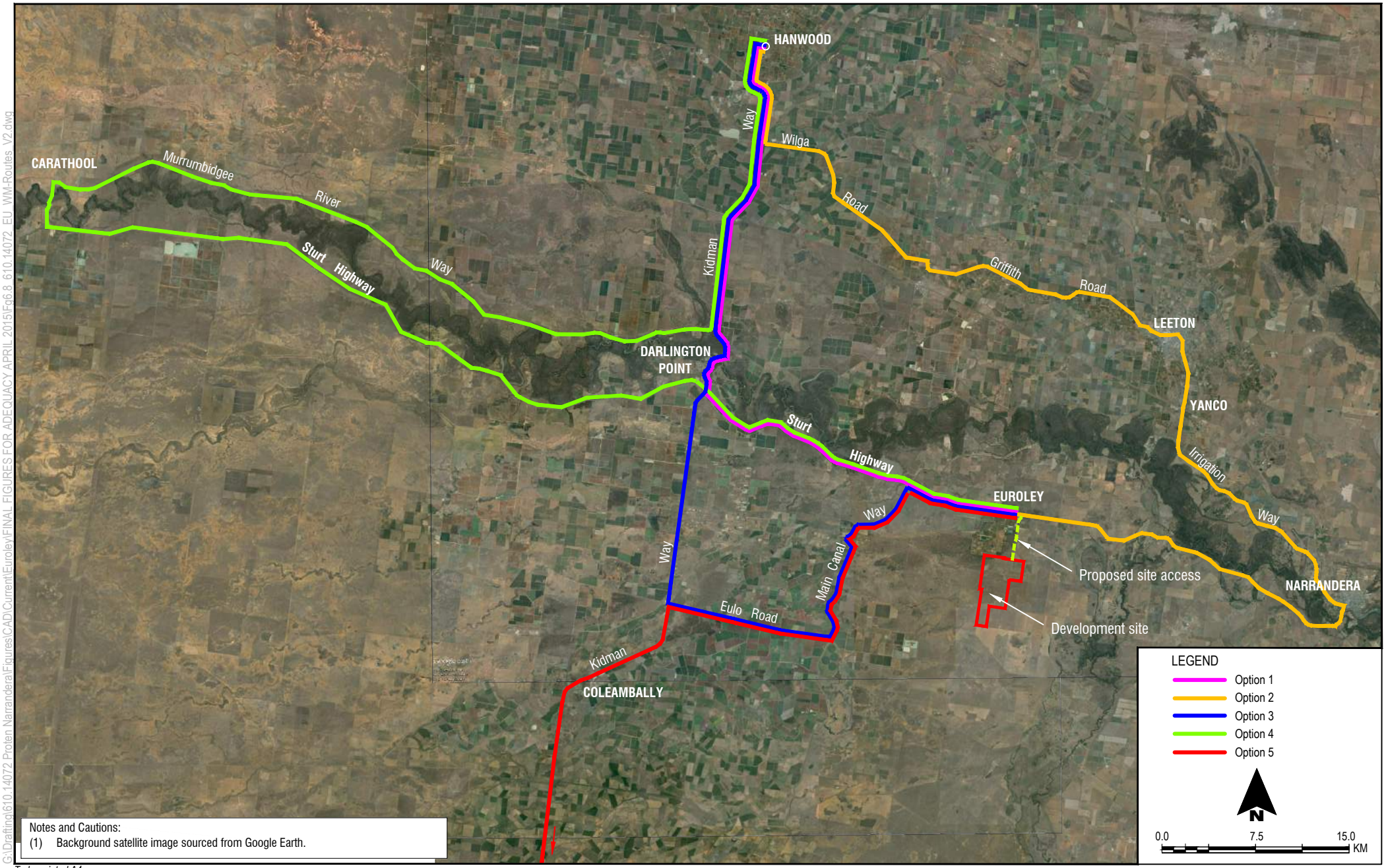
Transport of birds offsite

A number of transport route options exist for the transportation of birds from the development site to processing facilities. Each option is shown on **Figure 6.8** and described below.

Under normal conditions birds will be transported to the processing centre in Hanwood via Option 1 detailed below. Subsequent route Options 2 to 6 will be implemented where required, subject to road closures in the area. It is noted that Option 5 was available during the entire 2012 flood event and is therefore considered the most reliable egress route during a large flood event.

- **Option 1**; travel via Darlington point to the Hanwood Processing centre. Travel west on the Sturt Highway and then north on Kidman Way towards Hanwood.
- **Option 2**; travel via Narrandera and Leeton to the Hanwood Processing centre. Travel east on the Sturt Highway to Narrandera then north-west towards Leeton and continue north-west towards Hanwood.
- **Option 3**; travel via north Coleambally and Darlington Point to the Hanwood Processing centre. Travel west via Sturt Highway, then south via Main Canal Road, then west via Eulo Road and north via Kidman Way towards Hanwood.
- **Option 4**; travel via Carrathool to Hanwood Processing centre. Travel west on the Sturt Highway then cross the river towards Carrathool and continue east via Murrumbidgee River Road and then north via Kidman Way to Hanwood.
- **Option 5**; travel south to alternative processing facilities in Victoria or South Australia. Start on Sturt Highway driving east and then south on Main Canal Road, west on Eulo Road, then onto Kidman Way continuing south.
- **Option 6**; travel west beyond Narrandera towards Wagga Wagga before travelling north and then west back towards Hanwood.

It is likely that roads along due east routes (Option 2) will be blocked first during a flood event, but may become available again as floodwaters reside whilst routes due west (Option 2, 3 and 4) are still blocked.



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Transport Options During a Flood Event

FIGURE 6.8

Removal of dead birds during a flood event

This Project will have substantial capacity for the storage of dead birds prior to removal for processing in the purpose built chiller room to be constructed (refer **Figure 1.3**). The Euroley complex will have triple the amount of cool room capacity for the storage of birds in comparison to other ProTen farms. This will enable the storage of dead birds for an extended period of time.

If normal access (Option 1) is still restricted during an extreme flood event when the chiller room is at full capacity then the travel options listed above would be put into practice.

It is also noted that in the event a flood warning is received (which is likely to be several days before flood waters reach the Narrandera/Euroley area) ProTen will ensure the chiller room is emptied so that maximum storage capacity is available should access from the farm be restricted as a result of flooding.

Onsite Safe Egress and Refuge Areas

Designated flood egress routes from building exits to onsite safe refuge areas will be provided for each of the buildings onsite. Egress routes and refuge areas will be selected and established prior to the commencement of the operational phase of the development based upon the criteria set out in **Section 6.5.5**.

Review of Flood Management Plan

The flood management plan will be reviewed and updated as required after any major flood event to account for any unforseen flooding impacts which affect the adopted procedures.

6.5.7 Conclusion

Based upon the 100 year ARI flood map (Lyall & Associates, 2015), aerial photographs of the 1974 flood event and information in SKM (2000), the development site is unlikely to be flood affected during mainstream flood events up to and including the 1 in 100 year ARI event. In addition, based upon the Narrandera Flood Study Review (Lyall & Associates, 2015), and observations by an SLR hydrologist it is considered unlikely that the site will be flood affected by Murrumbidgee River or Yanco Creek out of bank flows during an extreme flood event such as the PMF.

Importantly, flood warnings are likely to be available via the NSW SES at least several days prior to a mainstream flood occurring. Where a flood warning is issued, the flood management plan documented in **Section 6.5.6** will be implemented to effectively manage the flood risk to the development.

The risk of overland flooding across the development site has also been considered by the Flood Assessment (SLR, 2015a). All PPUs will be constructed above the predicted flood depth associated with a 1 in 100 year ARI event. Concrete bund walls 0.4 m high will also be constructed around each of the poultry sheds, as well as swale drains designed to safely convey a 1 in 100 year ARI event. In addition, designated safe egress from buildings onsite to safe refuges will be documented in the flood management plan to ensure safe egress during a PMF event.

With regards to stormwater management, a drainage system has been designed for the development, with the total storage on site equivalent to 170% of the storage capacity required to contain runoff from a 1 in 100 ARI, 72 hour event.

6.6 Groundwater

6.6.1 Existing Environment

Regional Hydrogeology

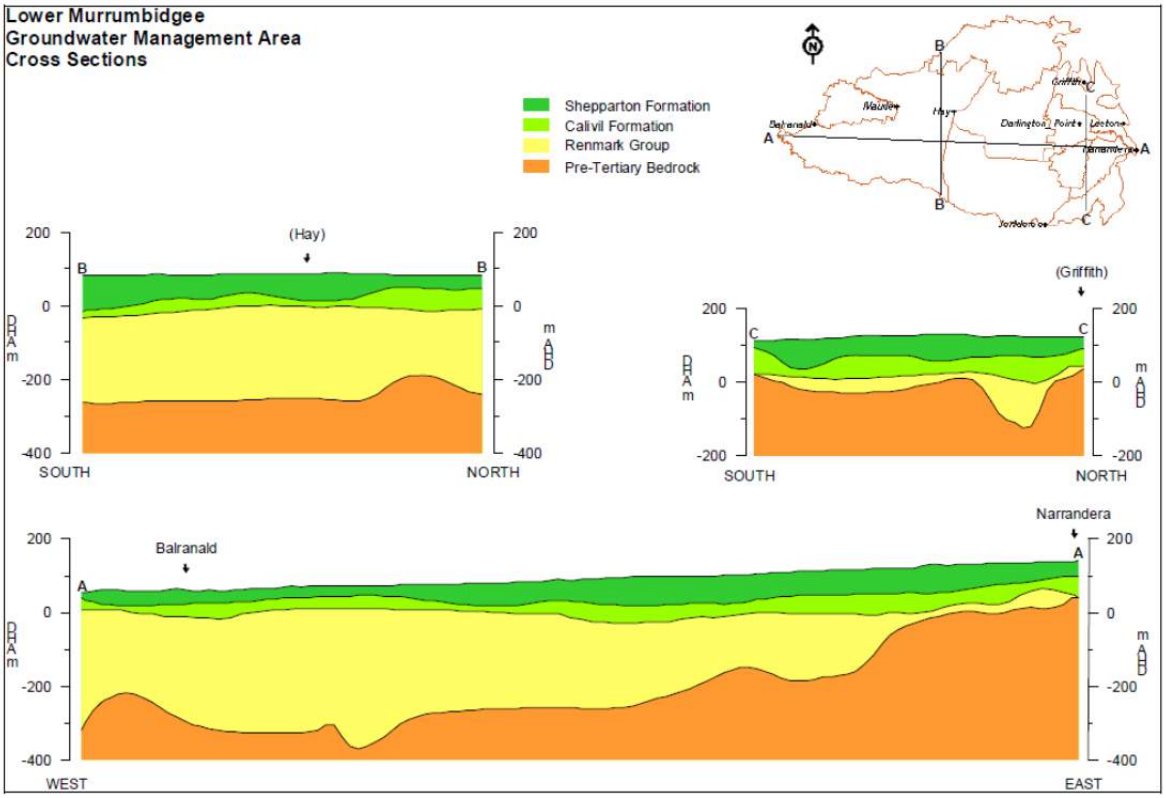
The development site is located in the Lower Murrumbidgee Groundwater Management Area (GMA), which lies within the eastern Riverine Plains province of the Murray Geological Basin. The GMA is located between the towns of Narrandera, Booligal, Balranald and Jerilderie and is bounded by Billabong Creek and the Edwards River in the south, the Lachlan River to the northwest and exposed Palaeozoic bedrock to the east (**Figure 6.9**). It covers an area of approximately 33,000 km^2 (3.3 million hectares).

The term "groundwater sources" as used in this section, refers to the Shepparton and Calivil/Renmark aquifers more commonly known as Shallow and Deep Sources. The Shallow Source is defined as extending to the depth of 40 metres or to the bottom of the Shepparton Formation whichever is the greater. The Deep Source is defined as extending from the bottom of Shepparton Formation down to the bedrock. It is the Deep Source which is the subject aquifer of the Project, relating to the Calivil Formation.

Figure 6.9 The Lower Murrumbidgee Groundwater Management Area

The GMA is underlain by semi-consolidated to unconsolidated flat lying Cainozoic sediments of mainly continental origin. Deposition of these sediments began some 50 million years ago (middle Miocene to early Paleocene). The maximum thickness varies from 170 metres in the east (at Narrandera) to about 400 m at Balranald (western end of GMA). The sediments overlie Paleozoic and Mesozoic rocks that form the basement. Within the GMA the sedimentary deposits have been subdivided in to three main units or layers. These are Shepparton Formation, Calivil Formation and the Renmark Group. **Figure 6.10** shows geological sections across the GMA.

Figure 6.10 Geological cross sections in the Lower Murrumbidgee GMA (NOW, 2009)



The Renmark Group forms the basal confined aquifer. It is characterised by dark grey to black carbonaceous clay and dark brown lignite. It also contains thick sequences of grey, medium grained quartz sand which commonly comprise 30-50 % of the entire unit. Its thickness is variable and peaks at 366 m within the GMA.

The Calivil Formation is semi-confined to confined middle aquifer deposited during 5-15 million years ago (Late to Middle Miocene). It is dominated by pale grey, coarse quartz sand with lenses of pale grey to white kaolinitic clay. The higher proportion of sand, typically 50-70%, makes it the most productive aquifer within the GMA. Its thickness ranges between 50 to 70 m in the eastern part of the management area (ie within the Narrandera – Euroley area) with a maximum of about 90 m. The Calivil is described (Wooley 1991 as cited in CSIRO, 2002) as a poorly consolidated pale grey, poorly sorted coarse to granular quartz sand conglomerate with white kaloinitic matrix. The formation includes thick intercalations of kaolin, with thin lenses of carbonaceous clay.

The Shepparton Formation, which is of Late Pliocene to Pleistocene age, directly overlies the Calivil Formation. It is a complex assemblage of clays, silts and sands that were deposited in a fluvio-lacustrine environment. The proportion of sand is highly variable but mostly about 20-30%, with most occurring in the top 30%. The thickness of sediments is variable and averages around 65 m.

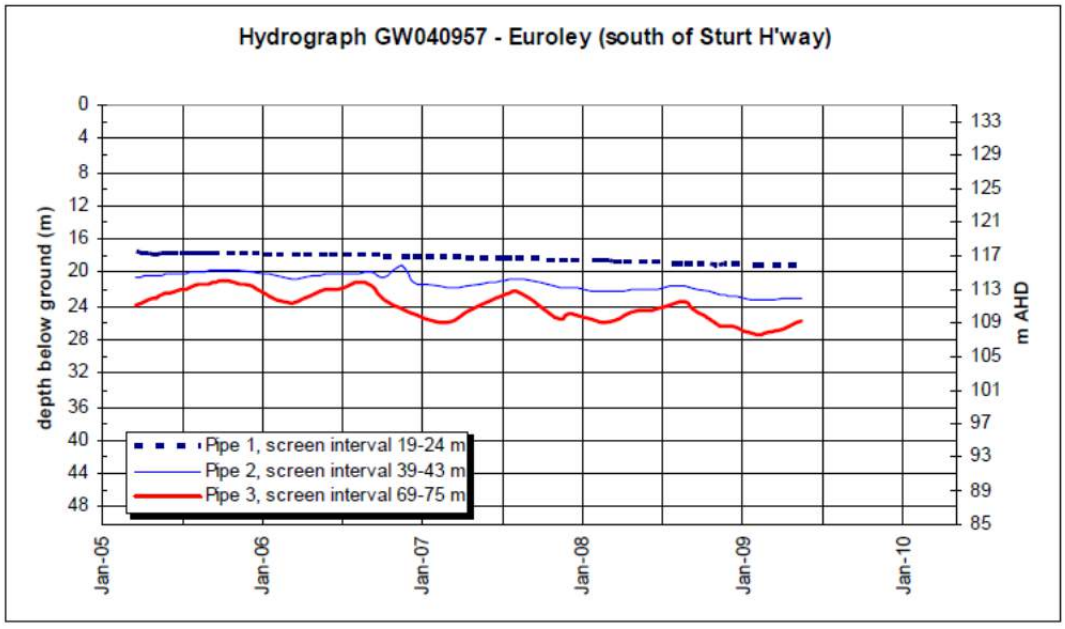
The characteristics of both the shallow and deep groundwater sources are summarised below in **Table 6.15**.

Hydrographs have been recorded in many wells across the GMA, and the hydrograph shown in **Figure 6.11** is taken from a well at Euroley in the region of the proposed site (NOW, 2009). Groundwater pressure levels (in deep confined to semi confined aquifer) and depths to water table (in the shallow unconfined aquifer) are presented as depths in metres below ground surface and metres above Australian Height Datum (or metres above mean sea level).

Table 6.15 Properties of the Lower Murrumbidgee GMA (NOW, 2009)

Description	Shallow (Shepparton)	Deep (Calivil/Renmark)
Age of water (years)	up to 3,000	2,000-20,000
Water Quality (mg/L)	Variable, generally 1,500-7,000, fresher quality closer to river and within irrigation areas.	Generally less than 1,000 in eastern parts, approximately over 40% of GMA.
Yields (L/s)	Variable, generally between 0.1 – 10, occasionally >10.	Variable, generally 50 - 350 occasionally >350.
Groundwater flow direction	generally east to west	generally east to west
Hydraulic gradient	1:4,300 (eastern part of GMA) 1:5,000 (western part of GMA)	1:1,900 (eastern part of GMA) 1:7,200 (western part of GMA)
Estimated rate of flow (m/yr)	0.04-0.20	0.1-11.5
Hydraulic conductivity (m/d)	0.5-2.0 (groundwater model)	2.0-60.0 (groundwater model)
Specific Yield/Storage Coefficient	0.10-0.25 (groundwater model)	1.00E-05 to 5.00E-03 (groundwater model)
Average thickness	65 m	100m in the eastern parts, >100 in the west
Volume of groundwater in storage (x1,000 GL)	532.5 (assuming a porosity of 0.25)	1,515.6 (assuming a porosity of 0.25)
Recharge to storage ratio	1:1,400	1:6,000
Volume of fresh groundwater in storage (x1,000 GL)	19.8 (assuming 37% of aquifer only)	330.0 (assuming average aquifer thickness of 100 m in recharge areas and 40% of aquifer only)

Figure 6.11 Hydrograph for groundwater monitoring site GW040957

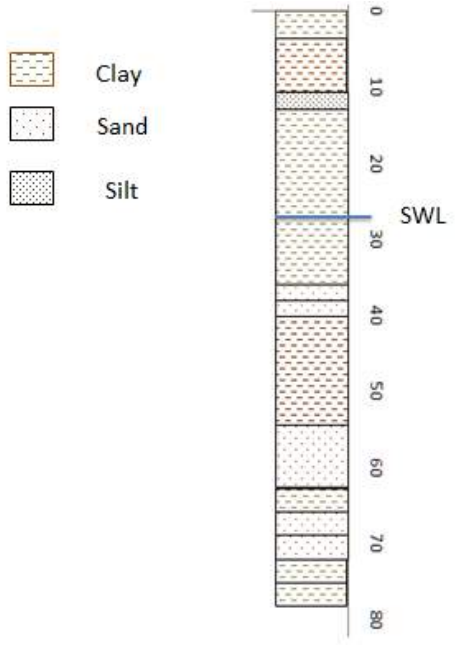


The Eastern portion of the GMA is described as an area where little groundwater pumping occurs. The hydrograph above show a gently declining trend in both shallow and deep aquifers. Small seasonal fluctuations, generally less than 5 metres, are observed due to some nearby pumping. The pressure levels in the deeper aquifer is lower than levels in the shallow aquifer indicating a downward vertical hydraulic gradient and that recharge to the deep aquifer in this area occurs predominantly through vertical leakage. The similar water level behaviour in the pipes indicates some hydraulic connection between the deep and intermediate aquifers.

Local Hydrogeology

Hydrogeology

The Project will access groundwater from the Calivil Formation. The local hydrogeology has been assessed by means of drilling a test well within the development site at the location where the production bore will be installed (labelled 'bore 1' on **Figure 1.3**). This bore was drilled to a depth of 78m BGL, encountered the sandy Calivil Formation at 36m BGL and records a standing water level at 27m BGL. This bore provides a useful description of the soil conditions. The lithological log from the test well is provided below in **Plate 14**.



From (m)	To (m)	Rock Type	Lithological Adjective	Colour
0	3	Clay		Grey
3	10	Clay	Silty	Brownish Grey
10	12	Silt		Grey
12	36	Clay		Greyish Brown
36	37	Sand		Brown
37	40	Sand	Unconsolidated	Brown
40	53	Clay		Brown
53	60	Sand	Unconsolidated	Brown
60	63	Clay		Brown
63	66	Sand	Unconsolidated	Brown
66	67	Sand	Firm	Brown
67	72.5	Sand	Unconsolidated	Brown
72.5	73	Clay		White
73	78	Clay	Firm	White

Plate 14 – Lithological log from test well drilled within the development site

The local hydrogeology from this on-site well is similar to the conditions ribed from a well located approximately 4km to the east of the proposed development site in Lot 52 DP 750906, which was drilled in 1998 by Watson Drilling and which remains operational. The original well log shows the geology - the upper 42m of the well are composed of generally sandy CLAY material, with occasional clay interbeds – which correlates with the regional geological description of the Shepparton Formation. From 42m below ground level (BGL) to the base of the well (at 93m BGL) the log generally describes formation as a SAND or clayey SAND, which corresponds to the Calivil Formation. The initial water level within the well was recorded at 29.2m BGL.

It is understood that the well has been pumped at rates of 20ML/day for discrete periods of time, indicating that the Calivil Formation in the Euroley area can produce yields in the range of 200l/s. This is within the range of yields (50-350 l/s) indicated from the NOW Groundwater Status Report (2009) for this formation. The well construction indicates the thickness of the Calivil Formation to be at least 50m in this area, although it is noted that the formation may be as thick as 100m (NOW, 2009)

As noted above, it is from this well that the WAL will be transferred to the new wells to be constructed as part of the Project.

Groundwater Quality

A water sample was taken from the recently constructed on-site well and has been tested by a NATA accredited laboratory indicating generally good quality water. In summary, the groundwater testing indicates pH 7.4, electrical conductivity 155 us/cm, total dissolved solids 332 mg/l and a suite of metals which were tested below detection limits.

Based on desk study information, the groundwater quality of the Calivil Formation is generally of good quality, with electrical conductivity less than 1,000 μs, and water generally being suitable for domestic and stock irrigation purposes – the principal water usages in the region. Groundwater testing undertaken during 2014 at the adjacent above-mentioned bore in Lot 52, DP 750906 has found that most test results for groundwater parameters were below detection (primarily set for ANZECC fresh water criteria), and the water quality was acceptable for domestic water use.

The GMA plan identifies the following beneficial water quality uses for the two water sources:

- ecosystem protection and agricultural water for shallow source, and
- raw water for drinking, ecosystem protection and agricultural water for deep source.

Under the plan water quality decline is deemed unacceptable if extraction causes water quality to decline to a lower beneficial use class. The most recent published groundwater resource assessment report (NOW 2010) indicates that “there are no reported or observed changes to the beneficial use class”.

The soils described within the onsite well and also the well on Lot 52 DP 750906 indicate predominantly clayey soils from surface to approximately 40m BGL, which indicate a cover layer above the Calivil Formation aquifer, reducing the vulnerability of the aquifer to potential impacts from surface developments.

Local Abstraction

A search of the Bureau of Meteorology Australian Groundwater Explorer indicates that there are around 24 bores recorded within a five kilometre radius of the development site. Groundwater within the area is primarily used for monitoring, irrigation, and stock and domestic uses.

The bore summaries for these 24 bores contain little information and are largely incomplete, however they indicate that 16 of the 24 bores are utilised for monitoring and the majority are located to the north-west, north and north-east of the development site. The minimum water bearing zone for these bores is not available in the groundwater summaries, however bore depth ranges from 21.5 metres to 138.6 metres with an average of 62.7 metres.

Groundwater Regulations

Water Sharing Plan

The Lower Murrumbidgee groundwater sources have been managed under *the Water Management Act 2000* (WMA 2000) since the commencement of the Water Sharing Plan for the Lower Murrumbidgee Groundwater Sources 2003 (hereafter referred to as the Plan) on 1 October 2006. The Plan sets the framework for managing these groundwater sources until the end of June 2017.

At the commencement of the Plan groundwater entitlements in the Deep groundwater source were reduced from approximately 515,000 ML to 270,000 ML. The Plan provides access to groundwater in addition to the portion of recharge available for extraction to assist users to progressively adjust down to this level.

Access to groundwater for basic landholder right's needs, which include domestic and stock rights and Native Title rights, are also provided for in addition to the portion of recharge available for extraction. That is, these supplies are accounted for against the volume of groundwater in storage.

Access licences

Four categories of groundwater access licenses are held in the Lower Murrumbidgee groundwater sources. These are:

- local water utility,
- domestic and stock,
- aquifer (sub categories community and education, town water supply), and
- supplementary water access licences.

The Local Water Utility Licences are held by local governments for town water supply purposes. The share component of these licences is for a specified volume of groundwater. The share components of Domestic and Stock Access Licences, Aquifer Access Licences and Supplementary Water Access Licences are issued for a specified number of unit shares. These are summarised in **Table 6.16Table 6.15**.

Table 6.16 Water Access Licences held in the Lower Murrumbidgee Groundwater Source

Existing Access Licences	Shallow Source	Deep Source (ML)
Basic Landholder Rights (ML/yr)	3,000	1,000
Local Water Utility Access Licences (ML)	0	2,210
Domestic and Stock Access Licences (shares)	0	324
Aquifer Access Licences (shares) Community and Education Licences	0	3
Town Water Supply Licences	0	20
Aquifer Access Licences	5,201	267,777
Supplementary Water Access Licences (shares)	n/a	41,196

Proposed Groundwater Abstraction

As mentioned in **Section 3.8.3**, the Project will require a total water supply of around 460 ML/year. This includes water supply for shed ventilation, bird consumption, shed cleaning, landscaping and staff requirements. This water will be sourced from two well locations to be developed within the development site (labelled 'bore 1' and 'bore 2' on **Figure 1.3**), each with two wells (a production well and a backup well at both locations).

A Water Access Licence (WAL 11788) for abstraction on Lot 52 DP 750906 (located approximately 5 kilometres north-east of the development site, refer **Figure 1.2**), which permits the abstraction of 488 ML/year will be transferred to the proposed development site to allow extraction of water from the new wells to be constructed. It is proposed that these wells will be installed within the Calivil Formation (Deep Source) in accordance with the current WAL conditions and will be capable of a maximum pump rate of 7 ML/day.

6.6.2 Impact Assessment

Conceptual Hydrogeological Model

Based on the regional and local hydrogeology, a conceptual hydrogeological model is described herein, along with the results of the model. The abstraction of groundwater will be undertaken from wells installed within the Calivil Formation (Deep Source) at the development site. The wells will be licenced to abstract a maximum of 488 Ml/year, and will be installed with pump capacity to produce a maximum yield of 7 ML/day.

The Calivil Formation is overlain by the Shepparton Formation (composed of sandy Clays and clay soils) which afford a reduction in vulnerability of the lower Calivil Formation from potential surface impacts. There is vertical interaction (ie leakage) from between the Shepparton and Calivil Formations. The majority of aquifer recharge is due to rainfall (and irrigation).

The Calivil Formation is composed of essentially sandy soil and is reported to have yields ranging from 50-350 L/s, hydraulic conductivities from 2.0-60 m/d and storage coefficients of 1.00E-05 to 5.00E-03. The Calivil Formation is reported to be approximately 100m thick in this part of the GMA (and is known to be in excess of 50 metres from the on-site test well drilled and the well log from Lot 2 DP 750906). The groundwater quality is suitable for domestic, irrigation and stock usages.

Analysis of Potential Groundwater Abstraction and Drawdown

To assess the potential impact of the proposed abstraction rate from the wells, a spreadsheet analysis was developed. The analysis is based on the Thies equation and enables assessment of drawdown against time and drawdown against distance from the abstraction well. The calculation is based on the following equation pair:

$$s = \frac{Q}{4\pi T} W(u)$$

$$u = \frac{r^2 S}{4Tt}$$

where *s* is the drawdown (change in hydraulic head at a point since the beginning of the test), *u* is a dimensionless time parameter, *Q* is the discharge (pumping) rate of the well (volume divided by time, or m^3/s), *T* and *S* are the transmissivity and storativity of the aquifer around the well (m^2/s and unitless, respectively), *r* is the distance from the pumping well to the point where the drawdown was observed (m), *t* is the time since pumping began (seconds), and *W(u)* is the "Well function" (called the exponential integration).

An analysis has been undertaken assuming a confined aquifer with aquifer transmissivity of $3000m^2$/day (thickness 100 metres), storativity of 0.0001 and a pumping rate of 70 l/s (the maximum abstraction rate proposed). Snapshots of the model are shown below.

Time-drawdown calculations using Theis equation

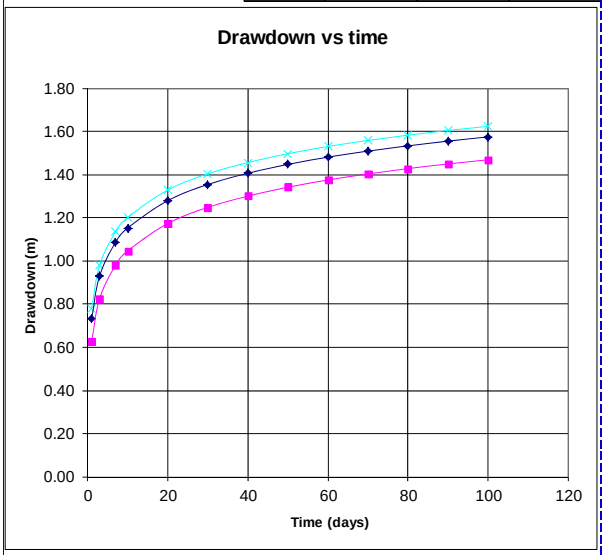
Aquifer parameters		
T	3000	m2/d
S	0.0001	
B		
Pumping rate		
Q	80	l/s

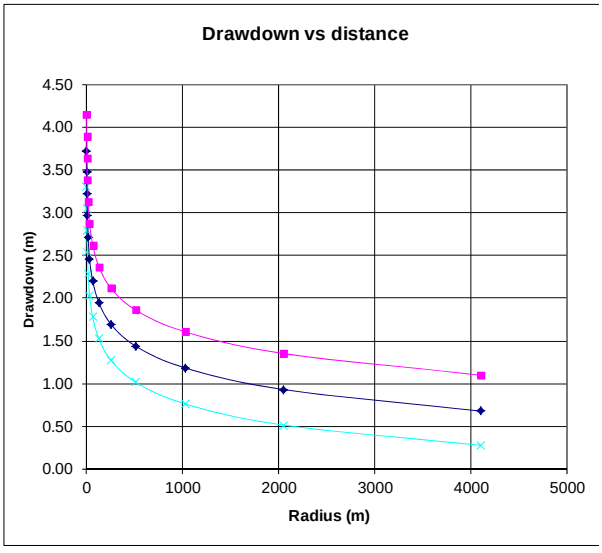
Radius (m)	979	1120	1495
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	0.781	0.732	0.628
3	0.982	0.932	0.827
7	1.137	1.087	0.982
10	1.202	1.153	1.047
20	1.329	1.280	1.174
30	1.403	1.354	1.248
40	1.456	1.407	1.301
50	1.497	1.448	1.342
60	1.530	1.481	1.375
70	1.559	1.509	1.403
80	1.583	1.534	1.428
90	1.605	1.555	1.450
100	1.624	1.575	1.469

Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	3000	m2/d
S	0.0001	
B		
Pumping rate		
Q	80	l/s

Time (days)	1	10	100
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	3.305	3.727	4.149
2	3.051	3.473	3.895
4	2.797	3.219	3.641
8	2.542	2.965	3.387
16	2.288	2.710	3.133
32	2.034	2.456	2.878
64	1.780	2.202	2.624
128	1.526	1.948	2.370
256	1.272	1.694	2.116
512	1.018	1.440	1.862
1024	0.765	1.186	1.608
2048	0.515	0.932	1.353
4096	0.280	0.680	1.099





With regards to the minimal impact considerations in the NSW Aquifer Interference Policy (NOW, 2012) for a Highly Productive Water Source, such as the Lower Murrumbidgee Deep Groundwater Source, drawdown is predicted to be less than 2 metres at the nearest groundwater bores. The nearest production well to the proposed location of bore 1 within the development site is an irrigation bore 2.4 kilometres to the north. The analysis conducted indicates that a 2 metre drawdown will occur within approximately 500 metres of the proposed extraction wells. Outside of this 500 metre radius the drawdown is predicted to be less than 2 metres. No groundwater wells exist within 500 metres of the proposed well locations within the development site, and as such, based on current knowledge of the aquifer, drawdown is predicted to be below the minimal impact criteria for aquifer interference activities at the nearest water supply work, as specified in the NSW Aquifer Interference Policy.

The abstraction of 460 ML/year will have no net impact on the sustainable yield of the Calivil Formation in any case, as the WAL will simply be transferred from another property to this proposed development site.

Groundwater Dependent Ecosystems

The GMA Plan prohibits the construction of a new or replacement works (bore) within 200 metres of high priority groundwater dependant ecosystem, or any creek or river for those exercising basic landholder rights and within 1,000 metres for extraction authorised under other access licences unless:

- the bore only draws water from an aquifer at depth, and
- has an impermeable seal constructed within the annulus of the bore to isolate aquifers,
- preventing water ingress from the restricted aquifer.

According to the NOW 2010 report, the vegetation communities in the GMA are believed to rely mainly on rainfall and periodic flooding from the Murrumbidgee River thus having a low dependency on groundwater. The wetlands within the GMA are known to depend mainly on surface water. The Deep Source is not known to support any ecosystems, and there is lack of information on any terrestrial fauna that may exist and have any dependency on groundwater (NOW 2010).

The Biodiversity Assessment Report (SLR, 2015b) completed for the Project (refer **Section 6.7**) notes that a patch of White Cypress Pine, which has a moderate potential of being a groundwater dependant ecosystem (GDE), is present adjacent to the Sturt Highway, approximately 4.8 kilometres north of bore 1. The drawdown is predicted to be less than 2 metres at this location, as shown in the results presented above, and therefore significant impact is not anticipated.

6.6.3 Mitigation Measures

Groundwater Well Construction and Management

The installation of the proposed groundwater wells should be designed by a suitably qualified engineer or hydrogeologist, and the design and construction should be undertaken in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (National Uniform Drillers Licensing Committee, 2012). The installation of the wells should include normal development practice, including a commissioning test on the well. ProTen will undertake a pump test on the proposed site wells to refine well design and to verify assumptions made in the planning stage.

The groundwater well locations and design of pumping equipment should be undertaken by an appropriately qualified engineer or hydrogeologist, and should include sufficient redundancy in the system to enable both operational abstraction backup in the case of pump failure and also appropriate spacing of wells so as to avoid on-site drawdown effects.

Groundwater Monitoring

Monitoring of wells should comply with the existing WAL conditions.

6.6.4 Conclusion

The Project contemplates transferring the existing water access licence (WAL 11788) from another property in Euroley (Lot 2 DP 750906) to the proposed site. The proposed abstraction of up to the licensed 460 Ml/year will not create any additional impact on the sustainable yield of the Calivill Formation (Deep Source). In addition Groundwater Dependent Ecosystems (GDEs) are not known to exist in the Deep Source, and therefore no impact is anticipated on GDEs.

The abstraction of 460 ML/year will require installation of well pump systems to a maximum rate of 7ML/day (approximately 80 L/s). Analysis of the impact of this pumping rate has been undertaken and indicates that impact on adjacent bores will not significantly impact the aquifer. The proposed extraction will also meet the Aquifer Interference Policy minimal impact considerations for a Highly Productive Groundwater Source, with the associated drawdown not exceeding 2 metres at any nearby extraction well. The abstraction of 460 ML/year will have no net impact on the sustainable yield of the Calivil Formation, as the WAL will simply be transferred from another property to this proposed development site.

6.7 Biodiversity

6.7.1 Introduction

SLR undertook an assessment of the biodiversity values of the development site in accordance with the requirements of the Framework for Biodiversity Assessment (FBA) and with respect to the Project. A copy of SLR's Biodiversity Assessment Report (BAR) (2015b) is contained within **Appendix I**, and a summary of the key findings provided below.

Survey and assessment of native vegetation and threatened species was conducted in January and February 2015 and involved investigations over the development site and the area of land that includes the proposed access road alignment and adjoining land south of the Sturt Highway. Hence, the BAR is based on assessment and mapping of this wider 'study area', which extends beyond the development footprint of the access road and the development site. The boundary of the study area is shown on **Figure 6.12**.

6.7.2 Existing Environment

Native vegetation

Whilst the majority of the study area has been historically cleared and used for agricultural purposes, patches of native vegetation are present. Three native plant community types (PCTs) were identified, mapped and assessed within the study area, as follows:

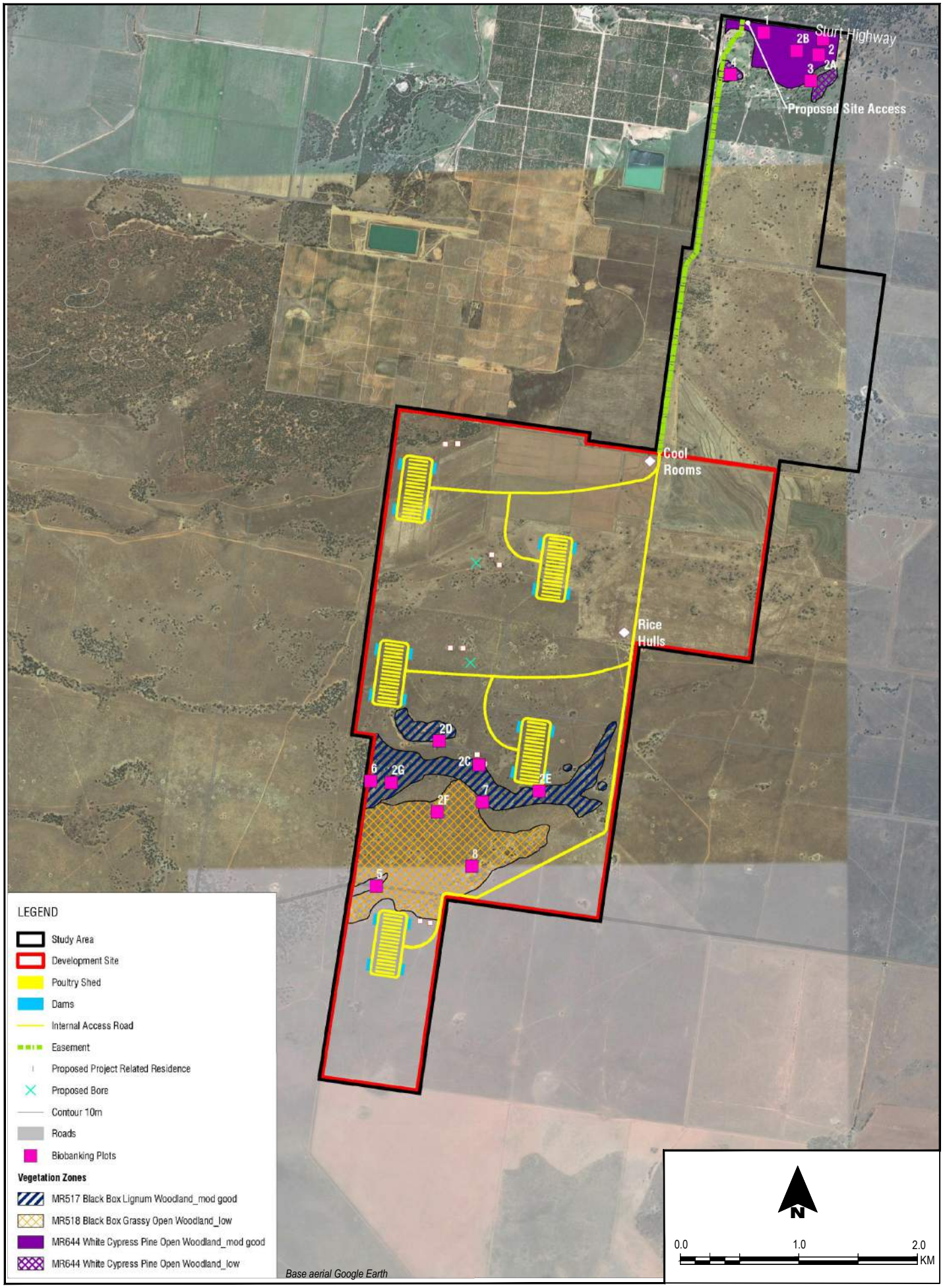
- Black Box Grassy Open Woodland, which occurs across the majority of the development site. This vegetation is subject to sheep grazing and is an open woodland with grassy understory, degraded by grazing and exotic grasses;
- Black Box Lignum Woodland, which occupies slightly lower lying land in the central parts of the development site; and
- White Cypress Pine Open Woodland, which occurs as a distinct patch in the northern parts of the study area and is bounded by the Sturt Highway to the north.

These PCTs were further subdivided into vegetation zones, using the Biobanking condition classes of 'low' and 'moderate to good'. The mapped area of each zone is listed in **Table 6.17** and their distribution across the study area is presented in **Figure 6-12**.

Table 6.17 Vegetation zones mapped within the study area

Code	Vegetation Zone	Area (ha)
MR517	Black Box Lignum Woodland – moderate to good condition	59.31
MR518	Black Box Grassy Open Woodland – low condition	109.68
MR644	White Cypress Pine Open Woodland – moderate to good condition	29.43
MR644	White Cypress Pine Open Woodland – low condition	5.78

'Black Box - Lignum woodland of the inner floodplains in the semi-arid (warm) climate zone (Benson 13)' is positioned on inner floodplains and on alluvial plains mostly in depressions that are frequently flooded. On the development site this community is generally in moderate to good condition and includes characteristic species Black Box *Eucalyptus largiflorens*, Lignum *Duma florulenta* (syn. *Muehlenbeckia florulenta*), Thorny Saltbush *Rhagodia spinescens*, Black Rolypoly *Sclerolaena muricata* and Quena *Solanum esuriale*. This plant community type does not constitute an Engendered Ecological Community (EEC).



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Vegetation Zones (and Plot Locations)

FIGURE 6.12

'Black Box grassy open woodland of rarely flooded depressions, south western NSW (Benson 16)' is located on alluvial plains. Within the development site this community includes characteristic species; Black Box *Eucalyptus largiflorens*, Thorny Saltbush *Rhagodia spinescens*, Black Rolypoly *Sclerolaena muricata* var. *muricata* and *Oxalis perennans*. Most of this vegetation had been subject to substantial amounts of disturbance for agricultural production (clearing for grazing and cropping) and is considered to be in 'low' condition. This plant community type does not constitute an EEC.

'White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone (Benson 28)' occurs on prior streams, source bordering sand dunes and sand plains in south-western NSW. Within the Study Area this community includes characteristic species White Cypress Pine *Callitris glaucophylla*, *Maireana enchylaenoides*, *Dissocarpus paradoxus*, Speargrass *Austrostipa scabra* subsp. *scabra* and *Calotis hispidula*. Most of this vegetation has been subject to substantial amounts of disturbance (including clearing; construction of tracks, grazing and tilling for crop production). This plant community type constitutes an EEC known as 'Sandhill Pine Woodland in the Riverina and Murray-Darling Depression Regions and NSW Western Slopes bioregions'. The White Cypress Pine Open Woodland is also considered to have moderate potential to be a groundwater dependent ecosystem in the Murrumbidgee catchment.

Threatened Biota

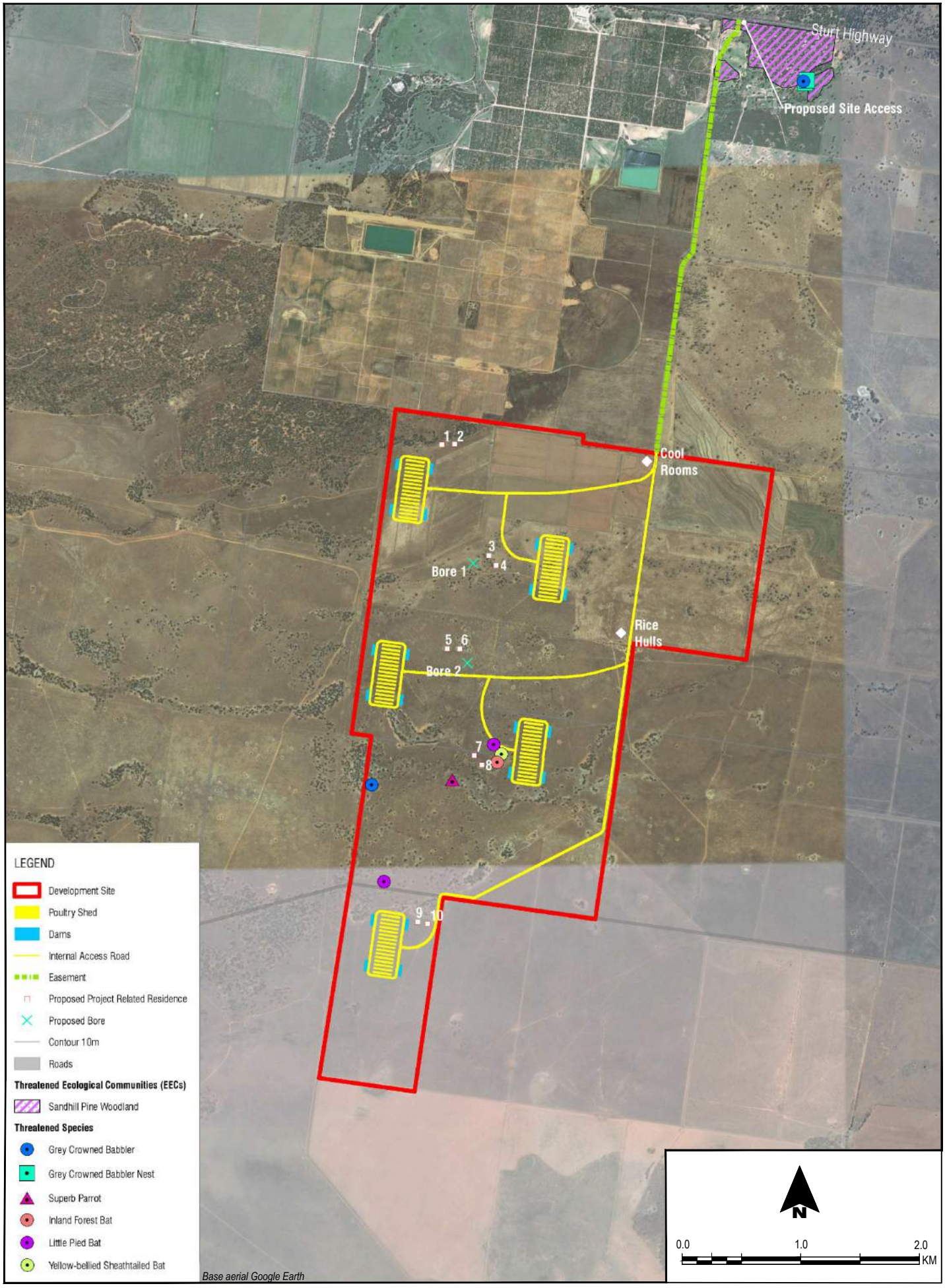
Threatened biota of potential relevance to the study area and which were considered in the assessment include:

- One EEC, Sandhill Pine Woodland, which is present in the northern parts of the study area, as noted above and as shown on **Figure 6-13**.
- One endangered population, being the Glossy Black Cockatoo population of the Riverina region. The site does not contain suitable foraging habitat for this species and so this population is assessed as unlikely to occur.
- Several threatened species, a selection of which were recorded on the site, but most of which are deemed unlikely to occur on the site owing to the degraded condition of the habitats present.

A list of 'candidate species' of potential relevance to the study area was compiled using a combination of the Biobanking Credit Calculator (predicted threatened species), the SEARs (OEH species for consideration in the EIS) and the NSW Wildlife Atlas (previous records within the locality). This list comprises 38 threatened species and one endangered population. This assemblage of threatened species consists of nine plants, 24 birds, four mammals and one amphibian. Additionally four endangered ecological communities have been identified as potentially occurring.

Five threatened species were detected within the study area (see **Figure 6-13**), including two threatened birds and three threatened microchiropteran bat species, as follows:

- Grey-crowned Babbler, listed as 'vulnerable' on the TSC Act;
- Superb Parrot, listed as 'vulnerable' on the TSC Act;
- Inland Forest Bat, listed as 'vulnerable' on the TSC Act;
- Little Pied Bat, listed as 'vulnerable' on the TSC Act; and
- Yellow-bellied Sheathtail Bat, listed as 'vulnerable' on the TSC Act.



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Threatened Ecological Communities and Threatened Species Recorded on the Site

FIGURE 6.13

6.7.3 Impact Assessment

Vegetation Removal and Habitat Loss

The final development footprint will involve the following direct impacts:

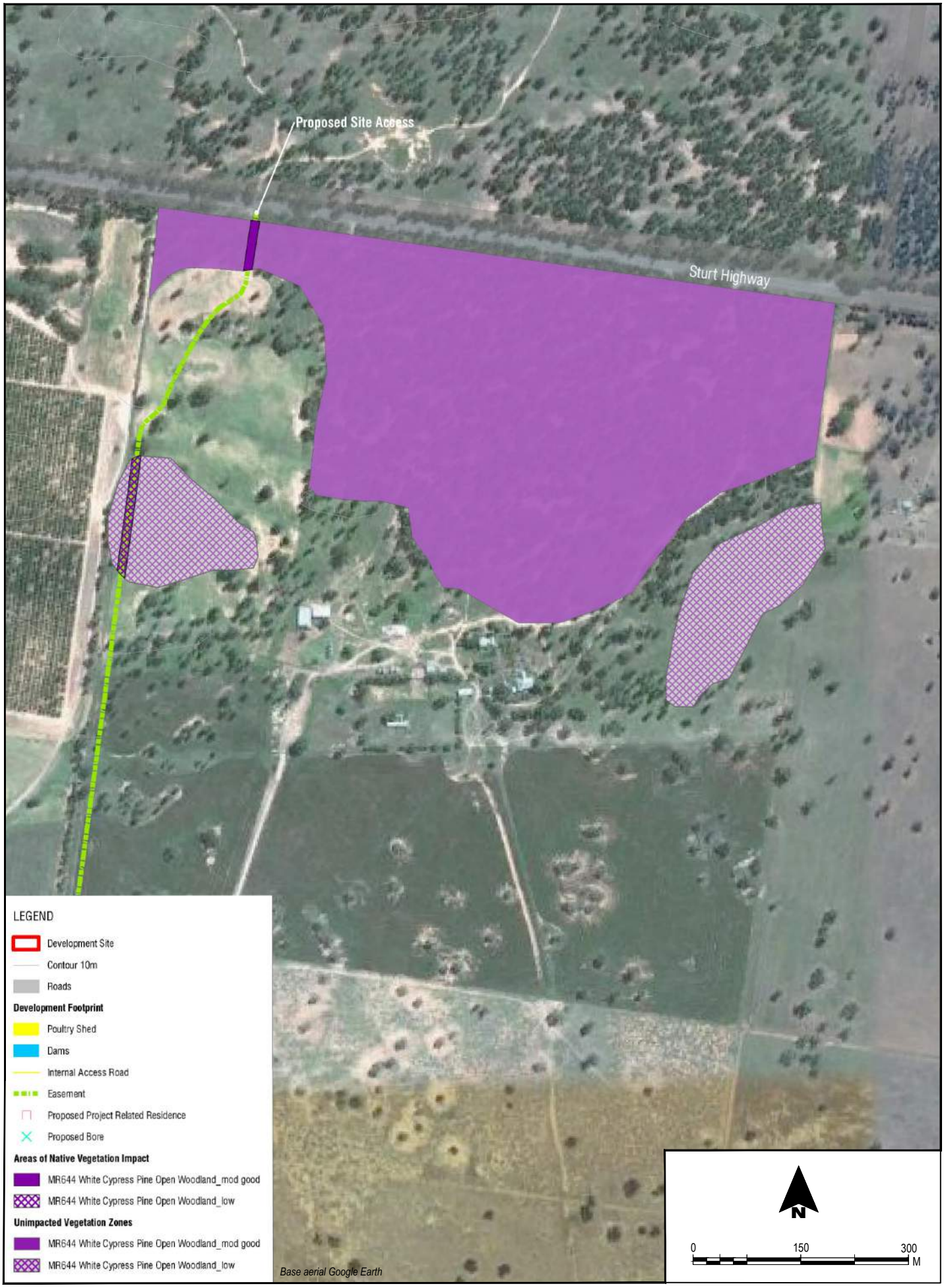
- clearing of native vegetation, involving clearing of a small amount of EEC vegetation;
- loss of hollow-bearing trees, some of which may provide potential roost sites for birds and microchiropteran bats;
- removal of low condition open woodland habitat that represents potential nesting habitat for the Grey-crowned Babbler; and
- removal of a small portion of potential fauna foraging habitat, in particular for threatened microchiropteran bats species, the Grey-crowned Babbler and the Superb Parrot.

Whilst the areas of native vegetation to be cleared have been carefully considered and reduced where possible the Project will impact a small area of White Cypress Pine Open Woodland (EEC) to facilitate the proposed access road off Sturt Highway. This includes mainly EEC vegetation in low condition.

The total area of mapped vegetation removal required for construction and operation of the Project is 0.74 hectares, which represents 0.4 % of the total area of mapped native vegetation on the development site and 0.06 % of the study area. These areas of native vegetation will be replaced with built infrastructure for the Project and therefore impacts on native vegetation (and associated habitats) will be permanent (and unavoidable). Areas of native vegetation impacts (or clearing) are listed in **Table 6.18** and shown on **Figure 6.14** and **Figure 6.15**.

Table 6.18 Native Vegetation Impacts (clearing areas for vegetation zones)

Code	Vegetation Zone Name	Clearing Area (ha)
MR518	Black Box Lignum Woodland - moderate to good condition	0.00
MR518	Black Box Grassy Open Woodland – low condition	0.46
MR644	White Cypress Pine Open Woodland - moderate to good condition	0.08
MR644	White Cypress Pine Open Woodland – low condition	0.20
Total native vegetation clearing area		**0.74**



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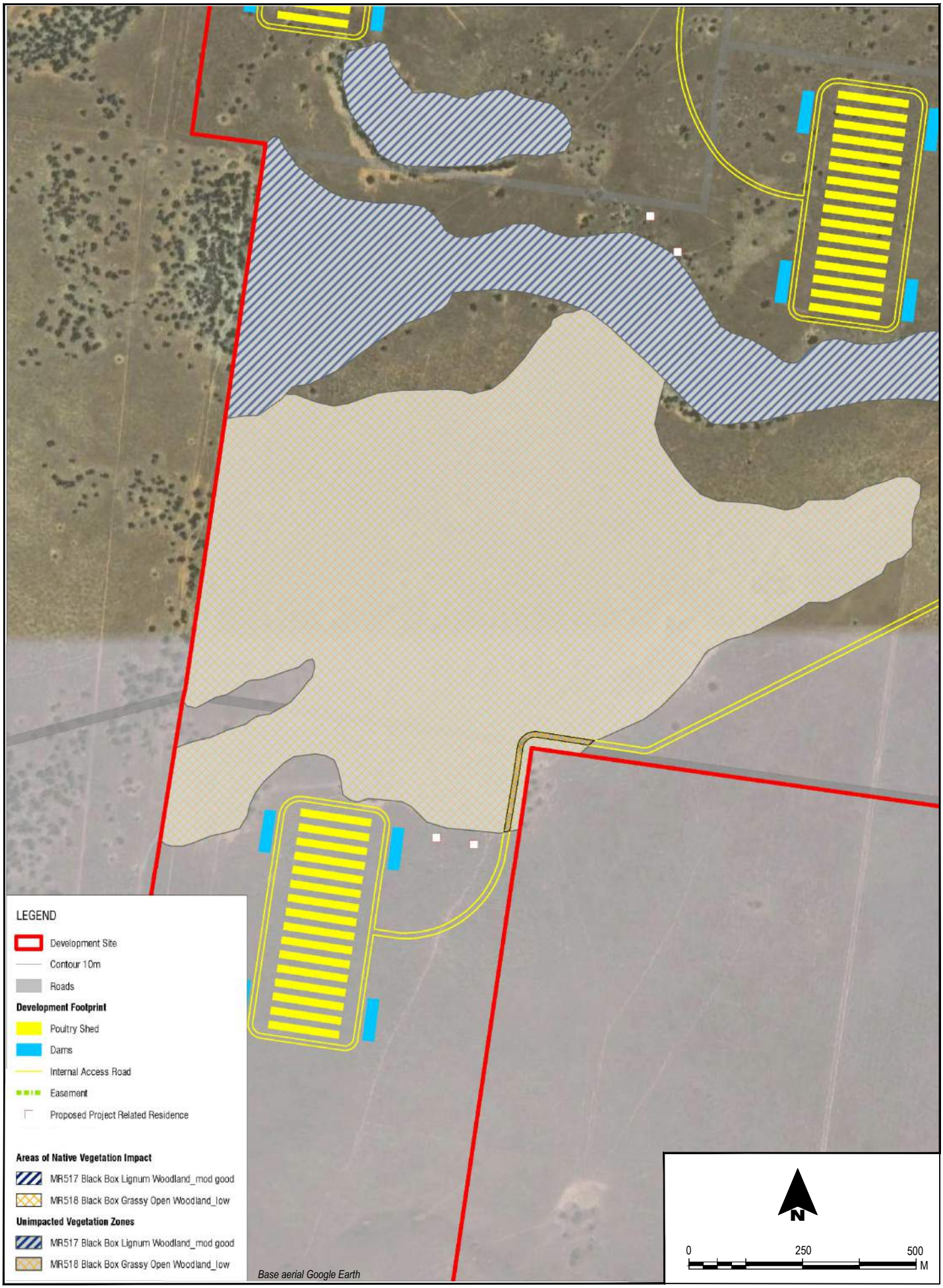
Impacts on Native Vegetation Zones (PCTs) Requiring Offset

FIGURE 6.14



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Impacts on Native Vegetation Zones (PCTs) Requiring Offset

FIGURE 6.15

Threatened Species

No local populations of threatened species that generate species credits are likely to occupy the vegetation on the site on other than a transient basis. One species credit species, the Superb Parrot, was recorded on the site. However, the site does not provide nesting resources for this species and so the occurrence of the Superb Parrot is likely to be transitory over the site (during dispersal through the landscape and/or during foraging activities).

Additionally, several orchids and other threatened plants that also generate species credits were also considered in the assessment; however, the degraded condition of the ground layer across most of the site and the historic and ongoing use of the site for sheep grazing precludes the occurrence of these species.

Accordingly, the creation of species polygons for the Superb Parrot or other species credit species is not considered appropriate for this assessment. Therefore there are no species credit polygons that require offset as part of the Project.

Biodiversity Credit Requirement

All vegetation zones mapped within the site have current site value scores of over 17 and represent habitat for at least some threatened species; hence any clearing in these vegetation zones would require an offset. Of the three PCTs mapped within the site, no clearing will be required within the Black Box Lignum Woodland PCT. Accordingly, the PCTs within which clearing will occur and which require an offset are:

- MR518 Black Box Grassy Open Woodland; and
- MR644 White Cypress Pine Open Woodland.

The Biobanking Credit Calculator has been used to calculate the impacts of the Project and potential offset requirements, in accordance with Section 8 of the FBA. A total of 16 ecosystem credits will be required to offset the clearing of native vegetation as part of the construction and operation of the Project. The types of ecosystem credits required for offsetting of native vegetation (and associated habitat) impacts are listed in **Table 6.19**.

Table 6.19 Vegetation zones requiring offset and credits required

Code	Vegetation Zone Name	Mgt Area (ha)	Current Site Value Score	Future Site Value Score	Ecosystem Credits
MR517	Black Box Lignum Woodland_mod_good	0.00	54.67	54.67	0
MR518	Black Box Grassy Open Woodland_low	0.46	40.00	0	6
MR644	White Cypress Pine Open Woodland_mod_good	0.08	45.31	0	3
MR644	White Cypress Pine Open Woodland_ low	0.20	38.02	0	7
Total		**0.74**			**16**

Groundwater Dependent Ecosystems

The potential for adverse impact to surface water and groundwater resources from the development of intensive poultry farms is very low, with the risk of impact considered far less than those associated with traditional agricultural activities.

While the proposed PPU sites are removed from any notable drainage features, construction activities could potentially impact upon water resources through changes to groundwater recharge as a result of soil compaction, loss of groundcover and generation of sediment-laden runoff. Given that the proposed PPU sites will be relatively small and the commercial activity associated with the development will be largely confined to these areas, changes to the existing runoff/recharge pattern will be relatively minor. No detectable impacts to groundwater levels or yields are expected. The nature of the strata and the depth to the water bearing zones will provide a substantial buffer against infiltration of any potential pollutants, such as turbidity and/or hydrocarbons.

The Project will have limited impact on those GDE terrestrial vegetation types within and adjoining the development site, with a small band of the White Cypress Pine vegetation requiring clearing for the access track. It is not likely that any significant impact on GDEs would ensue as a result of the development (refer **Section 6.6.2**).

EPBC Act matters

Matters of national environmental significance listed on the EPBC Act, that are of potential relevance to the study area include:

- Listed threatened species;
- Listed threatened ecological communities; and
- Listed migratory species.

The development site does not contain EPBC Act threatened ecological communities, but could provide habitat for some listed threatened species, such as bird and bats.

Thirteen threatened species (and/or their habitats) listed under the EPBC Act are predicted to occur within the locality. Of these, one, the Superb Parrot, was recorded on the development site. Individuals were recorded within woodland habitats in the central parts of the site and it is possible that this species utilises the site as part of its wide ranging foraging activities.

With regard to the EPBC Act listed species that are not listed on the TSC Act, SEARs or Credit Calculator, such as the Koala, Malleefowl and Australian Bittern – habitat for these species is not present in the development site. Similarly, there are no watercourses available on the subject site for threatened fish species, namely the Silver Perch, Murray Cod and Macquarie Perch.

Taking into consideration all stages and components of the Project, and all related activities and infrastructure, there is the potential for impacts, including indirect impacts, on matters of national environmental significance, being mainly loss of a small area of degraded habitat for mobile threatened fauna species. However, it is highly unlikely that any of such species will be adversely impacted by the Project.

Eight migratory species (and/or their habitats) are predicted to occur within the locality, none of which are likely to inhabit the development site.

6.7.4 Mitigation Measures

On-site mitigation measures to reduce direct and indirect impacts include before, during and after construction measures as outlined in **Table 6.20**.

Table 6.20 Mitigation measures to be implemented before, during and after construction

Action	Outcome	Timing	Responsibility
Before Construction			
Protection of native vegetation	Delineate construction zone (to ensure no impacts on adjoining native vegetation)	Prior to and for the duration of any works	Construction contractor
Erosion and sediment control measures	Install and maintain erosion and sediment control measures in accordance with the requirements of the 'Blue Book'	Prior to and for the duration of any works	Construction contractor
During Construction			
Fauna management	Supervision of tree felling to rescue and recover any fauna (as necessary)	During clearing	Construction team/ProTen
Weed management	Vehicle wash-down Site maintenance program	Ongoing	Construction team
Rubbish management	Rubbish (such as food scraps and building waste) are to be properly managed during construction and must not be stockpiled on areas of native vegetation	Ongoing	Construction team
Exposed soil surface management	Revegetation – using re-use of topsoil layers and seeding of pasture grasses and legumes (refer **Section 3.12**)	Immediately following soil disturbances	Construction team
Traffic management	Speed limits of 60km/hr are proposed, reducing the likelihood of animal strikes Educate workers on possibility of animal strike through construction management program	Ongoing	Construction team
After Construction			
Traffic management	Speed limits of 60km/hr are proposed, reducing the likelihood of animal strikes	Ongoing	Site operator
Weed management	Limit spread of weeds along with landscape maintenance program	Ongoing, half-yearly minimum	Site operator
Increased artificial light	Each luminaire will be aimed downwards and only switched on during loading-unloading and servicing activities outside of daylight hours and during heavy fog.	Ongoing	Site operator
Waste management	Appropriate systems will be implemented to ensure that each waste stream generated by the development is effectively managed and/or disposed of off-site (see **Section 3.10**). There will not be any on-site stockpiling or disposal of waste materials.	Ongoing	Site operator
Surface water and run-off	An engineered surface water drainage and management strategy is to be prepared and implemented (see **Sections 3.11** and **6.5**.	Ongoing	Site operator

6.7.5 Biodiversity Offset Strategy

As described above the assessment completed as part of the BAR determined that a biodiversity offset is required in accordance with the FBA and the *NSW Biodiversity Offsets Policy for Major Projects* (the 'Offsets Policy'; NSW Government and OEH 2014). As documented in **Table 6.19**, a total of 16 ecosystem credits are required to offset the Project impacts. No species credits are required as part of the offset.

A summary of the available offsetting options for the Project in accordance with the FBA, listed in order of priority, are summarised in **Table 6.21**.

Table 6.21 Ecosystem credits required for offset and matching credit types

Option	Offset Option	No. Credits	Offset Options/Comments

1a	Purchase and retire matching (like-for-like) ecosystem credits	16	• Like-for-like ecosystem credits comprise:
			  • Those of same PCT; or
			  • A PCT from the same vegetation class that has equal or higher percentage cleared value for the CMA.
			• See list of matching credit types in Table 17 in the BAR.
			• number and type of credits must be available on credit register, or will become available prior to construction (or during timeframe specified in in the Conditions of Approval for the SSD project application)

1b	Purchase land and create required credits through a Biobanking Agreement	16	• Requires proponent to find suitable properties for sale in the IBRA subregion, purchase property (or properties) and then generate a Biobanking Agreement on the land; • Biobank site should contain matching credit types and number as in in Table 17 of the BAR; • Proponent retires their own credits to offset project, using only Part A costs (ie management costs of biobank per credit).
2	Variation rules - Purchase and retire other credits within same vegetation formation	TBC	• Apply variation rules when matching credit types in Table 17 of the BAR is not available; • For MR 644 credits, find ecosystem credits for PCTs that fall within 'Semi-arid woodlands' formation, with >80% cleared value for CMA; • For MR518 credits, find ecosystem credits for PCTs within 'Grassy Woodlands' formation, with > 60% cleared value for CMA.
3	Supplementary measures	N/A	• Apply FBA variation rules • Apply when suitable credits and/or biobank site unavailable or cannot be secured within BOS and construction timeframe • Use interim method to calculate monetary contribution for supplementary measures • Could be combination of credit purchase and land purchase

A discussion on each of these options is presented below.

Like for like credits (Options 1a and 1b)

These credits are currently not available on the Biobanking Credit Register, and no applicable expressions of interest are currently published showing an availability of these credit types within the Riverina IBRA region. Given that no credit trades have, to date, occurred in the Murrumbidgee IBRA region, and that there are currently no published expressions of interest (EOIs) for these credit types on the Biobanking site register, it is unlikely that suitable like-for-like ecosystem credits will become available on the credit market in the near future. Accordingly, purchase of like-for-like credits (Option 1a) is not presently available to ProTen.

ProTen may also choose to create a Biobanking Agreement over a portion of land in order to generate the required like-for-like credits and retire these to fulfil the offset obligation. However, as described in detail in the BAR (refer **Appendix I**), this option is also not available to ProTen for the following reasons:

- ProTen has entered into a lease agreement with the current landowner that will allow continued use of the land within the development site surrounding the PPUs for an agricultural use such as grazing. This proposed future use of the surplus land within the development site is not compatible with management of a portion of the study area for biodiversity conservation under a Biobanking Agreement;
- The 16 credits required equates to around 2 hectares of land area. As this offset requirement is small, the cost of securing a biobank, and its ongoing management, would be disproportionate to its size. The creation of a biobank on a parcel of land this small would not be economical.
- Similarly, the purchase of other properties is not feasible for the small offset required. Searches of real estate sources within the Griffith-Narrandera district reveal that potential suitable rural properties are much larger than the required offset area. Suitable offset sites of the size required and containing the ecosystem credits required are not currently available. Similarly, the subdivision and purchase of a portion of one of the large rural properties would be disproportionate to the offset required. Given the rural land use of the majority of the IBRA subregion, the purchase of a 2 hectare property (or larger) and converting it into a biobank would not be feasible or economical.

Hence, whilst reasonable steps have been taken to obtain a suitable like-for-like offset, Option 1b is not available to ProTen. Accordingly, the 'variation rules' can be applied in accordance with Appendix A (Section 1) of the Offset Policy. That is, where the required credits are not available, proponents can apply the variation rules for matching ecosystem credit.

Apply variation rules (Option 2)

According to the variation rules, the consent authority may approve a variation of the offset rules for matching ecosystem credits, by allowing ecosystem credits created for a PCT from the same vegetation formation as the required ecosystem credit to be proposed as part of the BOS. However, at the time of writing, no ecosystem credits within the required vegetation formations are available on the credit register or through the EOI web page.

Supplementary measures (Option 3)

Where a proponent can demonstrate that all reasonable steps have been taken to obtain like-for-like credits or a suitable offset site (as per the steps listed above), they can choose to use 'supplementary measures'. Where the entire offset requirement is proposed to be fulfilled using supplementary measures, they "must negotiate the amount to be spent" with the consent authority, with the advice of OEH.

Finalising the Offset Strategy

In view of the above discussion, the following actions will be undertaken in consultation with OEH and the DP&E to finalise an appropriate offset package for the development:

- Uploading an EOI for the required ecosystem credits on the 'Credit Wanted' register of the Biobanking Credit Register;
- Monitor the availability of matching ecosystem credits during the six month advertisement period (as required by OEH), including regularly checking the credit register for ecosystem credits that match the required type and number of credits, including 'variation credits' from the same vegetation formations;
- Consult with the OEH Biobanking Team and the Albury office of OEH (during the EOI period) on the availability of suitable credits or offset sites;
- During, or at the end of, the advertisement period, either:
    - Purchase like-for-like credits or if not available purchase 'variation credits'; or if both credit types not available, then:
    - Apply supplementary measures, and calculate suitable monetary fund deposit.

Should supplementary measures be required, the following actions will be completed:

- Consult with OEH on suitable measures that would benefit the plant community types (ie ecosystem credits) impacted by the proposed development;
- Conduct research into current regional and local conservation programs that benefit the plant communities affected, including reference to:
    - NSW Priority Action Statements under the TSC Act;
    - Relevant Recovery Plans, threat abatement plans, or Final Determinations (for Sandhill Pine Woodland EEC);
    - Plans of managements for local and regional conservation reserves that are relevant to the offset entities; and
    - Scientific literature.
- Use the results of the research and consultation with OEH and DP&E to agree and determine a suitable supplementary offset and then calculate agreed monetary deposit to fulfil the project's offset requirements.

These actions and the final outcome will be documented in an addendum to the BOS. This will be completed within 12 months of obtaining Project Approval.

6.7.6 Conclusion

The development site has been chosen to, *inter alia*, avoid or minimise impacts on biodiversity and was chosen in part, as it contains large expanse of cleared land. As described further in **Section 8.2**, the site represents the preferred option of several considered and the culmination of a site selection process that has considered a range of criteria (including economic, social and environmental), not least of which is biodiversity.

Unavoidable impacts on native vegetation are minor and include impacting a small area of Sandhill Pine EEC in the north of the study area to allow construction of the internal access road and a small area of low condition Black Box Grassy Open Woodland in the south of the development site (to allow access to the southernmost PPU). These impacts and other potential indirect impacts will be reduced by the mitigation measures proposed. In addition appropriate biodiversity credits and offsetting are provided to compensate for vegetation and habitat loss.

Application of the Credit Calculator in accordance with the FBA reveals that the impacts of the Project correlate to a small requirement of 16 ecosystem credits, comprising 6 Black Box Grassy Open Woodland credits and 10 White Cypress Pine Open Woodland credits. No species credits are required for the Project.

ProTen will continue consultation with OEH and DP&E to finalise the offset strategy and fulfil offset obligations under the SSD approval process within 12 months of obtaining Project Approval. Taking into consideration all stages and components of the Project, and all related activities and infrastructure, there is the potential for impacts, including indirect impacts, on matters of national environmental significance listed under the EPBC Act, being mainly loss of a small area of degraded habitat for mobile threatened fauna species. However, it is highly unlikely that any of such species will be adversely impacted by the Project and hence there is no likelihood of the Project imposing 'a significant impact' on any matters of national environmental significance listed under the EPBC Act.

6.8 Aboriginal Heritage

6.8.1 Introduction

OzArk Environmental and Heritage Management (OzArk) undertook an assessment of the potential Aboriginal archaeological impacts of the Project. The assessment included:

- Historic research of the development site;
- Desktop database searches for previously recorded sites; and
- Formulation of a predictive model for archaeological site location;
- Consultation with Leeton and District Local Aboriginal Land Council (L&DLALC); and
- Field survey on 10-11th February 2015.

The assessment was undertaken in accordance with the *Code of Practice for the Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (ACHCRs) (DECCW, 2010). Further information on the consultation undertaken with the Aboriginal Community is provided in **Section 5.3**.

A copy of OzArk's Aboriginal Archaeological Assessment (2015) is contained within **Appendix J**, and a summary of the key findings provided below.

6.8.2 Existing Environment

Aboriginal History of the site

The development site is located within the southern boundaries of the territory of the Wiradjuri tribal and linguistic group (Tindale 1974, as cited in OzArk, 2015). The Wiradjuri tribal area is situated within the Murray Darling Basin and extends across three general geographical regions: the highlands or central tablelands in the east, the riverine plains in the west, and the transitional western slopes zone in-between. Within this region, the presence of Aboriginal people in the Darling Basin has been dated to 40,000 years ago (Hope 1981 as cited in Haglund 1985) with a spread east into the mountains thought to have occurred between 14,000 to 12,000 years ago.

Although no systematic, regional based archaeological study has been undertaken of the area, some development-driven studies have been undertaken which provide a useful context for the site and help inform the predictive model.

Table 6.22 summarises the findings of the desktop database searches, identifying any previously recorded sites within and surrounding the development site. The OEH administered Aboriginal Heritage Information Management System (AHIMS) database lists 43 sites, eight of which are within 10 kilometres of the site. Of these, none are within 3 kilometres and all are to the north and west, nearer to the Murrumbidgee River. Four of the eight sites within 10 kilometres of the proposed development site contain a culturally scarred tree only. Three sites are open artefact scatters only and one site is a scarred tree with stone artefacts.

Table 6.22 Desktop-Database Search Results

Name of Database Searched	Date of Search	Type of Search	Comment
Commonwealth Heritage Listings	9 February 2015	Narrandera LGA	No places listed on either the National or Commonwealth heritage lists are located within the development site
National Native Title Claims Search	9 February 2015	Narrandera LGA	No Native Title Claims cover the development site
OEH AHIMS	5 February 2015	36km by 16km centred on the Study Area*	No sites are within the development site
Local Environment Plan (LEP)	9 February 2015	Narrandera LEP of 2013	None of the Aboriginal places noted occur near the development site

* The search area encompasses an associated development not assessed in this report (see OzArk 2015).

Landscape Context

The proposed development site is within the Riverina Bioregion and with regard to the OEH Bioregion Overview (2011) the landscape context of the site is characterised as follows:

- Topography is flat ranging between AHD 133m and 138m with a more undulating landscape toward the Sturt Highway;
- Soils are reddish brown and almost dune like in the undulating areas, with no rock outcrops or gravels;
- There are no named water courses with the Murrumbidgee River approximately 9 km to the north. There are some shallow wide ephemeral floodways;
- Vegetation has been largely cleared with some stands of mature black or grey box trees concentrated around ephemeral water bodies. Cypress pines are common on the northern fringe;
- Mean minimum temperature of 3.1 degrees Celsius and mean maximum of 33.2. Rainfall is evenly spread throughout the year with a mean total of 435.8mm; and
- The site has been subject to intensive agriculture.

In the context of Aboriginal archaeological assessment the site represents a marginal landscape with limited reliable water resources and a lack of distinctive landscape character. The site also lacks stone resources for artefact manufacture and grinding. Mature trees are present but sparse and have appropriate bark structure for practical use.

Predictive Model for Archaeological Site Location

Across Australia there is a high correlation between the permanence of a water source and Aboriginal occupation. The presence of other natural resources such as plant and animal foods also affect site location, as does the impact of erosion and historic farming practices which can disturb sites from their original context.

In consideration of this, the environmental context of the development site and regional archaeological record, the following predictions can be made:

- Due to the distance from reliable water, the high levels of existing disturbance and the absence of distinctive landform features, few or no sites of Aboriginal heritage are expected to occur;

- It is acknowledged that there may have been prior streams carrying reliable water through the development site that are no longer evident on the surface. This would increase the likelihood of sites within 200 metres of them should they exist.
- Scarred trees are the most common site type, particularly in this environmental context. Many mature trees have been cleared, however there are many remnant. Scarred tree sites are likely to have the following characteristics:
    - Scarred tree sites are just as likely to have associated stone artefacts as not; and
    - Scars are most likely to occur on box trees (for practical or socio-cultural purposes) and Cypress pines (for socio-cultural purposes);
- Small open camp sites and isolated stone artefact sites may occur anywhere but are most likely to be adjacent to the ephemeral floodways. However, due to the high level of disturbance this site type, if present, has a high likelihood of being disturbed and/or of low integrity;
- Ground ovens or hearths may occur. If so, they are most likely to occur adjacent to the ephemeral floodways; and
- Burials are possible but very unlikely within the northern fringes where the landscape is undulating and the soils are sandy.

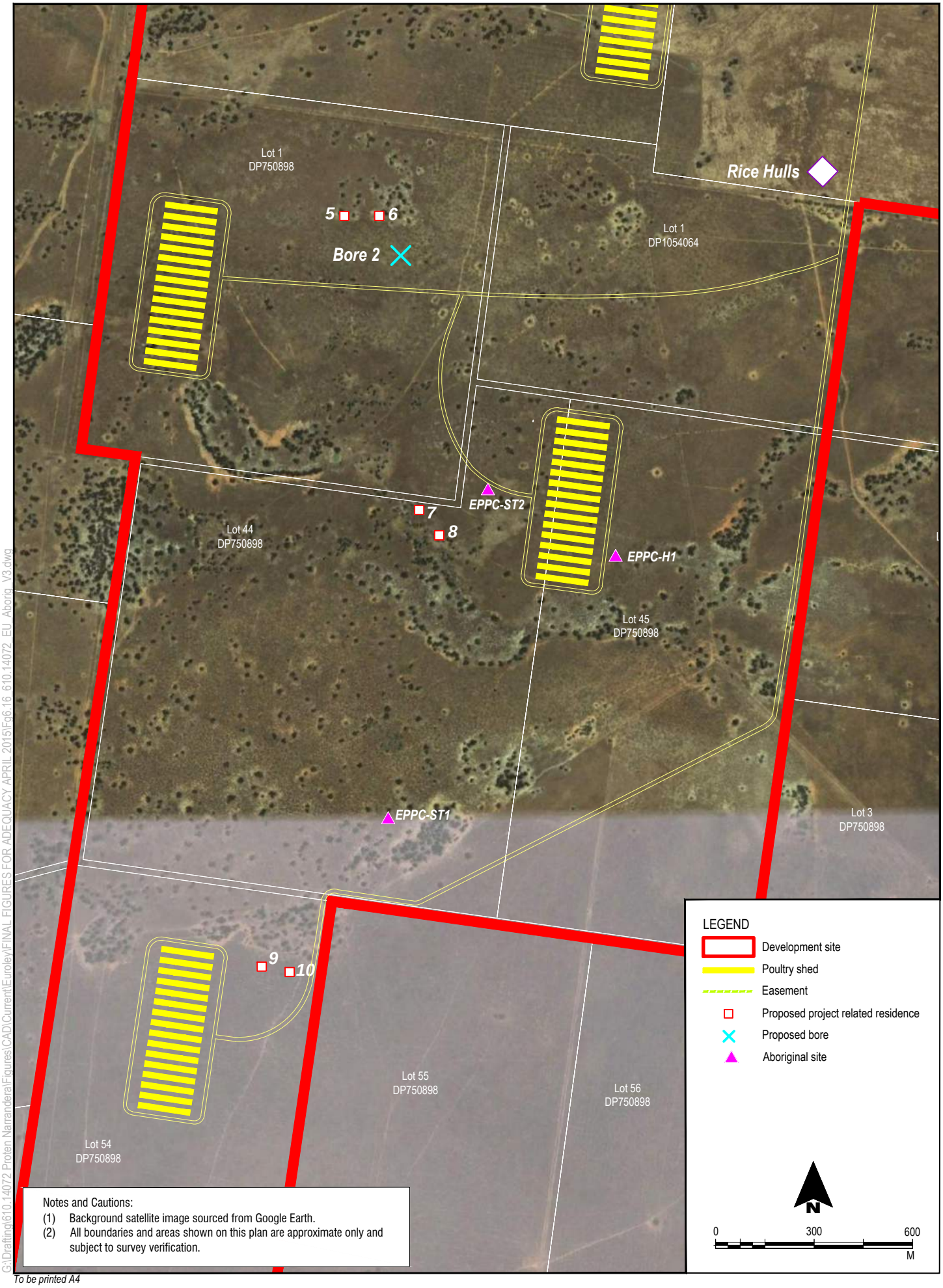
6.8.3 Impact Assessment

A survey of the development site was undertaken by OzArk with a representative of the L&DLALC, focussing on the entire proposed disturbance footprint of the Project. Following completion of the survey, as a result of consultation with OEH on biodiversity matters the proposed location of PPU 5 was moved slightly south out of the originally proposed treed area into a cropped paddock to avoid clearing of a mapped area of vegetation. Whilst the amended PPU location was not directly surveyed by OzArk, it was witnessed by OzArk from the north during the survey. The archaeology report was amended to reflect this slight change in PPU 5 location, and the report re-sent to the L&DLALC for comment, as mentioned in **Section 5.3** (consultation).

Two sites were identified during the field survey; a scarred tree and a hearth. A third site, another scarred tree, was identified during the ecological survey undertaken for the Project. Importantly, none of the sites identified are with the proposed disturbance footprint of the Project, as shown on **Figure 6.16**. The three sites are illustrated on **Plates 15-17**, and **Table 6.23** provides a description of each site.

Table 6.23 Archaeological Sites Recorded in the Development Site

ID	Type	Description
EPPC- ST1	Scarred tree	This site is a culturally-scarred tree with no observable associated artefacts. The elongated scar is on the south side of a mature Black or Grey box tree. The scar is approximately 1.5m in length and 0.35m in width, with 5cm to 10cm of regrowth. The base of the scar is approximately 0.60m above the ground. The scar is weathered but a possible axe mark is discernible at the southern end of the scar
EPPC-ST2	Scarred tree	This scar is on a Black box tree on grazing land that has been largely cleared of trees. The full details of this scar were not recorded however, a photograph of the site suggests that this is likely a cultural scar.
EPPC-H1	Hearth	The site was recorded within an exposure on the fringe of a cleared paddock that has been ploughed, although the site appears to have escaped ploughing. The hearth consists of a concentration of fired clay nodules within an area of approximately 50cm by 50cm and some outlying nodules up to 1.5m from the main concentration



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Aboriginal Sites Recorded within the Development Site

FIGURE 6.16

Plate 15 – Scarred tree within the development site (EPPC-ST1)

Plate 16 – Scarred tree within the development site (EPPC – ST2)

Plate 17 – Hearth within the development site (EPPC – H1)

The results of the survey closely match the expectations of the predictive model in that few sites were recorded. This was expected due to the low archaeological potential of the landscape and the existing high levels of disturbance. The L&DLALC representative was also of the opinion that the site had marginal potential. The sites that were recorded were of a predicted type and condition. Culturally-scarred trees and hearths are common in the region generally.

Table 6.24 summarises the significance of the three sites based on each of the items cultural, scientific, aesthetic and historic value. The three sites have a low archaeological/scientific and historic value as scarred trees and hearths are common in the landscape and these particular sites have no likely association with the history of the area. The scarred trees are prominent in the landscape but are not particularly unique and therefore are considered to have a low-moderate value. The aesthetic value of the hearth is also considered to be low.

The L&DLALC provided comments on the significance of the sites, stating that all sites are significant to Aboriginal people and should be managed as such. In this regard it is noted that all of the sites identified within the development site will be avoided by the Project's impact footprint. The L&DLALC also noted that the area that was inspected was void of any identifying landscape due to the clearing and farming that had been undertaken over the years. The full statement from the L&DLALC is provided in Section 5.7.2 of the Aboriginal Archaeological Report (refer **Appendix J**).

Table 6.24 Significance assessment

ID	Social or Cultural Value*	Archaeological / Scientific Value	Aesthetic Value	Historic Value
EPPC-ST1	Moderate - high	low	low-moderate	None
EPPC-ST2	Moderate - high	low	low-moderate	None
EPPC-H1	Moderate - high	low	Low	None

*Dependant on function and context

None of the recorded sites will be directly impacted by the Project, as summarised in **Table 6.25**. All sites are within 30 metres of the proposed impact footprint but are not within it. Notwithstanding, measures will be taken to ensure these sites are not impacted by the Project, as detailed in **Section 6.8.4**.

Table 6.25 Impact Assessment

Site Name	Type of Harm (Direct / Indirect / None)	Degree of Harm (Total / Partial / None)	Consequence of Harm (Total / Partial / No Loss of Value)
EPPC-ST1	None	None	No Loss of Value
EPPC-ST2	None	None	No Loss of Value
EPPC-H1	None	None	No Loss of Value

6.8.4 Mitigation Measures

To avoid any unintentional impacts on the identified sites the following management measures will be implemented:

- EPPC-ST1, EPPC-ST2 and EPPC-H1 will be temporarily fenced with a 10 metre buffer for the duration of construction. The fencing will be clearly visible and signed in such a way that it is clear that the sites should not be entered.
- Permanent fencing will be erected at EPPC-H1 for the duration of operation in order to exclude vehicles, pedestrians and animals from the site in the case of accidental impact. The fencing will be sturdy and visible to achieve this purpose.
- The location of the sites will be kept on a register and the farm manager will be made aware of their presence.
- Should impact to the sites become a requirement of the Project or any subsequent alteration to the Project post-approval, then an Aboriginal Cultural Heritage Management Plan (ACHMP) will be required to address the management of the sites.
- If the scarred trees (EPPC-ST1 and EPPC-ST2) naturally fall over, then L&DLALC will be contacted to discuss if further management is required and, if so, what the appropriate management will be.
- Should any Aboriginal artefact be uncovered during construction or operation all works will cease in that locale and the OEH will be notified. Works will only recommence when an appropriate and approved management strategy has been agreed to by all of the relevant stakeholders.

6.8.5 Conclusion

Three Aboriginal heritage sites have been recorded within the development site; two scarred trees and a hearth. These sites are all outside of the disturbance footprint associated with the Project and will not be impacted by the development.

6.9 Hazard and Risk

6.9.1 Introduction

A preliminary risk screening of the Project was undertaken by SLR in accordance with *NSW State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* (SEPP 33), and to satisfy the requirement relating to Land Use Safety in the SEARs.

The preliminary screening assesses the storage of specific dangerous goods classes that have the potential for significant off-site effects. The assessment involves the identification of classes and quantities of all dangerous goods to be used, stored or produced on site, as well as transported to and from the Project Site.

The purpose of an initial SEPP 33 risk screening is to exclude those developments which do not pose significant risk from more detailed studies. Where SEPP 33 identifies a development as potentially hazardous and/or offensive, a Preliminary Hazard Analysis (PHA) is required to determine the level of risk to people, property and the environment at the proposed location and in the presence of controls.

The preliminary risk screening found that the Project is considered potentially hazardous due to the amount of LPG to be transported and stored on site, and therefore in accordance with SEPP 33 a PHA is required.

The specific findings of the preliminary risk screening are discussed below. The full Preliminary Hazard Analysis report (SLR, 2015c) is provided in **Appendix K** with the key findings and recommendations of the PHA also summarised in the below sub-sections.

6.9.2 Preliminary Risk Screening

Dangerous Goods Storage

The classified dangerous goods to be stored at the development site include LPG, sodium hypochlorite and petrol. The most significant of these is LPG which will be used in the heating of the poultry sheds. LPG will be supplied from Griffith and stored on-site in bulk tanks installed at each of the PPU sites. At each PPU there will be eight LPG storage tanks each of 7,500 litres capacity, giving a maximum LPG storage at each PPU of 60,000 litres with overall onsite storage of 300,000 litres.

LPG is classified as a Class 2.1 Flammable Gas. As can be seen in **Table 6.26**, the quantity of LPG required to be stored is above the screening threshold ($16m^3$) and is therefore considered potentially hazardous. In accordance with SEPP 33, a Preliminary Hazard Analysis has been prepared and is summarised in **Section 6.9.3**.

Table 6.26 also lists the quantities of the other dangerous goods to be stored on site and illustrates that they are well below the threshold quantities and are therefore not potentially hazardous.

Table 6.26 Project Dangerous Goods Classes in Storage

Substance	Hazardous Class	Total Storage on Site (tonnes)	Threshold Quantity (tonnes)	SEPP 33 Threshold Level Findings
LPG	Class 2.1	$300m^3$ (40x7,500L tanks)	$16m^3$ (above ground storage)	**Above**
Sodium Hypochlorite (10-30%)	Class 8	7.34 tonnes	50tonnes	Below
Petrol	Class 3	2.5 tonnes	4 tonnes	Below

Dangerous Goods Transport

In applying SEPP 33 a proposed development may be deemed potentially hazardous if the numbers of generated traffic movements for significant quantities of dangerous goods entering and leaving the site are above the cumulative vehicle movements as specified in the SEPP 33 guideline. The dangerous goods to be transported to the development site include LPG, sodium hypchlorite and petrol. The level of maximum proposed movements to the development site per week is provided in **Table 6.27**.

Table 6.27 Dangerous Goods Vehicle Movements

Substance	ADG Class	Maximum Proposed DGs Vehicle Movements (per week)	SEPP 33 Threshold Vehicle Movements (per week)	SEPP 33 Threshold Minimum Quantity (per load)	Load Type (relevant to the facility)	SEPP 33 Threshold Level Findings
LPG	2.1	1	>40	2 tonne	Bulk	**Above**
Sodium Hypochlorite	8	<1	>30	5 tonne	Package	Below
Petrol	3	<1	>45	3 tonne	Bulk	Below

The quantities of LPG required for each delivery (vehicle movement) will be greater than 2 tonne and above the SEPP 33 Thresholds and therefore the Project is considered potentially hazardous with respect to the transport of LPG. The transport of the other dangerous goods required on site is again well below the threshold vehicle movements.

6.9.3 Preliminary Hazard Analysis

Due to the findings of the preliminary Risk Screening, a PHA was carried out for the Project in accordance with the *Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning, NSW Department of Planning* (HIPAP 4).

The procedure adopted for assessing hazardous impacts in accordance with HIPAP 4 involved the following steps:

1. Hazard identification;
2. Hazard analysis (consequence and probability estimations); and
3. Risk evaluation and assessment against specific criteria.

One potential hazard was identified for the development site with regard to the storage and transport of LPG, that being for the risk of an LPG fire.

In accordance with HITAP 4 the following risk assessment criteria were identified for the Project:

- Heat-Flux Radiation
- Explosion Over-Pressure for an on-site fire
- Toxic gas exposure
- Toxic release into the biophysical environment

However, the assessment found that various safety features of the Project were sufficient to not warrant any further consequence analysis of each risk criteria. Specifically AS/NZS 1596:2014 *The storage and handling of LP Gas* stipulates a number of safety features for the storage of LPG specifically designed to reduce the overall risk of operations. Some of the project features which reduce this risk are as follows:

- LPG storage will be separated into five areas with associated PPUs and approximately 1 km apart.
- The location and equipment will meet the requirements of AS/NZS 1596:2014 *The Storage and Handling of LP* Gas.
- Each LPG storage facility will be significantly further than the minimum distance required by AS 1596 of 10 metres to a public place and 17 metres to a protected area.
- Above ground storage tanks will be in the open air.
- Adjacent fences, walls, barriers or the like will permit free access and cross ventilation for the tank.
- The maximum tank diameter will be 1.2 metres and adjacent tanks will be 1.2 metres apart.
- The surrounding area is lightly populated with the closest potential residence approximately 2 kilometres from the boundary and the nearest population centre, Narrandera, 26 kilometres away.
- The design and layout of the LPG storage facilities has been undertaken by gas supplier Elgas.
- Rigid transport trucks will be used for the transport of LPG.
- Truck movements for LPG will generally be less than 1 per week.
- Other chemicals stored on site will also be spread among each PPU and are below the SEPP 33 thresholds.

Therefore, while the development is considered to be hazardous in accordance with the screening thresholds in SEPP 33, with suitable engineering controls in place and in consideration of all of the factors listed above, the development does not pose a significant offsite risk and is not considered to be an offensive or hazardous development.

6.9.4 Conclusion

The Preliminary Hazard Analysis concluded that the operation of the Project meets the criteria laid down in *HIPAP 4 Risk Criteria for Land Use Safety Planning,* and would not cause any risk, significant or minor, to the community.

6.10 Visual Amenity

6.10.1 Existing Environment

The visual amenity of the development is that of a rural property that has been significantly modified by historical land clearing and long-term agricultural activities. It is largely devoid of significant vegetation cover and primarily comprises treeless paddocks that have been consistently cropped and/or grazed for many years.

The proposed PPU sites are relatively small and the commercial activity associated with the development will be largely confined to these sites. The footprint of the proposed development, including the PPUs, ancillary infrastructure, associated residences and internal access roads will be approximately 90 hectares, comprising just 8 percent of the total development site.

6.10.2 Impact Assessment

As outlined in **Section 3.9**, the primary source of external lighting will comprise one luminaire mounted at a height of approximately 4 metres over the front and rear loading-unloading areas of each poultry shed. The development site offers several advantages in terms of lighting, including a very low density of surrounding residences and significant separation distances, and therefore no significant impact on surrounding residences as a result of light spill from the development site is anticipated.

The nearest residences to the development site, R5 and R4, are 2.1 kilometres and 2.3 kilometres respectively to the north of the northern-most PPU (PPU 1), as illustrated on **Figure 1.2**. Analysis of the topography reveals that there is a slight change in elevation between the northern PPU and these nearest receptors, which is likely to shield the view from these residences.

6.10.3 Mitigation Measures

While not anticipated to be an issue, ProTen will take reasonable and practicable steps to prevent or minimise light emissions, including the following best management practices and mitigation measures.

Operation and Maintenance

Each luminaire will be aimed downwards and will only be switched on when the loading-unloading areas are in use outside of daylight hours and during times of heavy fog. This is expected to minimise stray lighting from the development, minimise any distraction to passing traffic on the Sturt Highway and minimise harm to wildlife.

Landscaping Strategy

Landscape plantings will be established in accordance with the landscaping strategy described in **Section 3.13** and **Figure 3.8**. In additional to visually screening of the PPU, the plantings will provide a high level of light screening. ProTen will progressively establish the landscape plantings, as practically possible, following bulk earthworks and construction of development infrastructure.

Environmental Complaints and Incidents

The Complaints and Incidents Management Strategy contained within **Appendix C** will be implemented to ensure that any complaints and incidents relating to the poultry operation are promptly and effectively addressed. Appropriate documentation of complaint/incident handling will assist in identifying and implementing measures to negate the possibility of re-occurrence in the future.

6.11 Greenhouse Gas and Energy Efficiency

6.11.1 Sources of Greenhouse Gas Emissions

The primary sources of greenhouse gas (GHG) from the Project are identified as follows.

Soil Disturbance

Soil carbon is both a source and a sink of GHG. Emissions typically occur from soil disturbance during the process of land use change. Estimates of emissions depend on the area of disturbance and the amount of carbon sequestered in biomass and soils, which differs by vegetation type, geography and climate (Australian Greenhouse Office).

The footprint of the proposed PPUs are relatively small and comprises land that is already highly disturbed. The land is devoid of significant vegetation cover and now primarily comprises treeless paddocks that have been consistently cropped and/or grazed for many years. On this basis the value of the soil within the proposed disturbance footprint is considered to be of relatively low value in terms of sequestering carbon.

Fossil Fuel Emissions

The Project will rely on reticulated electricity for running fans, pumps and lights, and LPG for heating sheds. ProTen is constantly endeavouring to reduce costs associated with the construction and operation of their poultry developments, with a reduction in energy consumption translating into lower operational costs. As research and development identifies areas where energy efficiency can be improved, ProTen will endeavour to implement change to achieve cost reductions.

Over recent years, the poultry industry has moved towards new methods of shed construction and operation, with newer developments constructing larger sheds and using materials with higher insulation properties. Tunnel-ventilated fully-enclosed climate-controlled poultry sheds, such as those proposed at the site, improve efficiency by continuously monitoring parameters such as light, temperature, humidity and static pressure and adjusting the ventilation to suit conditions. The Project will therefore require less energy to regulate the internal conditions of the poultry sheds of previous years. Further, it is understood that a series of larger sheds, as proposed, is more efficient and economical to operate than a greater number of smaller sheds.

6.11.2 Mitigation Measures

The following best management practices will be implemented to improve energy efficiency:

Operation and Maintenance

- Low lux internal shed lighting, which has a significantly reduced power demand compared to past lighting practices, will be installed within the poultry sheds.
- External lighting will only be used when necessary during times of low light and/or heavy fog.
- The integrity of the poultry sheds will be regularly checked in order to identify and rectify any air leaks, which place additional load on ventilation fans.
- Automatic control systems will continuously monitor internal shed lighting, temperature, humidity and static pressure, and adjust the ventilation to suit conditions resulting in less energy to regulate the internal shed conditions.
- Ventilation fans and heaters will be regularly maintained and serviced to ensure optimal performance and efficiency.

Landscaping Strategy

- Landscape plantings will be established in accordance with the landscaping strategy described in in **Section 3.13**. Approximately 20,000 trees will be planted as part of this landscaping strategy around the PPUs. In addition to screening the PPUs, these plantings may act to offset some of the GHG emissions from the Project. Trees play an important role in the carbon cycle, removing carbon dioxide from the atmosphere and storing it as carbon in plant material and soil (CRC for Greenhouse Accounting). Trees and other plants sequester carbon dioxide from the atmosphere as they grow through the process of photosynthesis. This reduces the concentration of carbon dioxide in the atmosphere and helps reduce the greenhouse effect.

6.12 Poultry Disease

6.12.1 Overview

There is a major economic incentive for ProTen to ensure flocks are kept disease free. As well as affecting bird health and welfare, disease can significantly reduce production efficiency and product quality. If a flock requires depopulating, the economic gain from the flock is immediately lost. In addition there is considerable cost associated with the removal and euthanasia of birds, carcass disposal, shed disinfection and remediation activities. On this basis, ProTen places a high importance on maintaining flock health through vaccination, farm hygiene and biosecurity.

ProTen has demonstrated a strict biosecurity commitment and will implement a range of proven biosecurity measures at the proposed development site (see **Section 3.18**). These biosecurity measures, along with Australia's 'island' status and high standards set by the Federal Department of Agriculture (DoA), will provide significant protection against disease entering the poultry flocks.

Avian Influenza

Avian influenza, also known as bird 'flu, is an infectious disease of birds that attracts widespread media attention. It is important to understand that avian influenza and human pandemic influenza are different diseases, and that avian influenza is not a food-borne disease.

Australia has had five outbreaks of avian influenza (of a different strain to the H5N1 type) in commercial chicken flocks over the past 50 years. The nature of each of these outbreaks suggests that one or more biosecurity deficiency was involved in the spread of the virus within and between properties (Australian Animal Health Council 1999). On each occasion, Australia has been well prepared to quickly spot the infection and to take action to control and eradicate it.

Avian influenza is not currently present in Australia, and the government and poultry industry has rigorous systems in place to keep it that way. The Australian Government has an elaborate emergency animal disease response plan in place that clearly sets out how industry and government agencies would act to isolate farms with the disease and eliminate it while ensuring no further spread occurs.

Newcastle Disease

Newcastle disease is a viral disease of domestic poultry and wild birds characterised by gastrointestinal, respiratory and neurological signs. In response to outbreaks of the Newcastle disease between 1998 and 2002, the Australian Government and the poultry industry jointly developed a National Newcastle Disease Management Plan to provide for long-term management of the disease in Australia. A key element of this Plan is the compulsory vaccination of all commercial domestic poultry flocks across Australia, according to nationally agreed standard operating procedures.

Since the adoption of the National Newcastle Disease Management Plan, the implementation of vaccination and other measures, such as enhanced biosecurity practices, the Australian poultry industry has to date prevented the re-emergence of Newcastle disease in Australia.

6.12.2 Mass Mortality Disposal Procedure

In the unlikely event of a major disease outbreak, the EPA and DPI will be contacted as soon as the breakout is suspected and will likely assume control of the site. Immediate measures will be implemented to isolate the infected PPU site(s), effect strict quarantine procedures to prevent the spread of the disease, and notify all relevant stakeholders. Where permitted, urgent ring vaccination of flocks within the controlled area will be organised.

Upon confirmation that it is indeed an exotic disease or emergency animal disease (EAD) outbreak and immediate slaughter of farm stock is necessary, slaughter will be managed by the DPI in co-ordination with the EPA and technical service units of the poultry industry. The birds will be slaughtered within the poultry sheds.

A number of options exist for the disposal of bird carcasses and fomites. The *Best Practice Guidelines for Meat Chicken Production in NSW – Manual 2 Meat Chicken Growing Management* (DPI, 2012) list the following disposal options for mass-deaths, subject to Council, EPA and DPI approval:

- Rendering (if facilities are available);
- In-shed composting;
- External composting;
- Disposal in a landfill site; and
- Burial on-farm.

The most appropriate option in the event of a mass mortality event will depend on a number of factors, including the scale of the outbreak on farm, the ability of a render facility to accept large volumes of bird carcasses, the logistics and cost associated with transportation of carcasses off-site, and the suitability of the property for burial such as groundwater characteristics.

On-farm burial has traditionally been the predominant disposal option in the industry, due to it generally being the simplest, timely and most cost-effective option. However, this practice is now discouraged on the basis of significant environmental risk such as potential groundwater impacts, and more favourable options becoming available, such as on-farm composting.

Emergency management agencies throughout Australia have now identified composting as a preferred method of carcass disposal. A project investigating the feasibility of on-farm composting and the effectiveness of this disposal method in eliminating avian diseases in carcasses and litter was conducted by the Australian Government's Rural Industries Research and Development Corporation (RIRDC) with the resulting report, *The Biosecurity of Mass Poultry Mortality Composting,* published in January 2014.

The Project validated the technical feasibility of using composting for managing carcass disposal in an EAD outbreak in the Australian broiler industry. In-shed composting effectively restricts the spread of the disease because infected carcasses can be composted in the poultry shed or on the farm using the manure and bedding as the bulking agent. It is possible to use a range of bedding materials and other organic sources commonly available in Australia as co-composting ingredients in this process. Poultry carcasses rapidly decompose (usually within 14 days), and after a further period of composting, the compost can be safely applied to land.

Studies were also conducted on the survival of the V4 vaccine strain of Newcastle disease virus during composting, finding that the virus was killed within the first five days of composting. Conditions monitored during the composting process suggested there is a wide safety margin and that the Newcastle disease virus and other EAD such as avian influenza are unlikely to survive for long (RIRDC, 2014).

It is also noted that the successful implementation of composting as a disposal method during an emergency animal disease outbreak has been repeatedly demonstrated in the USA and Canada (RIRDC, 2014).

Although composting can be undertaken both inside and outside the poultry shed, in-shed composting is the preferred method since it provides better security and protection from wind, rain and scavengers. In-shed composting also holds an advantage over other options involving sending the bird carcasses off site for processing at a render plant or for burial in that it is a viable option during flooding events where access to and from the farm may be restricted.

Whilst in-shed composting has a significant number of advantages as a mass-mortality disposal option, a disadvantage is that the affected shed can be out of operation for weeks as composting process takes place. This is where rendering as a disposal option has an advantage, enabling the affected shed(s) to be cleaned, decontaminated and brought back into production in a much shorter period of time.

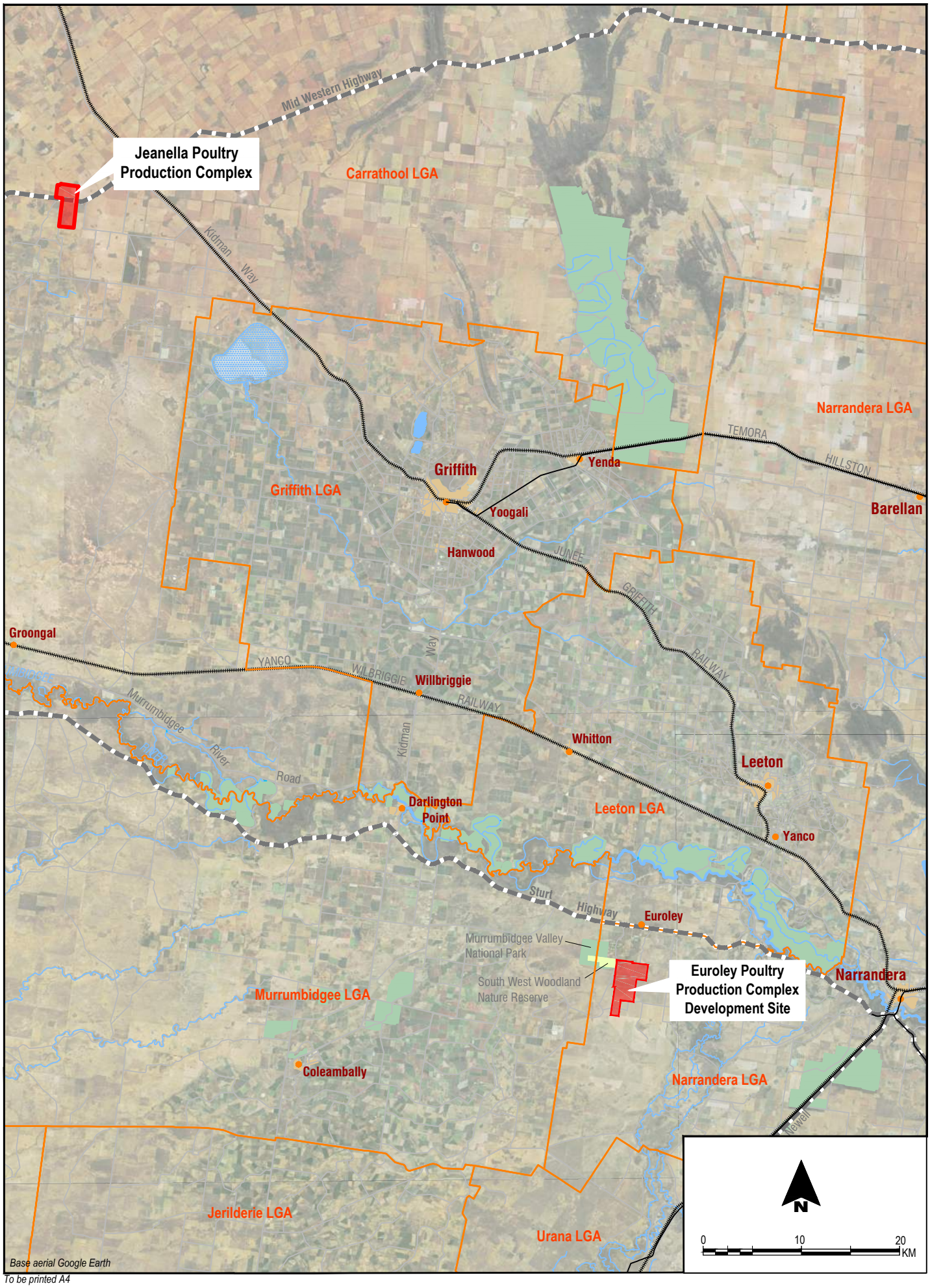
In consideration of the above, and pending the scale of the mass mortality event and advice from the DPI and EPA, the following options in order of preference will be implemented for the disposal of bird carcasses and fomites in the event of an EAD outbreak:

1. Rendering - the preferred option for mass bird disposal will be transportation to Baiada's protein recovery plant, which is part of the processing complex near Hanwood, for treatment and disposal. This would occur under the supervision of the DPI to ensure appropriate quarantine control and standard operating procedures are implemented in line with the relevant AUSVETPLAN disease strategy. Carcasses and fomites will be transported in appropriate trucks disinfected on exit from the development site. The volume of material treated and processed would not exceed the plant's daily processing capabilities. The truck and operator would be independent from normal ProTen and Baiada operations in order to minimise the risk to other poultry operations.

2. In-shed composting – if transportation of the bird carcasses to render is difficult due to the scale of the mortality or environmental conditions such as flooding, the birds will remain in the sheds and composted. Again, this would occur under the supervision of the DPI, and in accordance the *Standard Operating Procedures (SOPs) for Mass Poultry Composting* developed by the RIRDC (2014) in consultation with Biosecurity Victoria and the NSW DPI's Animal Health Branch. It is understood these SOPs are in draft form, and in the event of a mass-death, ProTen will consult with the DPI to ensure the most appropriate SOPs are referenced and implemented.

3. Off-site burial – A third option is transportation of bird carcasses and fomites to ProTen's Jeanella property at Goolgowi for burial. This property is located approximately 50 kilometres from the Murrumbidgee River, and 7 kilometres south-west of the township of Goolgowi, as shown on **Figure 6.17**, and has been chosen due its distance from the River and the favourable groundwater conditions there. This option may be considered where disposal via render is unavailable, and the scale of the mortality is such that in-shed composting would cause the poultry production complex to be off line for a significant period of time. Selection of an appropriate site for burial is critical in this option, with the major environmental constraints for burial site suitability being depth to groundwater, soil profile permeability and separation distances. Where necessary, appropriately qualified personnel would be engaged to confirm the most-favourable site(s) within the Jeanella property in terms of access, environmental constraints and construction requirements. The implementation of this option would therefore require careful consideration of the economic implications of both in-shed composting and off-site burial, the environmental constraints at the burial site, and the logistics of transportation, and would ultimately be determined in consultation with the DPI.

   Given the relative proximity of the Euroley development site to the Murrumbidgee River and Yanco Creek, bird carcasses will not be buried on site in the event of a mass-mortality, unless directed to do so in an EAD by the DPI.



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ProTen's Jeanella Property

FIGURE 6.17

6.13 Human Health

It is acknowledged that respiratory problems, such as asthma and allergies, can develop from prolonged exposure to air borne contaminants which may be present in the poultry industry. Dust and other air borne contaminants are affected by factors such as bird health, bedding material condition, ventilation rate, time of day, temperature and relative humidity.

According to the Rural Industries Research and Development Corporation and the Australian Centre for Agriculture Health and Safety (2005), an analysis of Australian workers' compensation data did not reveal any evidence of health effects among poultry industry workers associated with respiratory disease. In addition, ProTen has advised that there has never been a workers' compensation claim from any member of ProTen's farm staff for any type of respiratory disease. Logically, if there is no history of farm staff contracting illness, then the risk to the general populace is negligible.

ProTen understands that air quality issues are directly related to farm operation and management. On this basis, the best management practices and mitigation measures identified in **Section 6.2.5** will be implemented to minimise the risk of any adverse health impacts from dust and particulate matter emissions.

Refer to **Section 6.12** for details regarding poultry disease and disease management.

6.14 Socio-Economic Considerations

6.14.1 Overview

The potential for significant adverse socio-economic impacts as a result of the Project, including upon local land use and amenity, is considered minimal. Points to note in this regard include:

- The Project presents the opportunity for significant and sustained economic activity within the region. The generated economic activity, unlike some other business ventures that are largely seasonal, will be all year round;
- The development site is isolated from any urban areas and there is a very low density of surrounding residences;
- The development will employ best management practices and mitigation measures to minimise the potential for adverse impacts upon the local environmental and surrounding populace;
- The air and noise impact assessments conducted for the Project predict odour, dust and noise levels to all be within the relevant criteria at all of the nearest privately owned receptors; and
- The Complaints and Incidents Management Strategy in **Appendix C** will be implemented to ensure that all complaints and incidents relating to the poultry operation are promptly and effectively addressed. Appropriate documentation of complaint/incident handling will assist in identifying and implementing measures to negate the possibility of re-occurrence in the future.

6.14.2 Economic Activity

Commercial pursuits, regardless of size and by their very nature, increase economic activity within the locality in which they are situated. The poultry industry within the Griffith region is a perfect example of vertical integration, where each of the operations produce a different product or service and these combine to satisfy a common need, providing a very significant contribution to the local and regional economies.

Based on the information in **Section 3.20**, the net economic impact of the Project is anticipated to be one of significant benefit. Benefits include:

- The creation of an additional 30 full-time jobs, comprising five full-time site managers, five full-time assistant farm managers and 20 full time equivalent farm workers. The majority of poultry farm positions require low skill levels, with on-the-job training provided. This translates to up to 30 families receiving a benefit that would otherwise not be available. There will also be flow-on economic benefits into the wider community of this increased employment;
- At full operation, the development will consume around 105,000 tonnes of poultry feed per annum, which is a yearly recurrent cost of around $33 million (based on the average price of feed at the time this document was prepared); and
- Stimulus to local businesses through development construction activities, consumables and significant flow-on benefits.

It is obvious that there is substantial opportunity for the Project to create significant and sustained economic activity within the region. The generated economic activity, unlike some other business ventures that are largely seasonal, will be all year round.

The Griffith region is well known as a major centre for the chicken meat industry (broiler production and support/service facilities), providing significant employment. The Project will increase the supply of broiler poultry by around twenty million birds per year. This is integral to both ProTen's and Baiada's strategy for continued growth of its operations, and the poultry industry, within both the Griffith region and NSW.

Section 7

Statement of Commitments



7 STATEMENT OF COMMITMENTS

7.1 Summary

ProTen commits to the implementation of the operational mitigation measures, monitoring activities and management strategies outlined in **Section 6** for all activities associated with the Project. **Table 7.1** presents the key commitments proposed in this EIS, in order to effectively mitigate and/or manage the potential environmental and socio–economic impacts of the Project.

Table 7.1 Statement of Commitments

Aspect/Commitment	EIS Section
General	
• ProTen will carry out the development at Euroley generally in accordance with the development application and this EIS report. • The development site will not accommodate more than 3.92 million birds at any one time. • Construction will be undertaken within the hours of: a. Monday to Friday, 7.00 am to 6.00 pm; b. Saturday, 8.00 am to 1.00 pm; and c. No construction work on Sunday and public holidays • The poultry development will operate 24 hours a day, seven days a week, with the majority of activities carried out between 7.00 am and 7.00 pm. • The Complaints and Incident Management Strategy contained within **Appendix C** will be implemented to ensure that all complaints and incidents relating to the poultry operation, if they occur, are promptly and effectively addressed.	Section 3
Air Quality and Odour	
During Construction • No disturbance will occur outside of the nominated disturbance footprint, and disturbed areas will be promptly rehabilitated and revegetated to a stable landform to minimise dust emissions. • Dust will be minimised by 'wetting' down surfaces being worked or carrying traffic in dry periods. During Operation • A meteorological station will be installed within the development site to collect on-going and up-to-date weather data. • The poultry sheds and feed silos will be fully enclosed to reduce the level of moisture and to minimise emissions of dust/particulate matter. • The insides of the poultry sheds and the surrounds will be maintained at all times to ensure a clean and sanitary environment, including regular monitoring and maintenance of the tunnel ventilation systems and bird drinkers to avoid spillage, leaks and uneven distribution. • Stocking densities and bird health within each of the poultry sheds will be regularly checked and, if necessary, appropriate corrective measures will be implemented. • Daily monitoring and maintenance of the bedding material will be undertaken to identify, remove and replace any caked material beneath drinking lines and/or areas with excessive moisture content. • Internal access roads will be appropriately maintained to minimise dust and noise emissions.	Section 6.2.5

Noise	
• A 60 km/hr speed limit will be adopted on the site access road between the development site and the Sturt Highway. • Plant and equipment will be maintained in good repair and operators will be appropriately instructed on how to minimise noise generation at all times. • Noise generating equipment purchased by the operator will comply with relevant occupational health and safety requirements. • Emergency standby diesel generators will only be used when power from the electricity grid is lost and they will be appropriately sited and housed to minimise noise emissions. • A unidirectional traffic movement system, via a one-way circulation road around each PPU site, will be established with appropriate signage to minimise the use of reversing alarms.	Section 6.3.5
Traffic and Transport	
• An intersection between the Sturt Highway and the development site access road will be constructed at the location shown on **Figure 1.2**, with a basic right turn treatment (BAR) and basic left turn treatment (BAL) intersection in accordance with Austroads Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections. • The site access road from the Sturt Highway to the development site will be constructed to a minimum width of 6.5 metres, with a pavement and road surface suitable for B-doubles. • The access road will be bitumen sealed for a minimum length of 50 metres from the Sturt Highway intersection. • Advance signposting on the approach to the Sturt Highway intersection will be erected in both directions warning of trucks turning. In addition, an intersection direction sign opposite the access will be erected to further help identify the access point. • The farm access will meet the minimum requirements of AS 2890.2, to accommodate the turning movements of the largest vehicles generated by the poultry development. • The internal PPU access roads will be constructed as one-way circulation roads (ring roads) around the perimeter of each PPU to enable traffic to enter, exit and manoeuvre in a forward direction. The roads will be constructed as all-weather rural-type roads able to carry the anticipated heavy vehicle movements. • Suitable signage will be erected indicating internal traffic direction and speed limits to ensure the orderly and safe use of the site, as well as to minimise the potential for traffic conflict and noise. • All internal roads will be maintained clear of obstruction and used exclusively for the purposes of transport, loading-unloading and parking.	Section 6.4.4
Surface Water and Flooding	
• Temporary erosion and sediment control structures, such as hay bales and silt fencing, will be used during construction and regularly maintained to prevent soil loss and sediment-laden runoff. • All clean extraneous surface water from upslope will be diverted around areas of disturbance. • The stormwater management system described in **Section 3.12** will be constructed and appropriately maintained. • Staff members will be instructed in the proper use and handling of all chemicals used on-site. If appropriate, this will include completion of training such as SMARTtrain or ChemCert (or similar). • All chemical use will be undertaken in full compliance with the relevant statutory requirements, including the *Pesticides Act 1999*. • Wastewater generated by the on-site staff amenities and accommodation will be appropriately treated and disposed of via on-site wastewater management systems installed and operated in accordance with the requirements of Council and relevant	Section 6.5.4

standards/guidelines. Flooding • Habitable finished floor levels within farm managers' accommodation will be set at a minimum of 500 mm above adjacent ground level to reduce the likelihood of floodwater ingress to buildings. • Finished floor levels of the poultry sheds will be set at a minimum of 300 mm above adjacent ground level to reduce the likelihood of floodwater ingress to buildings. • The flood management plan described in **Section 6.5.6** will be implemented where necessary.	Section 6.5.5 and 6.5.6
Groundwater	
• Groundwater wells will be designed by a suitably qualified engineer or hydrogeologist, and the design and construction will be undertaken in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (National Uniform Drillers Licensing Committee, 2012). The installation of the wells should include normal development practice, including a commissioning test on the well. • Monitoring of wells will comply with the existing WAL conditions. • There will be no on-site disposal of bird carcasses or associated waste in the event of a mass-mortality, unless directed to do so by the DPI.	Section 6.6.3
Biodiversity	
• No disturbance will occur outside of the nominated disturbance footprint. • Erosion and sediment control measures will be installed and maintained to prevent the erosion and sedimentation impact on any areas downstream supporting remnant vegetation. • Weed management practices will be implemented to minimise the spread of exotic species into natural areas within the site. • A biodiversity offset strategy for the Project will be finalised in accordance with the actions detailed in **Section 6.7.5**, in consultation with OEH and within 12 months of gaining Project Approval. • Landscape plantings will be established in accordance with the Landscaping Strategy contained in **Section 3.13**, which will increase the total area under vegetation within the locality, create habitat and increase the local biodiversity.	Section 6.7.5
Aboriginal Heritage	
• No disturbance will occur outside of the nominated disturbance footprint. • The three aboriginal sites identified on site will be fenced during construction activities. The hearth will remain fenced during operation of the poultry production complex. • Should any Aboriginal artefact be uncovered all works will cease in that locale and the OEH will be notified. Works will only recommence when an appropriate and approved management strategy has been agreed to by all of the relevant stakeholders.	Section 6.8.4
Visual Amenity	
• The luminaires on each poultry shed will be aimed downwards and only switched on during loading-unloading and servicing activities outside of daylight hours and during heavy fog. • The landscaping strategy described in **Section 3.13** will be implemented and maintained in order to improve the visual and environmental amenity of the poultry development.	Section 6.10.3
Biosecurity and Poultry Disease	
• ProTen will meet all standards of care and management for animal health and welfare detailed in the *National Animal Welfare Standards for the Chicken Meat Industry* (Barnett et al, 2008). • ProTen will implement a suite of biosecurity measures in accordance with the *National Farm Biosecurity Manual for Chicken Growers* (Australian Chicken Meat Federation 2010). A copy of this manual will be kept at the development site and staff will be	Section 6.12

provided with training in the relevant parts of the Manual. • In the unlikely event of a major disease outbreak, the EPA and DPI will be contacted as soon as the breakout is suspected. Immediate measures will be implemented to isolate the infected PPU site(s), effect strict quarantine procedures to prevent the spread of the disease, and notify all relevant stakeholders. Where permitted, urgent ring vaccination of flocks within the controlled area will be organised. • Upon confirmation that it is an exotic disease outbreak and immediate slaughter of farm stock is necessary, slaughter will be managed by the DPI in co-ordination with the EPA and technical service units of the poultry industry. The birds will be slaughtered within the poultry sheds. • If ProTen's preferred option of disposal of infected birds at Baiada's protein recovery plant cannot be realised for various reasons such as quarantine requirements, disposal of diseased poultry via in-shed composting, or offsite burial at Jeanella will be undertaken in consultation with the DPI and EPA.	
Waste Management	
• No on-site stockpiling or disposal of waste materials will occur. • Day to day general waste will be placed into enclosed skips and removed from each PPU site by a licensed contractor on a regular basis. • Chemical Containers - a chemical supply company will be engaged to provide a chemical delivery and pickup service direct to the development site. At each delivery of new chemical supplies, empty chemical containers will be retrieved by the chemical company for recycling or appropriate disposal. • Poultry litter will be promptly removed from the sheds and transported off-site in covered trucks by an approved contractor at the end of each production cycle during the clean-out phase. • Dead birds will be collected from the poultry sheds on a daily basis and stored in on-site chillers for daily removal to Baiada's rendering plant near Hanwood on Kidman Way.	Section 3.10
Greenhouse Gas and Energy Efficiency	
• Low lux internal shed lighting will be installed within the poultry sheds. • External shed lighting will only be used when necessary during times of low light and/or heavy fog. • The integrity of the poultry sheds will be regularly checked in order to identify and rectify any air leaks, which place additional load on ventilation fans. • Ventilation fans and heaters will be regularly maintained and serviced to ensure optimal performance and efficiency. • Automatic control systems will continuously monitor internal shed lighting, temperature, humidity and static pressure, and adjust the ventilation to suit conditions resulting in less energy to regulate the internal shed conditions.	Section 6.11

7.2 Operational Environmental Management Plan

ProTen will prepare and implement a site-specific Operational Environmental Management Plan (EMP) for the proposed poultry development to ensure that the commitments made within this EIS, along with relevant statutory obligations and the conditions of development consent (including EPL requirements), are fully implemented and complied with.

The EIS Guideline – Poultry Farms (Department of Urban Affairs and Planning 1996) states:

> *an EMP is a technical document which is usually finalised during or after detailed design of the proposal following approval of the development application…..the level of detail required in an EMP is usually not considered necessary for an EIS.*

The EMP will establish the framework for managing and mitigating the potential environmental impacts of the poultry development over the life of the operation. It will be updated as required to respond to any changes to development operations and management and consent conditions.

It is envisaged that the Operational EMP will address the following key components:

Development Consent and Regulatory Approvals

This will include the development consent and EPL, with the conditions of consent and licensing requirements, along with any other statutory requirements and/or considerations.

General Site Maintenance Requirements

This will identify and address the on-going site maintenance requirements under ProTen's standard operating procedures, which are aimed at minimising the potential for adverse environmental impact, extending the life of farm equipment, reducing operating costs and maximising operational efficiencies.

Statement of Commitments

This will comprise the best management practices and mitigation measures listed in **Section 7.1** that ProTen will implement as part of the proposed poultry development to prevent, minimise and/or manage the potential for adverse impacts upon the local environment and surrounding populace.

Environmental Management Strategies

These will include, but may not be limited to, the Surface Water Management Strategy, Landscaping Strategy and Mass On-Site Disposal Strategy.

Environmental Management Requirements

Such requirements will be necessary to validate the success of the EMP, identify any changes required to operational and management regimes, and confirm the continual compliance with environmental performance indicators/targets and commitments.

It is envisaged that the primary requirement in this regard will be the preparation of an Annual Environmental Management Report (AEMR) and submission of this document to the relevant government agencies. At this point in time, and based on the best management practices and mitigation measures to be implemented, no long-term environmental monitoring programs have been identified as warranted.

Environmental Complaints and Incidents Management System

The Complaints and Incidents Management Strategy contained within **Appendix C** will be included within the EMP and implemented to ensure that all complaints and incidents relating to the poultry operation are promptly and effectively addressed. Appropriate documentation of complaint/incident handling will assist in identifying and implementing measures to negate the possibility of re-occurrence in the future.

Section 8

Justification and Conclusion



8 JUSTIFICATION AND CONCLUSION

In accordance with the statutory requirements for the content of an EIS, it is necessary to consider the reasons for carrying out the development in the manner proposed, having regard to biophysical, economic and social considerations and the principles of ESD. The various significant components of the biological and physical environments, as well as economic and social considerations, have been well documented and discussed in the previous sections of this EIS and its appendices.

8.1 Ecological Sustainable Development

ESD has emerged as a primary objective of environmental protection in NSW, being an objective of the EP&A Act. It is defined under Section 6(2) of the POEO Act as:

> *6(2) For the purposes of subsection (1)(a), ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:*
>
> *a. the precautionary principle - namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation...*
>
> *b. inter-generational equity - namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,*
>
> *c. conservation of biological diversity and ecological integrity - namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,*
>
> *d. improved valuation, pricing and incentive mechanisms - namely, that environmental factors should be included in the valuation of assets and services….*

The overall objectives of ESD are to use, conserve and enhance natural resources. This ensures that ecological processes are maintained facilitating improved quality of life, now and into the future.

ProTen has shown a commitment to the principles of ESD, through the use of innovative technologies and best practice in the design, operation and management of its various poultry operations. The company understands that social, economic and environmental objectives are interdependent, and acknowledges that a well-designed and effectively managed operation will avoid significant and/or costly impact or degradation. The commitments made in this EIS, in the form of development design, best practice operation and mitigation measures, demonstrate a commitment to environmental due diligence. The Operational EMP (see **Section 7.2**) that will be prepared and implemented following development consent will ensure on-going commitment to the principles of ESD over the life of the development.

8.1.1 The Precautionary Principle

The Precautionary Principle holds that where there are threats of serious or irreversible environmental damage, the lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

A detailed understanding of the issues and potential impacts associated with the Project has been obtained via consultation and assessment to a level of detail commensurate with the scale of the proposal, the characteristics of the proposed development site and surrounds and the legislative framework under which the proposal is permitted.

Specialist studies have been undertaken to ensure careful evaluation of the Project and associated impacts in order to avoid, where possible, serious or irreversible damage to the environment. Specialist studies relating to air quality, noise, traffic, cultural heritage, biodiversity, hazard and risk, and groundwater have been conducted. Additional issues including visual amenity, flooding and waste management have also been addressed.

The various consultation activities that have been undertaken (see **Section 5.3**) and the engagement of suitably qualified and experienced specialist consultants have ensured that the environmental impact assessment phase of the Project has been transparent. The contents of this EIS (including appendices), combined with the consultation activities, has enabled ProTen to understand the potential implications of the Project, and therefore identify appropriate mitigation measures and management strategies.

8.1.2 Intergenerational Equity

Intergenerational Equity is centred on the concept that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. There is a moral obligation to ensure that today's economic progress, which will benefit both current and future generations, is not offset by environmental deterioration.

The primary objective of the Project is to establish an intensive broiler production complex, adopting best practice in design, operation and management, within the Griffith region to augment the domestic supply of meat chickens and meet the increasing demand for poultry products within the Australian market. The mitigation measures and management strategies listed in **Section 6** have been identified to minimise the potential for adverse impact upon the local environmental and surrounding populace. Emphasis has been placed on anticipation and prevention of potential impacts, as opposed to undertaking later remedial action.

These actions and initiatives will assist in ensuring that current and future generations can enjoy equal and equitable access to social, environmental and economic resources through the maintenance of the health, diversity and production of the environment.

8.1.3 Conservation of Biological Diversity and Ecological Integrity

The principle of Conservation of Biological Diversity and Ecological Integrity holds that the conservation of biological diversity and ecological integrity should be a fundamental consideration for development proposals.

The assessment undertaken and reported in this EIS includes a relevant evaluation of the existing environment and the likely impacts as a result of the Project. It has been concluded that the proposal is highly unlikely to impact upon the current biological diversity and ecological integrity of the surrounding environment. Points to note in this regard include:

- Significant disturbance of the natural environment within the development site has occurred as a result of historic clearing and long-term agricultural production;

- The location of the PPUs and associated infrastructure has been determined based on the principle of avoidance of tree clearing. Of the 90 hectare disturbance footprint associated with the development, less than 1 hectare of a mapped vegetation community will be cleared as part of the development. An offset strategy has been devised to effectively mitigate this residual impact of the development, as discussed in **Section 6.7.5**.
- A suite of best management practices and mitigation measures have been nominated to minimise the potential for impact to the local environment;
- Landscaping (refer **Section 3.13**) will increase the total area under vegetation within the locality, create habitat and increase the local biodiversity; and
- There will be no on-site stockpiling or disposal of waste materials generated by the poultry operation.

8.1.4 Improved Valuation, Pricing and Incentive Mechanisms

The principle of Improved Valuation, Pricing and Incentive Mechanisms deems that environmental factors should be included in the valuation of assets and services. The cost associated with using or impacting upon an environmental resource is seen as a cost incurred to protect that resource.

The application of this principle remains in its infancy and, to date; there are few widely accepted methods by which monetary values are attributed to environmental factors. However, in terms of the proposed poultry development, ProTen will bear the costs associated with the avoidance, minimisation, mitigation and management of potential environmental and social impacts.

8.2 Analysis of Alternatives

8.2.1 General

It is necessary to consider any feasible alternatives to carrying out the development having regard to its objectives, including a consideration of the consequences of not carrying out the development.

ProTen has made a conscious decision to expand the company's operations in the Griffith region in order to meet the increasing demand for poultry products in the Australian market. The Griffith region is the obvious choice with the necessary support/servicing facilities, including an interdependent hatchery, feedmill and processing complexes. The poultry industry within the Griffith area is a perfect example of vertical integration where each of the operations produce a different product or service and these combine to satisfy a common need. Furthermore, ProTen has found both Narrandera Shire Council and Griffith City Council encouraging of additional development having recognised the employment and economic flow-on opportunities.

The increasing role of the poultry industry within the region plays an ever increasing role in the development of local agri-business. It is widely appreciated that the poultry industry has a good strategic fit and high recognition factor within the Griffith region. Management and labour expertise are available, local transport contractors are geared to the industry, and the community generally understands and accepts the specialist operation.

8.2.2 Alternative Development Sites

The principal siting requirements for a poultry broiler development, such as that proposed, include:

- Proximity to a chicken hatchery facility, such as Baiada's hatchery located on the outskirts of Griffith;
- Proximity to a reliable poultry feed source, such as Baiada's feedmill located near Hanwood just south of Griffith;

- Proximity to a processing facility (including protein recovery plant), such as Baiada's processing complex located near Hanwood just south of Griffith;
- Proximity to major regional and State transport routes, such as the Sturt Highway;
- Adequate separation distances to other poultry farms for biosecurity purposes;
- Appropriate land use zoning and surrounding land use activities; and
- Adequate access to a reliable supply of water and electricity.

Any investigation will reveal that finding a site that is both available and meets all of the above criteria is very difficult. Selection of alternative sites must be mindful of transport access to each of the abovementioned support/servicing facilities. The matter of a reliable water supply is crucial and the cost of satisfying the necessary power requirements is sometimes prohibitive. Finding a site that already has a compatible agricultural land use is also preferable, and limits the amount of clearing required to establish the PPUs which is advantageous from a biodiversity perspective.

Prior to proceeding with the development site subject to this development application, ProTen considered a number of alternative sites for the poultry production complex. A site near Goolgowi was initially considered and the environmental impact assessment process commenced. However, consultation with the relevant electricity provider revealed that the necessary power requirements to the site could not be met at the time, rendering the site unviable. A second alternative site was then investigated, this property approximately 20 kilometres west of Narrandera on the Sturt Highway, and 5 kilometres east of the current subject development site. An EIS was prepared for this alternative site and submitted to Narrandera Shire Council, who was the determining authority for the designated development (this Project was of a smaller scale and associated CIV compared to the current application due to a smaller property size, hence was not state significant development). During the assessment and consultation process with Council, EPA, OEH and the DPI, it became evident that, whilst not considered to be an operational risk by ProTen, the presence of a wetland known as 'Dry Lake' approximately 1 kilometre from the site meant that the property was not deemed an optimal location for an intensive poultry operation. The guideline document *Best Practice Management for Meat Chicken Production in New South Wales Manual 1 – Site Selection & Development* (DPI, 2012) states that new poultry farms should be preferentially located 3000 metres away from waterways and wetlands that are used extensively by waterfowl.

ProTen subsequently investigated a third site, being the development site subject of this application. The development site is still within the same wider Griffith region as the previous two sites, however will also have adequate access to power, and is further than 3 kilometres from the nearest wetland, as mapped on the wetlands map in the Narrandera LEP (refer **Section 2.10**). It also meets all of the principle siting requirements listed in the dot points above, and therefore represents an ideal site for the proposed poultry development.

8.2.3 Alternative Development Layout

Consideration of alternative PPU locations within the proposed development site was also considered, and is dependent upon a number of factors including both environmental impact considerations and engineering design requirements. While other locations were considered within the site, the proposed layout is considered optimal in terms of minimising the potential for adverse impact and required earthworks. In particular the proposed layout ensures that tree clearing is minimised, whilst ensuring the required buffer distances between PPUs is maintained. The proposed layout will also ensure that that the Project does not deny access to large areas of viable agricultural lands nor significantly reduce the land area available for agricultural production.

An alternate location for the southern-most poultry production unit (PPU 5) was originally considered and included in the draft EIS. As a result of consultation with OEH, the proposed location of PPU 5 was moved slightly south so as to avoid clearing vegetation within a mapped vegetation community. The original PPU 5 location was within an area of low condition Black Box grassy open woodland. PPU 5 and associated access track and houses will now be located within a cleared paddock under long term agricultural use, with just four trees to be removed for construction of the access track. Importantly, changing the proposed location of PPU 5 reduced the mapped vegetation to be cleared for the Project from 13.45 hectares to just 0.74 hectares. As a result, the offset requirement for the Project has also been significantly reduced, decreasing from 185 ecosystem credits to just 16 with the PPU in the revised location.

The alternative location originally considered for PPU 5, compared to the new location is illustrated on **Figure 8.1**.

8.2.4 Consequences of Not Carrying Out the Development

The proposed poultry development will increase the supply of broiler poultry by around 20 million birds per year, have significant capital outlay costs, create 30 full-time equivalent jobs and generate around $33 million in poultry feed sales annually (based on the average price of feed at the time this document was prepared).

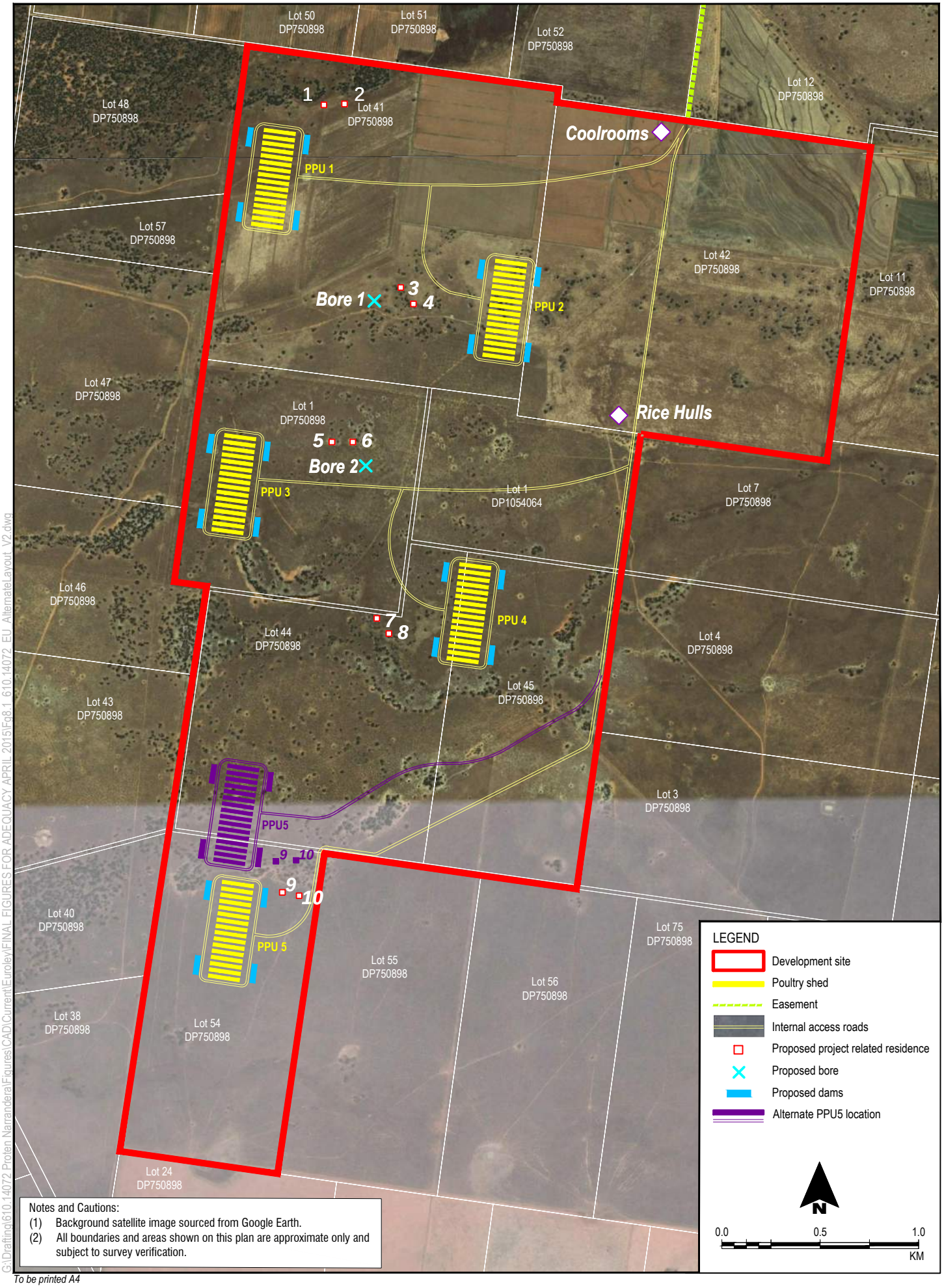
The consequences of not proceeding with the proposal have been evaluated and include:

- Adverse economic impacts on regional grain growers as the opportunity to increase the current market generated by ProTen/Baiada would be lost. The Project will see current grain purchases in the region and NSW increase significantly;
- Adverse economic impacts on those local businesses, transport operators and goods suppliers that service the poultry industry;
- No additional employment opportunities or flow-on benefits; and
- Adverse economic impacts on ProTen associated with the need to investigate development opportunities elsewhere, with related problems to the vertical integration of the poultry industry within the Griffith region.

The poultry industry is a ruthless market, and interruptions or gaps in ProTen's operations may expose the company to competitors and result in higher prices being passed on to consumers.

If the development does not proceed, the Griffith region may miss the accompanying economic and social boost, while the proponent may miss the opportunity to establish a broiler production complex adopting best practices in design, operation and management to meet the increasing demand for poultry products within the Australian market.

It is imperative for ProTen that the Project be permitted in order to cater for the immediate and projected long-term demands on its livestock division.



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Alternative Site Layout

FIGURE 8.1

8.3 Conclusion

Having observed the continuing expansion of the Australian poultry meat market, ProTen's primary objective is to develop an intensive broiler production complex, adopting best practice in design, operation and management, within the Griffith region to augment the domestic supply of meat chickens.

The assessment of ProTen's proposal to establish an intensive poultry broiler production operation within the proposed development site as detailed in this EIS has been multi-disciplinary and involved consultation with various government agencies. Emphasis has been placed on anticipation and prevention of potential environmental and social impacts, with best practice operation and mitigation measures identified to ensure environmental due diligence and minimal potential for adverse impact.

It is considered that the Project can proceed without resulting in significant or long-term adverse impacts to the local environment and surrounding populace. The development will be operated and managed in accordance with a site-specific Operational EMP, which will ensure that the commitments made in this EIS, along with relevant statutory obligations and conditions of development consent (including EPL requirements), are fully implemented and complied with.

Furthermore, the Project is justified in socio-economic terms as a catalyst for significant and sustained economic activity within the Griffith region, including positive employment and flow-on benefits.

Section 9

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Section 10

Abbreviations, Acronyms and Units



10 ABBREVIATIONS, ACRONYMS & UNITS

ABARE	Australian Bureau of Agricultural and Resources Economics
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
Ambient Air-NEPMs	National Environment Protection Measures for Ambient Air Quality
ARI	Average Recurrence Interval
Baiada	Baiada Poultry Pty Ltd
BoM	Bureau of Meteorology
DAFF	Department of Agriculture, Fisheries and Forestry
DCP	Development Control Plan
DoE	Commonwealth Department of the Environment
DP	Deposited Plan
DP&E	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environmention Protect Licence
ESD	Ecologically Sustainable Development
GHG	Greenhouse gas
kg/m^2	Kilograms per square metre
L&DLALC	Leeton & District Local Aboriginal Land Council
LSC	Land and Soil Capability
LEP	Local Environmental Plan

LGA	Local Government Area
LPG	liquid petroleum gas
Narrandera LEP	*Narrandera Local Environmental Plan 2013*
NSR	Nearest Sensitive Receptor
NES	National Environmental Significance
NHMRC	National Health and Medical Research Council
NOW	NSW Office of Water
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PAC	Planning Assessment Commission
POEO Act	*Protection of the Environment Operations Act 1997*
PPU	Poultry Production Unit
PHA	Preliminary Hazard Analysis
ProTen	ProTen Holdings Pty Ltd
PSNL	Project Specific Noise Level
RBL	Rating Background Level
RMS	Road and Maritime Services
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SLR	SLR Consulting Australia Pty Ltd
SSD	State Significant Development
TSP	Total Suspended Particulate